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OCCUPATIONAL MOBILITY AND LABOR MARKET SEGMENTATION IN MONTERREY, MEXICO (1940 - 1965)

AID/LA-G-1147

Paulo Vieira da Cunha

(Preliminary Version)

RIO DE JANEIRO
AUGUST, 1979

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(Preliminary Version not proofread)

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*/Not included in this report.
a/Includes only the 1940 and the 1965 Tables.

SECRETARIA DE PLANEJAMENTO DA PRESIDÊNCIA DA REPÚBLICA
INSTITUTO DE PLANEJAMENTO ECONÔMICO E SOCIAL (IPEA)

ERRATA

1. In the LIST OF TABLES the following Tables are missing:

Table I-13 Occupational Distribution: 1940-1965 (All Workers) 24
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2. The correct legend for Table I-8 (Size of Firm) appears at the foot of Table I-7.

   The correct legend for Table I-7 (Type of Employment) appears at the foot of Table I-8.

3. In the (correct) legend for Table I-8, the category Self-Employed (established) or Employer corresponds to categories 1 - 4 in Table I-6, or categories 1 and 5 in Table I-5.

INTRODUCTION

There are three objectives in this report: to present the final results of the occupational classificatio which will be used in implementing the analysis of patterns of mobility in Monterrey, to examine some of the characteristic of this distribution both at the time it was built and at the other periods encompassing the proposed 1940-1965 span, and, finally, to present some preliminary results of the mobility patterns in the sample. It is important to point out at the start that this report cannot be seen as an isolated effort, but rather as a part of a continuing research In particular, it supplements two earlier efforts: (a) the detailed project proposal[1] which presents the main research program, as well as the theoretical underpinnings for the occupational mobility model; and (b) the report on the occupational classification, which presents the experiments in classificatory design, as well as discusses the theory and methods used in obtaining these results. It also stands back of our current work[3] - presently, with the financial and technical support of the ECIEL program, we are on the final stages of designing the necessary statistical routines for implementing the probabilistic model of occupational mobility, the final empirical task anticipated in the original proposal[4].

1 - Classificatory Design: Final Results.. The criteria use for aggregating jobs into occupational categories was based on an analysis of covariance model applied to job specific age-earnings profiles. Jobs that could not be statistically distinguished from others were aggregated into occupational units that, as result, were both (as

much as possible) internally homogeneous and externally heterogeneous. The final results are shown in Table and Figure I-1. Appendix Table A-1 describes the job categories involved in each occupation.

It is true that from a strictly statistical point of view, the 10-fold distribution could be collapsed into 7 categories: grou 7 aggregating groups 9 and 10, group 6 combining classes 5 and 7, and group 4 encompassing the 4th and 6th occupational sub-units[5]. Nonetheless, for the reasons we shall present all along this report, we have come to believe that the 10-fold division more accurately captures the compartimentalization in Monterrey's labor market.

The figures for groups 1, 2 and 3 tell us a straightforward story: jobs up at the top of the hierarchy not only command larger initial wages but offer larger returns as the worker "ages" in his career. Although the relationship is significant nonlinear, the attenuation effects of "depreciation" are, numerically, very small. Both Occupations 4 and 5 appear to offer higher initial wages, but less scope for advancement -- indeed, much less so in the case of Occupation 5. Occupations 6, 7 and 8 are not necessarily inferior, in a hierarchichal sense, nevertheless, being industrial occupations they differ significantly from the others. Of these, occupational group 8 (assembling the construction crafts) is clearly the least desirable. Occupation 6, encompassing categories such as electricians mechanics, operators of construction machinery, and the alike, offers higher initial wages than Occupation 7 (Specialized mechanics, Foundry workers, Chemical workers, Textiles and Metals craftsmen), but, overtime workers in the latter can expect to earn higher wages. Workers

TABLE I-1

OCCUPATIONAL CLASSIFICATION
FINAL RESULTS 1/

		C	C*	AGE	AGE*	AGE^2	AGE^{2*}
	Occ (10)	176.717		- 205[a]		- 001[a]	
(I)	Occ (1)	418.078	594.795	55.514	55.309	- 975	- 974
	Occ (2)	125.955	302.672	48.799	48.594	- 936	- 935
	Occ (3)	12.106	188.823	39.199	38.994	- 810	- 809
(II)	Occ (4)	25.701	202.418	17.623	17.418	- 414	- 413
	Occ (5)	25.959	202.760	(a)4.454	4.249	- 062[a]	- 061
	Occ (6)	120.870	297.587	(b)- 470	- 675	106[b]	
(III)	Occ (7)	(c)45.170	221.887	(a)5.484	5.279	- 085[a]	- 084
	Occ (8)	(c)51.509	228.226	(b)- 406	- 611	032[b]	
	Occ (9)	(b)-2.360		(a)3.752	3.547	- 093[a]	- 092

* Total effects

a - The coefficients of Age and Age^2 are tested jointly due to extreme multicollinearity - Significant at least at the 5% level.

b - Not significant.

c - Significant at the 10% level.

1/ The model (analysis of co-variance) is: $Y_{ij} = a_0 + \Sigma a_j + b_0 A_{i0} + \Sigma b_j A + c_0 A_{10}^2 + \Sigma c_j A_{ij}^2 + u_i$

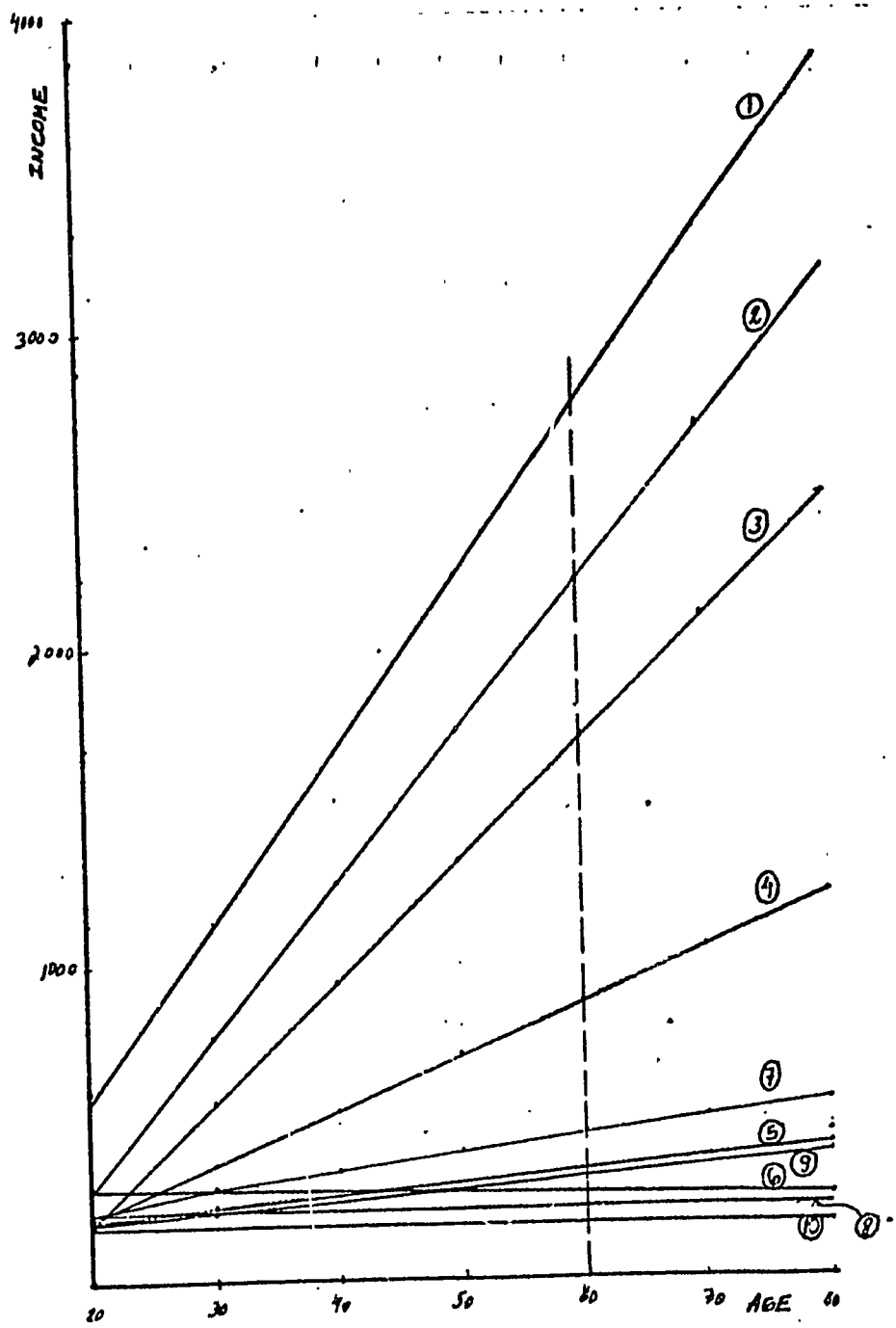
where: Y_{ij} = weekly earnings in Occupation j for Workers i

A_{ij} = age of workers i in Occupation j (Min = 20)

All the coefficients are significant at the 5% level, unless otherwise noted.

FIGURE I-1

AGE-EARNINGS PROFILES
BY OCCUPATIONS



in both occupations 9 and 10 start at very low wages and remain so up to age 30 which, given that no one in the sample is older than 60, accounts for more than 30% of the typical career span. Note further, that those in Occupation 10 experience a small but significant drop in earnings as they progress in age. The opposite is true for workers in group 9 - indeed, they describe a rather steep curve, which appears as something like a statistical fluke[6].

PART I

THE OCCUPATIONAL CLASSIFICATION

1 - Some Heuristic Checks on the Adopted Classification: There is no objective way to check a given occupational classification except, perhaps, through repeated sampling and direct observation. Nevertheless, if the classification is robust and useful, it must besystematically associated with a number of variables commonly related to the hierarchy of jobs. In the following paragraphs we show the results of some of such experiments, presenting, next, the discussion on the inter-temporal characteristics of the occupational distribution.

Tables I-4 to 12 were designed to contrast the chosen occupational distribution with a variety of attributes of the 1965 labor force. The first shows the dispersion of income. Since the occupational classification was partially based on mean income, the strong association reported in the Table is by no means surprising. On the other hand, the results show a high degree of dispersion that was not anticipated. Thus, almost 25% of the workers in Occupation 10 were receiving between 1.20 to 1.59 times the minimum wage - the modal interval not only for Occupational group 8, but also, although to a lesser extent, of groups 5 and 4.

In Table I-5 we find a partial explanation for this occurance. All of these occupational groups have a high proportion of employers and self-employed workers. But from Table I-6 we see that in group 10 the proportion of self-employed who are not established and use family help is significantly higher - that is, the larger incomes in this occupation reflect the contribution (unpaid) of other workers.

As would be expected, in Occupational Groups 1, 2 and 3 we find, predominantly, non-manual workers, and among professionals (group 1) a high percentage of employers. Group 4 (including both white collar Office Workers and blue-collar Truck-Drivers) has a mixed distribution - but the remaining groups are (as they should be) predominantly manual occupations, agglomerating a large share of un-established self-employed workers.

Intermittent, or eventual employment is more typical among the lowest occupations, as well as within the specialized construction trades (group 8), and to a smaller extent among Waiters, Barmen, Cab Drivers (group 5) and Electricians, Mechanics, Crasse Operators, and alike (group 6). For the group of construction related occupations we also observe a large percentage of workers hired on a temporary basis - a form of employment also common in the lower occupational groups. On the other hand, excluding the self-employed, the proportion of permanent employees is high both among the white-collar occupations and, among industry-specific craftsmen and workers (group 7).

Within all occupational groups we find a complete distribution of firm sizes. The importance of large organizations in Monterrey's economy is reflected in the fact that almost 22% of all workers were employed in firms with 500 or more employees (See Table I-8). At the same time, an almost equal proportion were employed in establishments with less than 5 workers.

As is customary in Latin American urban economies, the number of workers openly unemployed is small. Even then, the incidence is higher amid the occupations of group 10 - for 1965, Table I-9 shows a rate of unemployment of 5.8%. Of these, almost 32% was of less than a week and almost

80% of all the unemployed were employed 3 months before. Holding of multiple jobs is not, however a characteristic of low-wage employment. On the contrary it is most customary among professionals and managers, technicians, sales agents secondary and primary school teachers (See Table I-10).

A preponderant majority of the laborers, in all occupations worked from 46-50 hours a week, although some 15% of the total employed worked between 36-45 hours. Table I-11 indicates that more than 47% of the persons in group 1 work over-time - showing that, at least in part, their high earnings reflects greater effort. The argument, however, fails to apply to the also significant proportion of workers laboring long hours for small weakly earnings. Note also that Occupational Groups 4 and 5 (for which self-employment or owner-operator types of employment are common) also accuse disproportionately high proportion of workers who put in weekly over-time.

The final Table of this section (Table I-12) shows the relation between Pre-Migratory Activity and 1965 occupation for all groups, Still this time the tabular results confirm our expectations. Thus, the proportion of workers who came from agriculture is highest for the lowest occupation, and decreases as we move up the "hierarchy". On the other hand, the proportion of non-migrants describes an inverse relationship. It is interesting to note that many of the specialized industrial workers already had some industrial experience <u>before</u> migrating. By the same token, quite a few of the service sector employees had had some pre-migratory experience in Commerce or Service occupations. Among the managers and professionals, however, more than 60% of the total had either been born in Monterrey, or begun working in Monterrey.

This discussion on occupational "inheritance" concludes our brief examination of the characteristics of the 1965 occupational distribution. We believe that the chosen aggregation performed well - at least no major inconsistencies appeared in any of the Tables examined (and they were more than the ones included in this report). Next we shall discuss the much more controversial issue concerning the intertemporal stability of the distribution.

TABLE I-4

TOTAL WEEKLY INCOME BY OCCUPATION
1965

PE(7) TOTAL WEEKLY INCOME HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	8	9	AR	TOTAL
01	0 0.	1 .5	4 2.1	5 2.6	5 2.6	7 3.7	27 14.1	52 27.2	90 47.1	9	200 191
02	2 2.1	1 1.1	2 2.1	4 4.2	15 15.9	10 10.5	23 24.2	25 26.3	13 13.7	3	98 95
03	1 1.2	6 7.2	17 20.5	5 6.0	15 18.1	10 12.0	20 24.1	6 7.2	3 3.6	4	87 83
04	11 6.9	13 8.1	47 29.4	13 8.1	43 26.9	20 12.5	8 5.0	4 2.5	0 0.	14	174 160
05	4 5.1	5 6.4	24 30.8	24 30.8	14 17.9	4 5.1	3 3.8	0 0.	0 0.	4	82 78
06	6 4.6	13 9.9	27 20.6	19 14.5	42 32.1	15 11.5	9 6.9	0 0.	0 0.	12	143 131
07	1 1.0	14 14.1	27 27.3	19 19.2	31 31.3	5 5.1	3 3.0	0 0.	0 0.	1	100 99
08	3 3.2	5 5.4	48 52.7	19 20.9	14 15.1	2 2.2	1 1.1	0 0.	0 0.	5	98 93
09	35 15.6	71 31.7	61 27.2	23 10.3	21 9.4	5 2.2	7 3.1	1 .4	0 0.	15	239 224
10	112 37.5	93 31.1	74 24.7	11 3.7	7 2.3	1 .3	1 .3	0 0.	0 0.	26	327 299
AR	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	92	92 0
TOTAL	175 12.0	232 15.3	332 22.8	141 9.7	207 14.2	79 5.4	103 7.1	88 6.1	105 7.3	187	1640 1453

51.8%

CHI SQUARE STATISTICS... CHISQ=1622.597PHISQ= 1.117 TSCHUPROW-S T= .1
Z-SQ= .140 PEARSON-S C = .726
DF= 2100

*Income groups - Minimum wage**

1 *less than MW*
2 1.00 - 1.19
3 1.20 - 1.59
4 1.60 - 1.99
5 2.00 - 2.99
6 3.00 - 3.99
7 4.00 - 5.99
8 6.00 - 9.99
9 *more than 10 MW*

Minimum wage = $14500 pesos/weekly.

TABLE I-5

WORK STATUS BY OCCUPATION

1965

PE(39) WORK STATUS BBJ HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AP)

	1	2	3	4	5	6	7	8	9	TOTAL
01	27 13.5	0 0.	0 0.	0 0.	78 39.0	24 12.0	62 31.0	9 4.5	0 0.	200 200
02	1 1.0	2 2.0	1 1.0	2 2.0	12 12.2	26 26.5	44 44.9	10 10.2	0 0.	98 98
03	10 11.5	3 3.4	19 21.8	3 3.4	1 1.1	16 18.4	31 35.6	4 4.6	0 0.	87 87
04	50 28.7	25 14.4	38 21.8	14 8.0	2 1.1	15 8.6	27 15.5	3 1.7	0 0.	174 174
05	17 20.7	18 22.0	39 47.6	3 3.7	0 0.	1 1.2	3 3.7	1 1.2	0 0.	82 82
06	19 12.6	44 30.8	64 44.8	10 7.0	1 .7	1 .7	5 3.5	0 0.	0 0.	143 143
07	14 14.0	24 24.0	50 50.0	6 6.0	0 0.	2 2.0	4 4.0	0 0.	0 0.	100 100
08	19 19.4	29 29.6	36 36.7	11 11.2	2 2.0	0 0.	1 1.0	0 0.	0 0.	98 98
09	26 10.9	67 28.4	102 42.7	23 9.6	8 3.3	13 5.4	1 .4	3 1.3	0 0.	239 239
10	82 25.1	102 31.2	89 27.2	52 15.9	1 .3	0 0.	0 0.	1 .3	0 0.	327 327
AP	8 8.7	15 16.3	32 34.8	7 7.6	4 4.3	0 0.	5 5.4	4 4.3	17 18.5	92 92
TOTAL	272 16.6	325 19.8	470 28.7	131 8.0	109 6.6	98 6.0	183 11.2	35 2.1	17 1.0	1640 100.0

CHI SQUARE STATISTICS... CHISQ=1219.98 PHISQ= .788 TSCHUPROW-S T
Z-SQ= .113 PEARSON-S C = .664
DF= 63.000

1 Manual, self-employed - employer
2 Manual, employee in small enterprise
3 Manual, employee in large enterprise
4 Manual, employee - MD on firm size
5 Non Manual, self-employed-employer
6 Non Manual, employee in small enterprise
7 Non Manual, employee in large enterprise
8 Non Manual, employee - MD on firm size
9 Never worked

TABLE I-6

OCCUPATIONAL POSITION BY OCCUPATION
1965

PE(9) OCCUPATIONAL POSITION HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	8	9	TOTAL
01	8 4.0	49 24.5	36 18.0	12 6.0	18 -9.0	33 16.5	29 14.5	15 7.5	0 0.	200 200
02	8 8.2	4 4.1	1 1.0	0 0.	41 41.8	31 31.6	11 11.2	2 2.0	0 0.	98 98
03	5 5.7	5 5.7	1 1.1	0 0.	26 29.9	28 32.2	13 14.9	9 10.3	0 0.	87 87
04	23 13.2	29 16.7	0 0.	0 0.	87 50.0	35 20.1	0 0.	0 0.	0 0.	174 174
05	12 14.6	5 6.1	0 0.	0 0.	41 50.0	19 23.2	4 4.9	1 1.2	0 0.	82 82
06	11 7.7	8 5.6	0 0.	0 0.	88 61.5	32 22.4	4 2.8	0 0.	0 0.	143 143
07	7 7.0	7 7.0	0 0.	0 0.	54 54.0	25 25.0	6 6.0	1 1.0	0 0.	100 100
08	9 9.2	11 11.2	1 1.0	0 0.	45 45.9	31 31.6	1 1.0	0 0.	0 0.	98 98
09	26 10.9	8 3.3	0 0.	0 0.	199 83.3	6 2.5	0 0.	0 0.	0 0.	239 239
10	70 21.4	11 3.4	2 .6	0 0.	238 72.8	6 1.8	0 0.	0 0.	0 0.	327 327
AR	6 6.5	4 4.3	1 1.1	1 1.1	51 55.4	8 8.7	3 3.3	1 1.1	17 18.5	92 92
TOTAL	185 11.3	141 8.6	42 2.6	13 .8	888 54.1	254 15.5	71 4.3	29 1.8	17 1.0	1640 1640

CHI SQUARE STATISTICS... CHISQ= 906.507PHISQ= .595 TSCHUPROW-S T
Z-SQ= .684 PEARSON-S C = .809
DF= 81.000

1 Self-employed (established)
2 Employer = 1-5 workers
3 Employer = 6-49 workers
4 Employer = 50 or more workers
5 Self-employed + Family help
6 Employee = 1-10 workers
7 Employee = 11-49 workers
8 Employee = more than 50 workers
9 Does not work

TABLE I-8

SIZE OF FIRM BY OCCUPATION

1965

PE(12) SIZE OF FIRM HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	9	AR	TOTAL
01	7 3.7	42 22.3	43 22.9	25 13.3	28 14.9	12 6.4	31 16.5	0 0.	12	200 188
02	8 9.3	8 9.3	13 15.1	11 12.8	11 12.8	17 19.8	18 20.9	0 0.	12	88 86
03	5 6.3	8 10.0	7 8.8	10 12.5	9 11.3	13 16.3	28 35.0	0 0.	7	87 80
04	22 14.0	40 25.5	20 12.7	10 6.4	20 12.7	16 10.2	29 18.5	0 0.	17	174 157
05	12 16.4	13 17.8	2 2.6	8 11.0	11 14.1	10 12.8	21 26.9	0 0.	4	82 73
06	10 7.5	24 18.0	15 11.3	15 11.3	22 16.5	12 9.0	35 26.3	0 0.	10	143 133
07	7 7.4	15 16.0	10 10.6	8 8.5	13 13.8	15 14.9	27 28.7	0 0.	5	100 94
08	8 9.2	17 19.5	16 18.4	9 10.3	9 10.3	9 10.3	19 21.8	0 0.	11	88 87
09	26 12.2	35 16.4	34 16.0	15 7.0	32 15.0	23 10.8	48 22.5	0 0.	26	239 213
10	58 24.8	53 19.3	45 16.4	19 6.9	30 10.9	19 6.9	40 14.6	0 0.	53	327 274
AR	9 7.4	11 13.6	5 6.2	4 4.9	9 11.1	6 7.4	23 28.4	4 21.0	11	92 81
TOTAL	179 12.7	266 18.1	210 14.3	135 9.2	194 13.2	151 10.3	319 21.7	17 1.2	159	1640 1471

1 Permanent employee
2 Hired on a temporary basis
3 Eventual employee
9 Self-employed (established) or Employer
(Categories 1-4 in Table I-9)
(Categories 1 and 5 in Table I-8)

TABLE I-9

DURATION OF UNEMPLOYMENT BY OCCUPATION 1965

PE(4) DURATION OF UNEMPLMT HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	AR	TOTAL
01	1 33.3	1 33.3	0 0.	1 33.3	0 0.	0 0.	0 0.	197 98.5	200 3
02	0 0.	0 0.	1 100.0	0 0.	0 0.	0 0.	0 0.	97 99.0	98 1
03	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	87 100.0	87 0
04	0 0.	0 0.	3 60.0	1 20.0	1 20.0	0 0.	0 0.	169 97.1	174 5
05	0 0.	2 66.7	0 0.	1 33.3	0 0.	0 0.	0 0.	79 96.3	82 3
06	2 28.6	2 28.6	2 28.6	1 14.3	0 0.	0 0.	0 0.	136 95.1	143 7
07	0 0.	0 0.	1 100.0	0 0.	0 0.	0 0.	0 0.	97 99.0	100 1
08	1 25.0	1 25.0	2 50.0	0 0.	0 0.	0 0.	0 0.	94 95.9	98 4
09	0 0.	1 12.5	5 62.5	2 25.0	0 0.	0 0.	0 0.	231 96.7	239 8
10	6 31.6	6 31.6	3 15.8	3 15.8	1 5.3	0 0.	0 0.	309 94.2	327 19
AR	0 0.	3 4.1	0 0.	5 6.8	14 19.2	19 26.0	32 43.8	19	92 73
TOTAL	10 8.1	16 12.9	17 13.7	14 11.3	16 12.9	19 15.3	32 25.8	1516	1640 124

1 Up to a week
2 More than a week up to a month
3 1 - 3 months
4 3 - 6 months
5 6 months - 1 year
6 1 - 3 years
7 3 years or more

TABLE I-10

NUMBER OF CURRENT JOBS BY OCCUPATION - 1965

PE(5) NUMBER OF JOBS
PE(3765) GRP(10) OCCUPATIONS 1965

TYPE OF PERCENTAGING IS HORIZONTAL (MIN

	1	2	3	AR	TOTAL
01	145 73.6	40 20.3	12 6.1	3	204 197
02	86 88.7	11 11.3	0 0.	1	98 97
03	75 88.4	9 10.6	1 1.2	1	87 86
04	156 92.3	13 7.7	0 0.	5	174 169
05	76 96.2	3 3.8	0 0.	3	82 79
06	131 96.3	5 3.7	0 0.	7	143 136
07	94 94.9	5 5.1	0 0.	1	100 99
08	93 95.7	3 3.2	1 1.1	4	98 94
09	216 93.5	15 6.5	0 0.	8	239 231
10	300 97.4	7 2.3	1 .3	19	327 309
AR	2 100.0	0 0.	0 0.	90	92 2
TOTAL	1372 91.6	111 7.4	15 1.0	142	1640 1499

1 one
2 two
3 three or more

TABLE I-7

TYPE OF EMPLOYMENT BY OCCUPATION - 1965

PE(9) TYPE OF EMPLOYMENT
PE(3765) GRP(10) OCCUPATIONS 1965

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR

	1	2	3	9	AR	TOTAL
01	93 45.5	6 3.0	1 .5	102 51.0	0	2 2
02	81 82.7	3 3.1	1 1.0	13 13.3	0	
03	72 82.8	4 4.6	0 0.	11 12.6	0	
04	114 65.5	1 .6	7 4.0	52 29.9	0	1 1
05	55 67.9	3 3.7	6 7.4	17 21.0	1	
06	106 74.6	7 4.9	10 7.0	19 13.4	1	1 1
07	81 81.0	2 2.0	3 3.0	14 14.0	0	1
08	54 55.1	11 11.2	12 12.2	21 21.4	0	
09	169 70.7	20 8.4	16 6.7	34 14.2	0	2 2
10	140 43.1	36 11.1	67 20.6	82 25.2	2	3 3
AR	45 50.6	7 7.9	8 9.0	29 32.6	2	
TOTAL	1008 61.7	100 6.1	131 8.0	394 24.1	7	1 1

1 Only employee, self-employed(establis
2 2-5 workers (employer or employee
3 6-20 workers
4 21-50 workers
5 51-200 workers
6 201-500 workers
7 500 or more
9 does not work

TABLE I-11

HOURS OF WORK PER WEEK
OCCUPATION: 1965

PE(6) HOURS OF WORK WEEKLY HORIZONTAL
PE(3745) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	8	9	AR	TOTAL
01	2 1.0	1 .5	41 21.1	55 28.4	20 10.3	35 18.0	19 9.8	18 9.3	3 1.5	6	200 194
02	2 2.1	7 7.3	28 29.2	33 34.4	6 6.3	9 9.4	3 3.1	7 7.3	1 1.0	2	98 96
03	5 6.5	7 9.1	9 11.7	30 39.0	6 7.8	12 15.6	3 3.9	4 5.2	1 1.3	10	77 77
04	3 1.8	5 2.9	32 18.4	53 30.5	9 5.3	18 10.6	18 10.6	24 13.8	5 2.9	4	174 170
05	0 0.	0 0.	14 17.1	35 42.7	5 6.1	14 17.1	5 6.1	6 7.3	3 3.7	0	82 82
06	1 .7	3 2.1	18 12.7	82 57.7	7 4.9	17 12.0	5 3.5	2 1.4	7 4.9	1	143 142
07	0 0.	1 1.0	14 14.1	65 65.7	5 5.1	10 10.1	3 3.0	0 0.	1 1.0	1	100 99
08	0 0.	2 2.1	11 11.[illegible]	61 63.[illegible]	3 3.1	10 10.[illegible]	4 4.[illegible]	1 1.0	4 4.[illegible]	2	[illegible]
09	2 .9	12 5.2	32 13.9	95 41.7	5 2.2	25 11.0	19 8.3	31 13.6	8 3.5	9	217 270
10	9 2.8	15 4.7	46 14.4	150 47.0	16 5.0	36 11.3	13 4.1	15 4.7	19 6.0	8	327 319
AR	1 1.1	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	90 98.9	1	92 91
TOTAL	25 1.6	53 3.3	246 15.4	659 41.3	92 5.8	187 11.7	92 5.8	110 6.9	142 8.9	44	1540 1592

1 up to 25 hours
2 26-35
3 36-45
4 46-50
5 51-55
6 56-65
7 66-75
8 76 or more
9 did not work

TABLE I-12

PRE-MIGRATORY OCCUPATION
OCCUPATION 1965

PE(32) PRE-MIGRATORY OCC HORIZONTAL
PE(3765) GRP(10) OCCUPATIONS 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AB)

	1	2	3	4	5	6	7	9	AB	TOTAL
01	8 4.1	1 .5	20 10.3	5 2.6	17 8.7	3 1.5	23 11.8	119 60.5	5	200 195
02	4 4.1	0 0.	18 18.6	1 1.0	11 11.3	3 3.1	7 7.2	53 54.6	1	98 97
03	3 3.5	1 1.2	13 15.1	1 1.2	11 12.8	3 3.5	19 22.1	35 40.7	1	87 86
04	30 17.4	1 .6	12 7.0	3 1.7	21 12.2	15 8.7	8 4.7	82 47.7	2	174 172
05	12 14.6	3 3.7	7 8.5	2 2.4	3 3.7	4 4.9	7 8.5	44 53.7	0	82 82
06	22 15.4	4 2.8	26 18.2	5 3.5	6 4.2	5 3.5	4 2.8	71 49.7	0	143 143
07	20 20.0	3 3.0	18 18.0	3 3.0	1 1.0	5 5.0	3 3.0	47 47.0	0	100 100
08	25 25.8	5 5.2	17 17.5	9 9.3	1 1.0	0 0.	2 2.1	34 35.1	1	98 97
09	70 29.5	8 3.8	22 9.3	11 4.6	14 5.9	7 3.0	18 7.6	86 36.7	2	239 237
10	130 40.4	15 4.7	24 7.5	16 5.0	14 4.3	6 1.9	15 4.7	102 31.7	5	327 322
AB	13 14.1	3 3.3	11 12.0	1 1.1	5 5.4	3 3.3	1 1.1	55 59.8	0	92 92
TOTAL	737 20.8	45 2.8	188 11.6	57 3.5	104 6.4	54 3.3	107 6.5	731 45.0	17	1640 1623

CHI SQUARE STATISTICS... CHISQ= 321.849 PHISQ= .210 TSCHUPRO=-S T
Z-SQ= .033 PERSQU-S C = .417
DF= 54.000

1 Agriculture
2 Mining
3 Manufacturing Industry
4 Construction
5 Commerce, Banks, Insurance
6 Electricity, Gas, Transport and Communications
7 Other Services
9 Did not work, not a migrant

Best Available Document

2 - Inter-temporal Consistency of the Occupational Classification

Apart from the information on total weekly income per worker in 1965 - already used in the classification procedure - the Monterrey Sample contains data on annual earnings throughout the work history of the interviewees. We at first rejected the possibility of using reconstructed earnings data as a classificatory variable. The reasons for this were tied to the nature of the available information, that is to say, to the possibility of large recollection biases. This body of data is, nevertheless, usefull as a check on the hierarchy derived from the much more realiable 1965 cross-sectional information.

Given a test criteria based upon mean incomes, the figures on Table I-2 could hardly be more encouraging. The "hierarchy" of occupations is maintained throughout the period. Moreover, the few inconsistencies can be readilly accounted for. As our analysis of the Age-Earnings profile would indicate, there are some regions of overlap between Occupational Groups 6 and 4. In particular, workers in Occupation 6 have a minute advantage in income for 1960 and 1965; but the trend reverses for periods 1940 through 1955. Another predictable overlap occurs between Occupational Groups 5 and 6 - for both 1940 and 1945, workers in the latter group have a minimal advantage, while in the more recent periods workers in 5 tend to have larger mean earnings than those in group 6.

TABLE I-2

MEAN INCOME BY OCCUPATION

1940-1965

1940	17.262 [a] (23.189) [b]	8.077 (5.724)	4.449 (4.417)	3.615 (3.206)	2.866 (2.145)	3.340 (2.640)	2.722 (1.630)	2.802 (3.200)	1.818 (2.440)	1.387 (818)
1945	27.946 (36.109)	13.952 (8.961)	8.519 (4.681)	5.431 (4.851)	4.801 (3.033)	4.987 (3.057)	4.037 (2.067)	3.660 (3.237)	2.959 (2.648)	2.153 (1.132)
1950	34.243 (35.250)	16.628 (10.001)	14.527 (11.437)	8.057 (5.733)	[illegible].812 (3.468)	7.278 (4.104)	5.511 (2.839)	5.038 (3.182)	3.577 (2.811)	3.091 (2.191)
1955	42.245 (30.420)	22.624 (15.796)	18.888 (19.395)	9.290 (6.317)	7.385 (4.021)	8.421 (4.084)	7.494 (3.515)	6.813 (3.713)	5.154 (4.240)	4.360 (3.106)
1960	57.488 (34.144)	29.729 (17.620)	20.256 (18.227)	11.280 (6.519)	10.153 (4.378)	11.700 (5.369)	10.021 (4.722)	9.152 (4.139)	7.939 (8.074)	5.987 (3.793)
1965	73.172 (36.204)	42.077 (26.003)	28.035 (26.075)	16.238 (8.654)	14.684 (6.436)	16.896 (11.273)	14.289 (5.429)	12.226 (4.424)	11.093 (6.455)	8.211 (3.218)

(a) *Yearly income measurent in current pesos.*

(b) *Standard deviation of income.*

TABLE I-2a

RATES OF GROWTH IN MEAN
OCCUPATIONAL EARNINGS - 1940-1965

	1940-45	1945-50	1950-55	1955-60	1960-65	1940-65
1	619	225	234	361	273	3.239
2	727	192	361	314	415	4.208
3	915	705	300	072	384	5.301
4	502	484	153	214	439	3.492
5	675	210	271	375	446	4.122
6	493	459	157	389	444	4.059
7	483	365	360	337	427	4.253
8	306	376	352	343	336	3.363
9	628	209	441	540	397	5.100
10	552	436	411	373	371	4.919

Source: Table I-2.

In comparing the overall increases in mean income by occupation we note that - contrary to the more usual results based on Census evidence - there was a slight but significant narrowing in the inter-occupational differentials. While in 1940 the relative annual earnings of workers in group 10 were 8% of those in group 1, in 1945 the differential had decreased to the still stupefying figure of 11%. That is, even by 1965, what a regular professional or manager earned in one month was more than what an unspecialized construction worker could earn in a year.

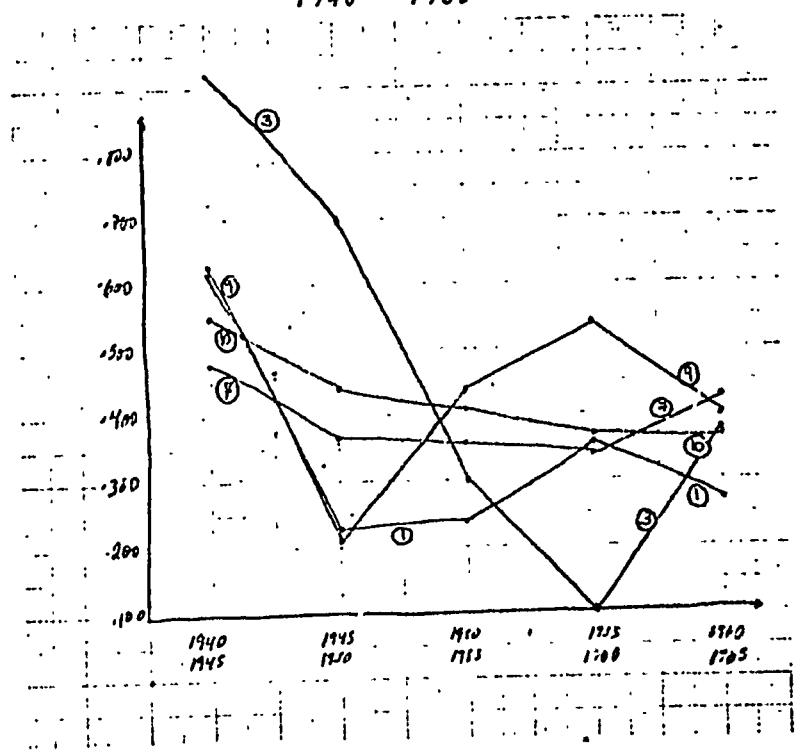
Of course, this narrowing is nothing but the effect of differential rates of growth in mean incomes, and most likely the result of "aging" the cohorts. In Table I-2a we have calculated these rates, for the 5 five periods as well as for the whole 1940-1965 interval. It thus appears that members of group 1 had the smallest percentual gain, while workers in Occupational groups 3, 9 and 10, the highest.

The overall results mask, nevertheless, considerable fluctuations. It is a brazen fact that the highest increases, for all occupations, were those obtained during the 1940 to 1945 span. Indeed, as the trajectories drawn in figure I-2 show, workers in occupation 10 had,

FIGURE I-2

PERCENTAGE INCREASE IN MEAN INCOMES

1940 - 1965



thereafter, consistently smaller increases in mean wages - a non-advantageous regularity to which they only are entitled. The most dramatic changes are, nevertheless, those for members of group 3, who owe their overall gain

merely to the very substantial increases obtained during 1940-45, and later, during 1960-65. On the whole, the period of 1945-50 was one of slower growth, and that of 1940-45 of very fast growth; during the other periods the gains of ones tended to match the losses of others. This pattern is consistent with what we know about Monterrey's recent past.

Another, more formal way of testing for the inter-temporal consistency of the occupational classification scheme is to measure the significance of the link between income and occupation for all periods. The F-statistics for this two-way test are presented in Table I-3, bellow.

TABLE I-3

RELATIONSHIP BETWEEN INCOME AND OCCUPATION
1940-1965

	N	D.F.	F*
1940	323	9,313	14.065
1945	421	9,411	20.722
1950	591	9,581	39.391
1955	826	9,816	85.748
1960	1.087	9,1077	156.704
1965	1.489	9,1479	256.094

* All values are significant at the 1% level or more.

As the Table indicates, in all periods, the association is highly significant, supporting our claims with reference to the inter-temporal robustness of the classification scheme. The designed groups behave well inspite of the very large within occupation variances.

3 - The Occupational Distribution, 1940-1965: In examining the occupational distribution for the various periods (Table I-13) it is important to keep in mind the peculiar nature of the data set. The figures are not representative samples of the population in each period (except for the 1965 one which is an accurate picture of the overall distribution). They are, rather, cross-sectional snap--shots in the careers of the 1640 workers interviewed in 1965. Thus, the distributions reflect several simultaneous influences: the changing pattern of labor demands; the changing composition of the sample through the addition of new members; the increasing urbanization that must result from the very way the sample was collected; the "aging" of the original population; as well as, the re-arrangement that results from the process of occupational mobility in itself.

It is not, therefore, surprising to note that the proportio of workers in the lowest occupations dropped to more than half its original size in a span of only 25 years. In fact, if we look only at the distribution of workers who where in Monterrey (Table I-14) we see that the drop, though still significant, is smaller: from 32.4 to 21.1%. Figure I-3 displays graphically the main tendencies: while the proportion of workers in the lowest occupations tended to decline, that in the highest, increased continuously. On the other hand, the "lower-middle" occupations tended to have a relatively constant share of the total labor force. The typically industrial occupations (groups 6, 7 and 8) also showed an increase in their share of employment, although very slight - and mostly through the force of group 6.

Throughout the periods, the lower occupations (groups 9 and 10) are numerically the most important, albeit their

TABLE I-13

OCCUPATIONAL DISTRIBUTION

1940 - 1965

	1	2	3	4	5	6	7	8	9	10	Total*
1940	29 (3.3)	28 (3.2)	24 (2.7)	81 (9.3)	32 (3.7)	36 (4.1)	31 (3.5)	30 (3.4)	156 (17.8)	428 (48.9)	875
1945	47 (4.5)	53 (5.1)	31 (3.0)	103 (9.8)	45 (4.3)	50 (4.8)	38 (3.6)	47 (4.5)	148 (14.1)	485 (46.3)	1 047
1950	73 (5.9)	62 (5.0)	48 (3.9)	123 (10.0)	46 (3.7)	79 (6.4)	59 (4.8)	74 (6.0)	192 (15.6)	475 (38.6)	1 231
1955	111 (7.8)	86 (6.1)	54 (3.8)	155 (10.9)	62 (4.4)	104 (7.3)	67 (4.7)	86 (6.1)	241 (77.0)	452 (31.9)	1 418
1960	150 (9.7)	101 (6.6)	71 (4.6)	168 (10.9)	85 (5.5)	128 (8.3)	92 (6.0)	99 (6.4)	253 (16.4)	393 (25.5)	1 540
1965	200 (12.9)	98 (6.3)	87 (5.6)	174 (11.2)	82 (5.3)	143 (9.2)	100 (6.5)	98 (6.3)	239 (15.4)	327 (21.1)	1 548

* Number of workers in the Labor Force.

TABLE I-14

OCCUPATIONAL DISTRIBUTION (MONTERREY RESIDENTS)

1940 - 1965

	1	2	3	4	5	6	7	8	9	10	Total*
1940	22 (4.6)	18 (3.7)	17 (3.5)	57 (11.6)	26 (5.9)	29 (6.0)	27 (5.6)	24 (5.0)	105 (21.8)	156 (32.4)	481
1945	41 (6.4)	37 (5.8)	19 (3.0)	72 (11.2)	36 (5.6)	40 (6.2)	35 (5.4)	40 (6.2)	112 (17.4)	211 (32.8)	643
1950	65 (7.6)	51 (6.0)	41 (4.8)	102 (11.9)	40 (4.7)	61 (7.1)	53 (6.2)	65 (7.6)	153 (17.9)	223 (26.1)	854
1955	101 (9.1)	72 (6.5)	46 (4.1)	131 (11.8)	53 (4.8)	84 (7.6)	59 (5.3)	80 (7.2)	206 (18.5)	280 (25.2)	1 112
1960	141 (10.4)	87 (6.4)	64 (4.7)	154 (11.3)	78 (5.7)	115 (8.4)	88 (6.5)	94 (6.9)	232 (17.0)	306 (22.6)	1 361
1965	199 (12.9)	98 (6.3)	87 (5.6)	174 (11.2)	82 (5.3)	143 (9.2)	100 (6.5)	98 (6.3)	239 (15.4)	327 (21.1)	1 547

* Number of workers in Monterrey's Labor Force.

participation systematically decreases from over 54% of the total in 1940 to 36% in 1965. The industrial occupations accounted for another 17% in 1940, and for 22% of the total in 1965. The share of the "lower middle" occupations (groups 4 and 5) remained pegged to 17% mark, so that most of the slack generated by the drop in size of the lowest, was picked up by the increase in the relative importance of the highest - from 12% of the total in 1940 to almost 25% in 1965.

Even though these patterns bear evidence to the occupational mobility of the sample, they are also the result of selective additions to the labor force. New entrants accounted for close to 30% of the 1945 distribution. Nevertheless, their impact halved by 1965, a fact that once again reflects the changing age-composition of the sample. As the disaggregated occupational level this tendency is not, however, as smooth or as drastic as the figures might indicate. The sharp and continuous drop is characteristic of the most populous lower occupations (see Figure I-3), but the pattern for group 4 is erratic, showing increases in the participation of new entrants for both the 1940-45 and 1950-55 periods. On the other hand, the percentage of new entries in Occupation 6 increases throughout the 1940 to 1960 period, although numerically the figures are indeed small. Table I-15 also demonstrates the overpowering influence of migrants in the composition of new entrants. It suggests two hypothesis that merit further confirmation: that the intensity of migration to Monterrey was greatest in the 1960-65 period, and that it actually declined from 1945 to 1950.

TABLE I-15

NEW ENTRANTS IN THE LABOR FORCE

1940-1965

		1940-45	1945-50	1950-55	1955-60	1960-65
Occ.01*	(1)	10	10	16	18	29
	(2)	3(30.0)	4(40.0)	6(37.5)	10(55.6)	14(48.3)
	(3)	7(70.0)	6(60.0)	10(62.5)	8(44.4)	15(51.7)
	**(4)	24.4	15.4	15.8	12.8	14.6
Occ.02	(1)	3	11	16	12	16
	(2)	2(66.7)	4(36.4)	9(56.25)	8(66.7)	5(31.2)
	(3)	1(33.3)	7(63.6)	7(43.75)	4(33.3)	11(68.8)
	(4)	8.1	21.6	22.2	13.8	16.3
Occ.03	(1)	8	14	8	13	20
	(2)	2(25.0)	6(42.9)	3(37.5)	7(53.9)	6(30.0)
	(3)	6(75.0)	8(57.1)	5(62.5)	6(46.1)	14(70.0)
	(4)	42.1	34.1	17.4	24.0	23.0
Occ.04	(1)	17	32	27	36	17
	(2)	8(47.1)	15(46.9)	16(59.3)	16(44.4)	1(5.9)
	(3)	9(52.9)	17(53.1)	11(40.7)	20(55.6)	16(94.1)
	(4)	23.6	31.4	20.6	23.4	9.8
Occ.05	(1)	9	6	12	16	8
	(2)	4(44.4)	1(16.7)	4(33.3)	10(62.5)	2(25.0)
	(3)	5(55.6)	5(83.3)	8(66.7)	6(37.5)	6(75.0)
	(4)	25.0	15.0	22.6	20.5	9.7
Occ.06	(1)	5	8	15	21	17
	(2)	0 (-)	3(37.5)	6(40.0)	7(33.3)	2(11.8)
	(3)	5(100.0)	5(62.5)	9(60.0)	14(66.7)	15(88.2)
	(4)	12.5	13.1	17.9	18.3	11.9
Occ.07	(1)	2	10	9	12	9
	(2)	0 (-)	4(40.0)	0 (-)	5(41.7)	2(22.2)
	(3)	2(100.0)	6(60.0)	9(100.0)	7(58.3)	7(77.8)
	(4)	5.7	18.9	15.2	13.6	9.0

TABLE I-15 (Cont.)

		1940-45	1945-50	1950-55	1955-60	1960-65
Occ.08	(1)	7	10	10	8	8
	(2)	0 (-)	1(100.0)	2(20.0)	0 (-)	2(25.0)
	(3)	7(100.0)	9(90.0)	8(80.0)	8(100.0)	6(75.0)
	(4)	17.5	15.4	12.5	8.5	8.2
Occ.09	(1)	38	55	72	71	36
	(2)	18(47.4)	27(49.1)	32(44.4)	27(38.0)	7(19.4)
	(3)	20(52.6)	28(50.9)	40(55.6)	44(62.0)	29(80.6)
	(4)	33.9	35.9	34.9	30.6	15.1
Occ.10	(1)	86	84	106	83	67
	(2)	28(32.6)	22(26.2)	31(29.2)	25(30.1)	6(9.0)
	(3)	58(67.4)	62(73.8)	75(70.8)	58(69.9)	61(91.0)
	(4)	40.1	37.7	37.8	26.9	20.5
TOTAL	(1)	185	240	291	290	227
	(2)	65(35.1)	87(36.25)	109(37.5)	115(39.7)	47(20.7)
	(3)	120(64.9)	153(63.75)	182(62.5)	175(60.3)	180(79.3)
	(4)	28.8	28.1	26.2	21.3	14.7

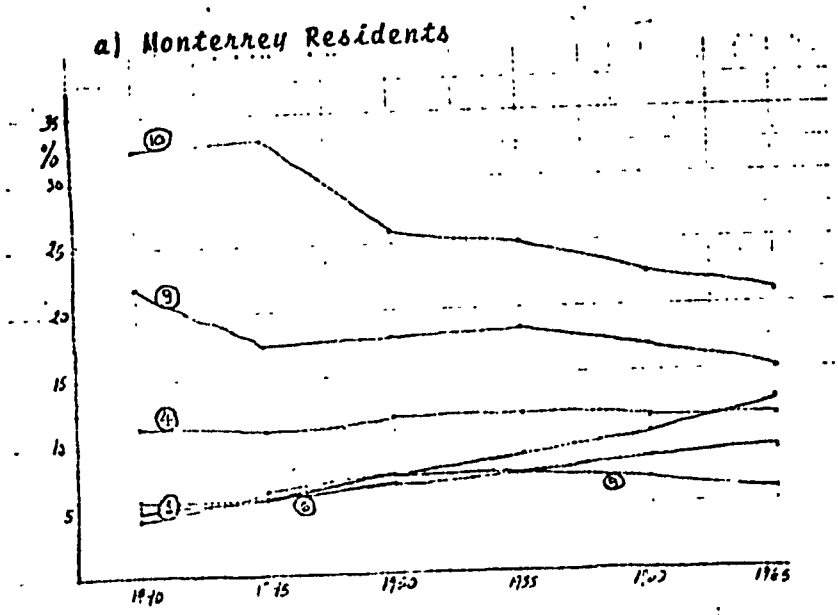
(1) New Entrants Total
(2) Monterrey residents
(3) Migrants
(4) % of Occ. Total

* Up to the terminal year.
** Applies to total at terminal year.

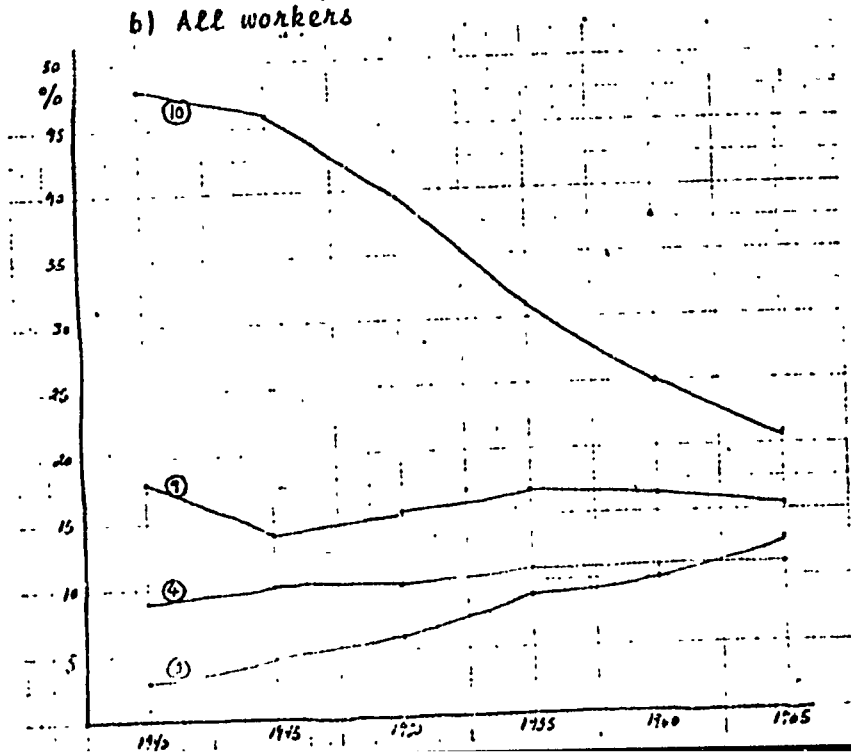
FIGURE I-3

OCCUPATIONAL DISTRIBUTION
1940-1965

a) Monterrey Residents



b) All workers



PART II

PRELIMINARY RESULTS OF OCCUPATIONAL MOBILY PATTERNS

1 - Some characteristics of the Sub-samples: Having designed the occupational classification we next proceeded to analyse several variables that, given our model, should influence the conditional probability of occupational mobility in each of the sub-samples. The variables examined were:

A) Characteristics of the worker:

1 - Age
2 - Labor market experience (including pre-migratory work)
3 - Occupational experience (number of years spent in the occupation now employed - not necessarily in continuous employment)
4 - Socioeconomic background (measured alternatively as the occupation of the father when the son was 20 years old; or as a composite index of the above, the father's and the mother's education).
5 - Geographic origin (Matrix of categories)
6 - Education (measured alternatively as number of years of schooling (not counting repetitions) or type of degree completed.
7 - Specialization of industrial workers (Matrix of categories)
8 - Training

B) Characteristics of the worker's employment position:

1 - Position in the occupation (Employee, employer, self-employed, etc.)
2 - Size of firm (for employers and employee)
3 - Sector of enterprise

4 - Number of workers under direct supervision
5 - Presence of relatives in the enterprise

Tables II-1 to 4 show some of the results of the association between the occupational "hierarchy" and the individual characteristics. For example, in all of the periods we observe that, as expected, the occupational status of the father (measured when the son was 20 years old of age) has a systematic influence on the current occupational distribution. (Tables II-1). Although the classification of father's occupation is different than that the son's (7 versus 10 categories) all measures of association are highly significant (*). It is interesting to note that the association is strongest in 1950, declining both towards 1940 and 1965. Given the "aging" of the cohorts, this suggests that there is an interaction between age and socio--economic background; it would be advisable, therefore to include a multiplicative (Age) (SEB) variable in the decomposition of the total probability of movement.

Economy of space (and of the reader's time) would not allow us to describe in detail each of the remaining distributions. Suffice it to say that they behaved as expected, barring the following exceptions: (a) The percentage of workers (in any of the 10 occupations) that declared having received any training was minimal[2]. In light of this we have decided to exclude this variable from further analysis (b). On examining the data it become clear that the detailed disaggregation of especialization (for industrial workers)[3] was unnecessary. The variability in the sub-samples could

(*) All of the Chi-Square statistics presented are significant beyond the 001 level. We base our comparison on the Phi-Square statistic because it corrects the Chi-Square result for the size of the tables.

TABLE II-1

INTERGENERATIONAL MOBILITY

1940

PE(3601) FATHER OCC 20 HORIZONTAL
PE(3540) OCC(10)M 1940 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1 (low)	2	3	4	5	6	7 (high)	AR	TOTAL
01 (high)	3 13.6	0 0.	4 18.2	4 18.2	1 4.5	5 22.7	5 22.7	0	22 22
02	1 5.9	1 5.9	5 29.4	5 29.4	2 11.8	1 5.9	2 11.8	1	18 17
03	6 37.5	2 12.5	2 12.5	2 12.5	2 12.5	2 12.5	0 0.	1	17 16
04	14 25.5	7 12.5	15 26.8	11 19.6	3 5.4	4 7.1	2 3.6	1	57 56
05	10 40.0	2 8.0	8 32.0	4 16.0	1 4.0	0 0.	0 0.	1	26 25
06	10 35.7	2 7.1	8 28.6	4 14.3	1 3.6	2 7.1	1 3.6	1	29 28
07	9 34.6	8 30.8	6 23.1	2 7.7	0 0.	1 3.8	0 0.	1	27 26
08	9 39.1	6 26.1	6 26.1	1 4.3	0 0.	1 4.3	0 0.	1	24 23
09	42 41.6	18 17.8	28 27.7	8 7.9	2 2.0	3 3.0	0 0.	4	105 101
10 (low)	39 60.9	25 17.0	24 16.3	8 5.4	1 .7	0 0.	0 0.	(9)	156 147
AR	535 45.8	178 16.2	183 16.6	106 9.6	56 5.1	57 5.2	17 1.5	59	1159 1101
TOTAL	637 44.6	249 15.9	289 18.5	155 9.9	69 4.4	76 4.8	27 1.7	69	1580 1562

CHI SQUARE STATISTICS... CHI SQ= 144.5[illegible] PHI SQ= .305 TSCHUPROW
Z-SQ= .561 PEARSON-S C = .517
DF= 54.000

Father Occ at Age 20 (of respondent)

(high) 7 owners or managers of large enterprises, professionals, etc.
6 rural owners, employed professionals, medicin sized ent. managers, etc.
5 teachers, technicians, office heads, etc.
4 foremen, salesmen in large magazines, office employees, small owners.
3 craftsman or specialized workers, chofers (w/own car), operators owners.
2 specialized mining workers , machine operntors, chofers, salesmen (small)
(low) 1 rural workers, unspecialized workers, street peddlers, etc.

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TABLE II-1 (Cont.)

INTERGENERATIONAL MOBILITY

1965

PE(3501) FATHER OCC 20 HORIZONTAL
PE(4505) OCC(1-)N 1965 VERTICAL

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	7	AR	TOTAL
C1	14 7.3	12 6.3	37 19.4	41 21.5	25 13.0	41 21.5	20 10.5	8	199 191
02	15 15.5	9 9.6	21 21.9	24 25.0	12 12.5	12 12.5	3 3.1	2	95 96
03	25 29.8	14 16.7	21 25.0	11 13.1	8 9.5	4 4.8	1 1.2	3	87 84
04	68 40.0	32 18.8	41 24.1	16 9.4	10 5.9	3 1.8	0 0.	4	174 170
05	39 46.2	13 16.7	18 23.1	9 11.5	1 1.3	1 1.3	0 0.	4	82 78
06	51 37.0	33 23.9	29 21.0	13 9.4	7 5.1	5 3.6	0 0.	5	143 138
07	41 43.2	29 30.5	15 15.9	7 7.4	0 0.	0 0.	0 0.	5	100 95
08	49 53.3	19 20.7	18 19.6	6 6.5	0 0.	0 0.	0 0.	6	98 92
09	146 64.0	39 17.3	28 12.4	9 4.0	0 0.	2 .9	2 .9	13	239 226
10	223 72.9	36 11.8	39 12.7	7 2.3	1 .3	0 0.	0 0.	21	327 306
AR	29 33.7	13 15.1	19 22.1	12 14.0	4 4.7	8 9.3	1 1.2	7	93 86
TOTAL	697 44.6	249 15.9	285 18.5	155 9.9	69 4.4	76 4.9	27 1.7	74	1646 1562

CHI SQUARE STATISTICS... CHISQ= 645.433PHISQ= .437 TSCHUPROW-S
Z-SQ= .071 PEARSON-S C = .552
DF= 59.000

Note: If the occupation of the father is measured at the time the worker was born, $\phi^2 = .442$
If it is measured when the father died, or alternatively, the current occupation, $\phi^2 = .450$

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be well captured by a three-way division between: Aprendizes, Peones, Ayudantes, on the one side, with Operarios on the other and the group of Artesanos, Maestros y Mayordomos completing the hierarchy.

The characteristics of the worker's employment situation showed, nevertheless, some surprises. As an example of the kind of tabular comparisons we are dealing with, Table II-2 presents the results for Occupational Position. Note first that we are controlling for Monterrey residence, ie: excluding all future migrants and new entrants, secondly that the results show all workers who were in a given occupation, say, in 1950. It does not indicate how many of these were still in Monterrey's labor force in the next period, nor the particular occupational destination by the next period. Turning now to the specific results of the Table we observe that categories 2 (Employers or self employed w/o capital), 4 (Employee on commission), 5 (Family Help) and 6 (Odd-jobbing), hardly appear at all. Moreover, not that category 2 is concentrated on the lower occupations (09 and 10), and that in these occupations category 1 (Employer or self-employed with capital) is much less representative. It seemed therefore both convenient and correct to eliminate the distinction between categories 1 and 2 - a distinction already well captured by the occupational classification itself. A somewhat similar argument would apply to the aggregation of categories 5 and 6. With regards to category 4, Table II-1 shows that it is only important for occupational group 02. This group include the activities of sales agents, of small managers and the alike, (that is workers that are likely to be paid on commission), as well as technicians, secondary school teachers, etc., who are, most probably, paid a regular wage. In other words, it appears that the

TABLE II-2

OCCUPATIONAL POSITION

1940

PE(2840) POSITION 1940 HORIZONTA
PE(3740) G2P(10) OCCUPATIONS 1940 VERTICAL
PE(4230) MONTEREY POSITION 1940 POOL AV

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AP)

	1	2	3	4	5	AP	TOTAL
01	18 81.8	0 0.	4 18.2	0 0.	0 0.	0	22 22
02	2 11.1	0 0.	12 66.7	4 22.2	0 0.	0	18 18
03	2 11.8	0 0.	15 88.2	0 0.	0 0.	0	17 17
04	7 12.3	1 0.	48 84.2	0 0.	1 1.8	0	57 57
05	2 7.7	1 3.8	23 88.5	0 0.	0 0.	0	26 26
06	3 10.3	0 0.	26 89.7	0 0.	0 0.	0	29 29
07	0 0.	0 0.	27 100.0	0 0.	0 0.	0	27 27
08	1 4.2	0 0.	23 95.8	0 0.	0 0.	0	24 24
09	1 1.0	6 5.7	86 81.9	1 1.0	8 7.6	3	105 105
10	5 7.8	16 10.2	122 78.0	0 0.	12 7.7	0	157 157
AP	0 0.	0 0.	0 0.	0 0.	0 0.	235	235 0
TOTAL	42 8.7	23 4.8	390 81.1	5 1.0	21 4.4	235	716 481

1 Employer or self-employed with some capital(land, vehicle, or est)
2 Employer or self-employed w/o capital
3 Employee = wage earner
4 Employee = on commission
5 Family help
6 Dad jobbing

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TABLE II-7 (Cont.)

OCCUPATIONAL POSITION

1965

PF(2865) POSITION 1965 HORIZONTAL
PC(3765) GRP(15) OCCUPATIONS 1965 VERTICAL
PF(4265) MONTEREY RESIDENCE 1965 HOMOGAM 1

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	1	2	3	4	5	6	AR	TOTAL
01	104 97.7	0 0.	95 47.7	0 0.	0 0.	0 0.	0	199 199
02	6 6.1	2 2.0	77 78.6	13 13.3	0 0.	0 0.	0	98 98
03	10 11.5	0 0.	77 88.5	0 0.	0 0.	0 0.	0	87 87
04	51 29.5	1 .6	120 69.4	0 0.	1 .6	0 0.	1	174 173
05	18 22.0	0 0.	64 78.0	0 0.	0 0.	0 0.	0	82 82
06	19 12.6	3 2.1	121 83.5	0 0.	2 1.4	0 0.	0	143 145
07	14 14.0	0 0.	86 86.0	0 0.	0 0.	0 0.	0	100 100
08	15 15.3	5 5.1	77 78.6	0 0.	0 0.	1 1.0	0	98 98
09	14 5.9	17 7.1	199 83.7	6 2.5	3 1.3	0 0.	0	239 239
10	22 6.7	40 12.2	240 73.1	0 0.	5 1.5	1 .3	0	327 327
AR	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	92	92 0
TOTAL	272 17.6	88 5.7	1154 74.7	19 1.2	11 .7	2 .1	93	1539 1546

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distinction between categories 1 and 2 is important only insofar as of distinguish activities within Occupation 2. Since this is not our interest, we once again opted to aggregate categories: combining 1 and 2.

Table II-3 summarizes this information for Occupation 10 across all periods. We include it because it exemplifies one of the characteristics of the changing composition of jobs in the low occupation. Whilst in 1940, only 14.1% of the workers in Occupation 10 were self-employed, this proportion increased steadily during the following years, so that by 1965 a full one-quarter of the workers were self-employed. Although this in part reflects a drop in the number of workers who were unpaid helpers in family activities (a decline which reflects mostly the aging of the sample) it is predominantly the result of decreasing levels in wage-employment. This points out to the difficulty of dealing with broad occupational groupings: some of the most interesting changes must be occuring within the group and not only between this group and the others.

In examining the results for Firm Size (Tables not show here) we encountered similar problems in re--grouping the data. After trying other combinations, the following aggregation seemed preferable:

a) For employees - 1. Less than 5
2. From 6 to 20
3. From 51 to 200
4. 201 or more

b) For employers - 1. Less than 5
2. From 6 yo 20
3. More than 20

TABLE II-3

POSITION IN OCCUPATION - OCCUPATION (10): 1940-1965

	1[a]	2[b]	3[c]	4[d]	5[e]	6[f]	Not[g] in L.F.	N
1940	3.8	10.3	78.2	-	7.7	-	-	156
1945	4.7	9.0	81.5	-	4.7	-	-	211
1950	5.8	11.2	78.5	-	4.5	-	-	223
1954*	3.5	14.8	78.9	-	2.5	.4	1	285
1955	2.9	16.8	77.1	-	2.9	.4	-	280
1959*	4.7	16.2	76.2	-	2.2	.6	4	324
1960	3.9	17.2	76.3	-	2.3	.3	-	308
1964*	6.9	18.6	73.1	-	1.5	-	.8	342
1965	6.7	18.3	73.1	-	1.5	.3	-	327

a: Employer or self-employed with some capital (land, vehicle or establishment) (%)

b: Employer or self-employed w/o capital (%)

c: Employee: wager earner (%)

d: Employee: on commission (%)

e: Family help (%)

f: Odd-Jobbinh (%)

g: Number of workers out of Labor Force

*Refers to workers who in this year were in Occupation 10, cross-classified by their Occupational Position the following year. The difference in the last column indicates workers who moved from the occupation in the one year internal.

This aggregation would not, however, eliminate the problem of missing observation. Given the large number of employers who had failed to declare their firm's size[4], it would not be possible to simply abandon the cases with MD. Instead we settled for the following two step procedure: calculate for each year and each occupational group the mean size of the enterprise (based on the disaggregate data); replace teh MD for that year and occupation with the category (1 to 4 in the above list) which came closest to the mean.

The information on sector of activity was given according to a 2-Digit code (99 possible categories). Clearly, it was necessary to reconvert this information to a more manageable (and theoretically appropriate) format. The first step was to transform the 99 code into the usual 2-Digit - SIC code. Next, for the Industrial Sector, we grouped the industries into four categories (Modernizing Traditional Industries - Stationary Traditional Industries - Stationary Dynamic Industries - Modernizing Dynamic Industries), and these sub-periods (1940-1950, 1950-1960, 1960-1965). The criteria for aggregation was based on a "shift--share" analysis of the Mexican employment data[5]. One may analytically divide an increase in sectoral employment into two components. The first is the increase (decrease) in aggregate sectoral employment resulting from the changes in the composition of the demand in the economy (ie: increase share in total value added): the "dynamic" component. The second is the decrease in aggregate sectoral employment owing to an increase in the productivity of labor within each sector with no change in its share of total employment - the "modernization" component. Thus, Modernizing Traditional are the industries that had

nonpositive changes in demand with positive changes in productivity per worker. For the non-industrial activities we are planning to use the same criteria.

Both the variables 4B (Number of Workers Under Direct Supervision) and 5B (Presence of Relatives in the Enterprise) will be dropped from the analysis. The frequencies of response are very small, and then only in the "higher" occupations, for which we are not planning any detailed statistical analysis.

Finally, we analyzed the information on Full Time Workers and Current Health Problems in order to detect possible plans in the data. The information for the proportion of full time workers, for Occupation Group 10 is presented in Table II-4. This occupational group is the one with the highest incidence of partial work, and yet even in this case the proportion is very small. Given this result, we decided to exclude from further analysis all workers who were only partially occupied. Since the results for the presence of health problems, particularly those which seriously impaired capacity to work, were of the same order of magnitude, we propose to also exclude those cases from further analysis.

2 - Patterns of Occupational Mobility: Table II-5, describing the patterns of inter-period occupational mobility, presents those results that are elemental for all subsequent analysis. Turning once again to the summary measures of association we observe that present occupation is most strongly related to future (5 years hence) occupation. It is indicative that the intensity of the association increases with time, except for a slight drop from 1950-55 to 1955-60.

TABLE II-5

OCCUPATIONAL MOBILITY
(MONTERREY RESIDENTS)
1940-1945

DF(3740) GRP(10) OCCUPATIONS 1940 — HORIZONTAL
DF(3745) GRP(10) OCCUPATIONS 1945 — VERTICAL
DF(3740) MONTERREY RESIDENCE 1940 — BOOLEAN 1
DF(3745) MONTERREY RESIDENCE 1945 — BOOLEAN 2

→ Occupation 1940

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AP)

	01	02	03	04	05	06	07	08	09	10	AP	TOTAL
01	20 64.5	0 0.0	2 6.5	2 6.5	1 3.2	2 6.5	0 0.	0 0.	0 0.	0 0.	3	31 31
02	0 0.	16 47.1	2 5.9	11 32.4	2 5.9	0 0.	0 0.	0 0.	1 2.9	1 2.9	2	34 34
03	2 0.	0 0.	7 53.8	1 7.7	1 7.7	1 7.7	1 7.7	0 0.	0 0.	0 0.	2	13 11
04	0 0.	0 0.	1 1.6	37 60.0	3 4.8	0 0.	0 0.	0 0.	8 14.5	10 18.2	8	63 55
05	0 0.	0 0.	0 1.	1 3.7	13 48.1	0 0.	0 0.	0 0.	6 22.2	5 18.5	4	27 23
06	0 0.	0 0.	0 0.	1 2.8	1 2.8	23 65.7	1 2.9	0 0.	8 22.9	1 2.9	0	35 30
07	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	21 63.6	0 0.	5 15.2	7 21.2	0	33 33
08	0 0.	0 0.	0 0.	1 7.7	0 0.	0 0.	0 0.	20 60.6	4 12.1	8 24.2	0	33 33
09	0 0.	0 0.	1 1.4	1 1.4	2 2.7	1 1.4	2 2.7	1 1.4	45 60.8	21 28.4	18	92 74
10	0 0.	0 0.	0 0.	1 .8	1 .8	0 0.	1 .8	2 1.6	20 16.0	100 80.0	28	133 125
AP	0 0.	0 0.	0 0.	0 0.	0 0.	1 25.0	0 0.	0 0.	2 50.0	1 25.0	168	172 4
TOTAL	22 4.8	16 3.5	15 3.3	57 12.6	26 5.7	28 6.1	26 5.6	23 5.0	99 21.4	154 33.3	232	455 452

→ Occupation 1945

$X^2 = 1735.8$ D.F. = 81.

$\phi^2 = 3.790$

Cramer's C = .890

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TABLE II-5(Cont.)

1945-1950

PF(3745) GRP(10) OCCUPATIONS 1945 — HORIZONTAL
PF(3750) GRP(10) OCCUPATIONS 1950 — VERTICAL
PF(4245) MONTEREY RESIDENCE 1945 — BOOLEAN 1
PF(4250) MONTEREY RESIDENCE 1950 — BOOLEAN 2

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	01	02	03	04	05	06	07	08	09	10	AR	TOTAL
01	39 [illegible]	0 0.0	0 0.0	0 0.0	2 5.0	2 5.0	0 0.0	0 0.0	2 3.6	2 3.6	4	53 55
02	1 2.5	28 70.0	1 2.5	6 15.0	1 2.5	0 0.0	0 0.0	0 0.0	1 2.5	1 2.5	4	44 40
03	1 3.7	2 7.4	12 44.4	4 14.8	1 3.7	1 3.7	2 7.4	0 0.0	4 14.8	0 0.0	6	33 27
04	0 0.0	0 0.0	2 2.9	51 73.9	7 10.0	1 1.4	0 0.0	0 0.0	3 4.3	6 8.6	15	85 70
05	0 0.0	0 0.0	0 0.0	5 14.7	14 41.2	0 0.0	0 0.0	1 2.9	7 20.6	7 20.6	1	35 34
06	0 0.0	0 0.0	0 0.0	0 0.0	3 5.7	39 74.5	1 1.9	0 0.0	8 15.1	7 13.2	3	56 57
07	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	28 65.1	0 0.0	8 18.6	7 16.3	4	47 43
08	0 0.0	0 0.0	0 0.0	2 5.7	1 2.9	0 0.0	0 0.0	38 67.1	2 3.6	14 25.0	1	56 55
09	0 0.0	0 0.0	0 0.0	3 3.1	4 4.1	0 0.0	0 0.0	0 0.0	59 60.2	32 32.7	27	125 98
10	0 0.0	0 0.0	0 0.0	0 0.0	1 .7	1 .7	2 1.4	1 .7	11 7.9	123 88.5	22	161 170
AR	0 0.0	1 12.5	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	3 37.5	4 50.0	208	216 8
TOTAL	41 4.1	36 3.6	18 2.0	69 11.1	35 5.6	39 6.3	43 5.9	40 4.4	108 17.4	203 32.6	295	917 622

$\chi^2 = 2546.067$

$C^2 = 4.147$

$C_{\text{count}} = .898$

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TABLE II-5(Cont.)

1950-1955

DF(3750)	GDP(10) OCCUPATIONS 1950	HORIZONTAL	
DF(3750)	GDP(10) OCCUPATIONS 1955	VERTICAL	
DF(8250)	MONTEREY RESIDENCE 1950	BOOLEAN 1	
DF(8250)	MONTEREY RESIDENCE 1955	BOOLEAN 2	

Number of women who were in Occ 05 in 1950
% of women in 1955 who were in Occ 1 in

TYPE OF RESPONDENTS IN HORIZONTAL (MINUS AB) ←1950→

	01	02	03	04	05	06	07	08	09	10	AB	TOTAL
01	1 71.4	2 13.6	1 7.1	3 3.5	0 0.	3 3.5	0 0.	1 1.2	1 1.2	1 1.2	6	21 35
02	1 1.8	20 45.6	4 9.1	8 18.2	2 3.6	0 0.	0 0.	0 0.	2 3.6	0 0.	0	55 56
03	0 0.	2 5.1	26 66.7	5 12.8	0 0.	2 5.1	1 2.6	1 2.6	1 2.6	1 2.6	3	41 39
04	0 0.	0 0.	2 1.0	77 77.1	2 1.0	0 0.	1 1.0	2 1.0	12 11.5	9 8.7	16	120 104
05	0 0.	0 0.	2 4.9	0 0.	31 75.6	1 2.4	1 2.4	1 2.4	3 7.3	2 4.9	4	45 41
06	1 1.4	0 0.	0 0.	1 1.4	1 1.4	55 75.4	0 0.	0 0.	6 8.7	7 10.1	6	75 69
07	0 0.	0 0.	0 0.	1 2.0	0 0.	0 0.	37 74.0	0 0.	6 12.0	6 12.0	0	50 50
08	0 0.	0 0.	0 0.	0 0.	0 0.	0 0.	1 1.4	54 77.1	3 4.3	12 17.1	2	72 70
09	2 1.5	1 .7	0 0.	2 2.2	2 1.5	0 0.	6 7.0	1 .7	98 73.1	23 17.2	32	165 134
10	0 0.	0 0.	0 0.	2 1.1	0 0.	1 .6	3 1.7	3 1.7	15 8.6	150 85.2	31	205 174
AB	0 0.	0 0.	1 11.1	0 0.	0 0.	1 11.1	1 11.1	1 11.1	3 33.3	2 22.2	174	143 9
TOTALS 1950	4 7.8	23 4.1	40 4.9	99 11.9	41 4.7	66 7.7	49 5.9	64 7.7	150 18.1	213 25.7	243	1273 830

$\chi^2 = 4052.653$ DF = 540

$\phi^2 = 4.936$

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TABLE II-5(Cont.)

1955-1960

PF(3755) GRP(10) OCCUPATIONS 1955 HORIZONTAL
PF(3760) GRP(10) OCCUPATIONS 1960 VERTICAL
PF(4255) MONTEREY RESIDENCE 1955 BOOLEAN 1
PF(4260) MONTEREY RESIDENCE 1960 BOOLEAN 2

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS A2)

	01	02	03	04	05	06	07	08	09	10	AP	TOTAL
01	22 77.2	13 13.6	7 5.7	8 6.5	1 .8	1 .8	0 0.	1 .8	2 1.6	0 0.	10	133 123
02	3 7.7	56 73.7	2 2.7	10 13.2	2 2.7	2 2.7	0 0.	0 0.	1 1.3	0 0.	9	83 75
03	2 3.9	0 0.	33 64.7	6 11.8	0 0.	3 5.9	1 2.0	1 2.0	3 5.9	2 3.9	7	58 51
04	1 .9	2 3.5	1 .9	94 71.2	2 1.7	2 1.7	1 .8	2 1.7	11 9.3	11 9.3	16	134 118
05	0 0.	0 0.	1 1.6	2 3.2	56 91.3	0 0.	1 1.6	1 1.6	11 17.7	7 11.3	10	72 62
06	0 0.	0 0.	1 1.1	0 0.	1 1.1	67 71.3	2 2.1	4 4.3	13 13.8	6 6.4	7	101 94
07	0 0.	0 0.	0 0.	0 0.	2 2.6	3 3.9	44 57.9	1 1.3	13 17.1	13 17.1	5	91 76
08	1 1.2	0 0.	0 0.	2 2.3	1 1.2	2 2.3	1 1.2	61 70.9	4 4.7	14 16.3	0	96 86
09	1 .7	0 0.	1 .7	8 5.0	2 1.2	2 1.2	0 0.	2 1.2	121 75.2	23 14.3	27	189 161
10	2 .9	0 0.	0 0.	4 1.8	2 .9	0 0.	5 2.2	2 .9	22 9.8	190 84.4	25	230 225
AP	2 2.1	0 0.	0 0.	2 2.1	0 0.	1 4.5	4 18.2	3 13.6	3 13.6	7 31.8	53	75 22
TOTAL	33 2.1	72 4.6	46 3.2	127 11.6	61 4.7	94 7.7	59 5.4	79 7.1	204 18.7	273 25.0	148	1261 1097

χ^2 = 910.421 D.F. = 81.
ϕ^2 = 4.492
Pearson C = .904

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TABLE 11-3(CONT.)

1960-1965

DF(3760) SOP(1C) OCCUPATIONS 1960 HORIZONTAL
DF(3765) SOP(1C) OCCUPATIONS 1965 VERTICAL
DF(4260) HUNTERDON RESIDENCE 1960 BOOLEAN 1
DF(4265) HUNTERDON RESIDENCE 1965 BOOLEAN 2

TYPE OF PERCENTAGING IS HORIZONTAL (MINUS AR)

	01	02	03	04	05	06	07	08	09	10	AR	TOTAL
01	138 79.8	10 5.8	9 5.2	7 4.1	2 1.2	1 .6	0 0.	3 1.8	4 2.4	0 0.	14	184 170
02	3 5.7	67 81.7	1 1.2	4 4.9	1 1.2	3 3.7	0 0.	0 0.	2 2.4	0 0.	5	87 82
03	0 0.	2 3.0	45 67.2	6 9.0	3 4.5	4 6.0	1 1.5	4 6.0	2 3.0	0 0.	6	73 67
04	0 0.	2 1.3	2 1.3	121 77.1	3 1.9	1 .6	3 1.9	1 .6	8 5.1	10 6.4	1	154 157
05	0 0.	0 0.	1 1.4	4 5.4	51 71.6	2 2.7	1 1.4	2 2.7	7 9.5	4 5.4	2	75 74
06	2 1.6	0 0.	1 .8	1 .8	1 .8	95 75.4	3 2.4	0 0.	16 12.7	7 5.6	2	128 126
07	0 0.	0 0.	0 0.	0 0.	0 0.	2 2.2	68 74.7	1 1.1	15 16.5	4 4.4	2	93 91
08	0 0.	0 0.	0 0.	1 1.1	1 1.1	1 1.1	2 2.2	75 83.3	0 0.	10 11.1	2	92 90
09	2 0.	2 1.0	1 .5	2 1.0	5 2.5	3 1.5	4 2.0	5 2.5	145 72.9	33 16.7	7	210 203
10	1 .3	2 .7	1 .4	3 1.2	1 .4	0 0.	4 1.5	1 .4	25 9.5	224 85.2	6	266 260
AR.	1 2.4	4 9.8	3 7.3	4 9.8	2 4.9	2 4.9	2 4.9	2 4.9	5 12.2	16 39.0	40	81 41
TOTAL	141 10.4	97 7.4	64 4.7	154 11.3	74 5.4	117 8.6	89 6.5	94 6.9	232 17.0	308 22.6	87	1444 1361

$\chi^2 = 6346.980$ DF = 81

$\phi = 5.187$

Cramer's C = .916

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There is also a strong dependence between the occupation distribution and the educational level of the labor force. The results shown in Table II-6 summarize 80 different cross-tabulations - occupational mobility for the 5 periods, controlling for each of the 8 educational categories measured alternatively at origin or destination. The impact of measuring the educational level at destination (as would be correct, given ghe assumptions of the Markov model) is not great; moreover, it does not always lead to an increase in the degree of interdependence between the two distributions. Another surprising result is that the intensity of the relation does not augment as we move up in the hierarchy of education (*). Thus, for example, in the moves between 1955 and 1960 the closest link was for workers who had a complete primary degree. This is an indication that less educated workers may be more mobile than the better educated ones, although we cannot be sure of the direction of the move. In any case, in comparing the filtered results with the raw totals, it becames clear that education does act in the expected direction - increasing the reciprocal relation between present and future occupation.

Replacing the educational filters for ones based on occupational experience we once again observe high and significant measures of association between present and future occupation (Table II-7). Nevertheless, in this case there are marked and systematic differences between categories of experience. The measures of

(*) It should be pointed out, however, that beyond the lower secondary degree the calculations falter due to the extreme number of empty cells.

TABLE II-6

OCCUPATIONAL MOBILITY: MEASURES OF ASSOCIATION CONTROLING FOR EDUCATIONAL LEVEL

		1	2	3	4	5	6	7	8	Total
1940-1945	1940[a]	4.050[c*] .896[d]	4.165*	4.287	3.954*	-	-	-	-	3.790 .890
	1945	4.087 .896	4.139 .897	4.359 .902	3.637 .886	-	-	-	-	
1945-1950	1945	3.930 .893	4.043 .895	4.091 .897	3.957* .893					4.147
	1950	3.940 .893	4.122 .897	3.894 .892	3.778 .889	-	-	-	-	.898
1950-1955	1950	4.970 .912	4.823 .910	4.818 .910	3.516* .882					
	1955	5.001 .913	4.827 .910	4.960 .912	3.651 .882	-	-	-	-	4.936 .912
1955-1960	1955	5.156 .915	3.942 .893	5.206 .916	3.446 .880					4.492
	1960	5.139 .915	3.961 .894	5.295 .917	3.425 .880	-	-	-	-	.904
1960-1965	1960	5.155 .915	5.831 .924	4.107 .897	4.406 .703	4.167* .898	4.035* .895			
	1965	5.147 .915	5.800 .924	4.436 .903	4.278 .900	4.104 .897	4.338 .901	-	-	5.187 .916

*DF < 81

1 Incomplete Primary
2 Primary
3 Incomplete Lower Secondary
4 Lower Secondary
5 Incomplete Upper Secondary
6 Upper Secondary
7 Incomplete University
8 University

a: Controling for educational level in 1940 (origin)

b: Controling for educational level in 1945 (destination)

c: ϕ^2

association tend to increase as occupational experience increases. Workers with less than 9 years of occupational experience are clearly much more mobile than those with 10 or more years of experience. On the other hand, in comparing the 1945-50 with the 1960-65 moves, it is apparent that workers who had the same amount of occupational experience at the earlier period were slightly more mobile than their youngesters.

We shall consider only one more of these experiments (*). The figures in Table II-8 refer to the Age-group filters, measured at destination. In this case the distribution of measures by groups (within a given period) is even more clearly unimodal. For the 1940-45 period it rises until age 35-39 and decreases thereafter; for 1945-50 the mode slides to the 40-44 group, then to the 45-49 group, and it remains these during 1955-60. The regularity is only broken in the last period; although the most immobile group is the one aged 50-54 in 1965, workers who then were 40-44 years old showed less mobility than those who were in ages 45-49. In all cases, however, the closeness of the association between present and future occupation was greater for workers who were over 30, and smaller for those under 30.

The Occupational Mobility Tables (II-5) also show the sample sizes for the different origin occupations throughout the 1940-65 interval. The figures for Occupational Groups 9 and 10 are more than adequate.

(*) The tabulations were made mostly to check the completeness of the distributions, for purposes of implementing the model. The measures of association are, therefore, a marginal bonus.

TABLE II-7

OCCUPATIONAL MOBILITY: MEASURES OF ASSOCIATIONS CONTROLLING FOR OCCUPATIONAL EXPERIENCE**

	1	2	3	4	5	6	7	8	9	10
1940-1945	1.668*[a] .791[b]	1.614* .786	5.296 .949	9.000						3.790 .890
1945-1950	2.323* .836	1.554 .780	5.549 .920	8.724 .947	8.583 .946	8.000* .943				4.147 .898
1950-1955										
1955-1960	1.776* .800	1.246 .745	4.455 .904	8.157 .944	8.333 .945	8.840* .948	9.000 .949	7.000* .935		4.492 .904
1960-1965	1.822* .804	1.353 .758	4.202 .899	7.364 .938	7.418 .939	7.813* .942	7.893* .942	8.000* .943	7.000* .935	5.187 .916

*D.F. < 81

1	1	years of experience in same occupation
2	2-4	"
3	3-9	"
4	10-14	"
5	13-19	"
6	20-24	"
7	25-29	"
8	30-34	"
9	35-50	"

a = ϕ^2

b = Persons' c

**Measured at destination (Terminal year)

TABLE II-8

OCCUPATIONAL MOBILITY: MEASURES OF ASSOCIATION CONTROLLING

FOR AGE GROUP**

	1	2	3	4	5	6	7	8	9	Total
1940-1945	-	1.819[a] .803[b]	3.627 .885	4.713 .908	5.342 .918	4.417 .903				3.790 .890
1945-1950	-	2.121 .824	2.828 .860	4.197 .899	5.234 .916	6.105 .927	5.662 .922			4.147 .898
1950-1955	-	2.654 .852	3.584 .884	5.201 .916	5.698 .922	6.270 .929	7.078 .936	5.092 .914		4.936 .912
1955-1960	-	2.239 .831	3.681 .887	4.660 .907	5.203 .916	4.589 .906	6.300 .929	5.877 .924	5.063 .914	4.492 .904
1960-1965	-	1.850 .806	3.151 .871	5.581 .921	5.730 .923	6.519 .931	6.200 .928	7.026 .936	6.669 .933	5.187 .916

1: 10-19 years
2: 20-24 "
3: 25-29 "
4: 30-34 "
5: 35-39 "
6: 40-44 "
7: 45-49 "
8: 50-54 "
9: 55-65 "

a = ϕ^2

b = Pearson's C

** Measured at destination (terminal year)

Those for group 4 are sufficient, and for groups 1, 6 and 8 acceptable for all except the first period. The number of cases in groups 2 and 7 are, however, only tolerable after 1950; those for groups 3 and 5, only after 1960.

Table II-9 shows the same type of mobility result, not filtering for residency in Monterrey. The measures of association are still uncomfortably high, although less so than those applicable to changes only within Monterrey's labor market[6]. A cursory examination did not detect great differences between Tables II-5 and 6. It is, nonetheless, noticeable that the number of moves within group 10 is higher in the latter - indicating migration out of low rural occupations into low urban occupations.

If we now look at a comparable result, but aggregated into 7 instead of 10 occupational groups (see Table II-10) we begin to see what, in our opinion has come to be the difficult hurdle in the road ahead. The measures of association between contiguous distributions are still high[7]. In fact, since the 7 categories are an aggregation of the 10[8], if anything the association should be stronger - and this, mostly due to the main diagonal effects that never represent less than 50% of the total number of moves. In particular, moves from group 7 to group 7 invariably account for more than 90% of the total moves originating in that grouping.

3 - <u>Occupational Immobility - Period by Period Analysis:</u> Several of the previous results have indicated both the tenacity and the closeness of the association between the occupational distributions at the beginnings and ends of the periods. Another way of saying this, is that there are few movers per period.

Table II-11 displays the relevant information. Inter--period immobility is greatest for Occupation 1 (Professionals, managers and alike). This in itself is not surprising for, as we have discussed before[9], in these occupations the typical path of mobility is through greater incomes without changes in occupation. What is surprising (and disturbing) is the high rate of inheritance in the "lower" occupations - close to 70% on average. Thus, if we look at Table II-12 we see that out of the 481 workers who were in Monterrey's labor market in 1940, 56.4% of them exercised the same occupations 5 years previously, and, that increasingly, this proportion rises. By 1965, only 26.4% of the workers occupied other occupations than the ones they had 5 years earlier. The picture is even more dramatic if we choose to compare by occupation of origin and project 5 years hence. For the base year of 1940, Table II-13 shows that 65.5% of the workers remained in the same occupation up until 1945. For the period 1960-65 this proportion had risen to 78.2%. The figures in the Table could be construed to paint a bright picture of upwards mobility. Indeed, in all periods the number of upwards move greatly exceeds that of downward moves. Nevertheless, the truth is other: what best characterizes the inter-period mobility pattern is the disproportionate amount of stayers.

It is not, however, generally the case that an increase in the homogeneity of the sample will cause these proportions to rise. For example, the figures in Table II-14 indicate that, after selecting workers with 5-9 years of occupational experience, the percentage of movers rises for the period 1960-65, in 6 out of 9 occupations. Table II-15 exemplifies

TABLE II-11

PERCENTAGE OF WORKERS WHO DID CHANGE OCCUPATIONS

Occupation:	1	2	3	4	5	6	7	8	9	10
1940-1945	100.0 (20)	88.9 (18)	46.7 (15)	62.3 (53)	57.7 (26)	85.2 (27)	80.8 (26)	87.0 (23)	46.4 (97)	65.4 (153)
1945-1950	95.1 (41)	80.0 (35)	66.7 (18)	73.9 (69)	40.0 (35)	87.2 (39)	84.8 (33)	95.0 (40)	56.9 (105)	61.8 (199)
1950-1955	93.8 (65)	76.5 (59)	64.1 (39)	76.8 (99)	79.5 (39)	88.1 (59)	77.1 (48)	85.7 (63)	66.7 (147)	71.1 (211)
1955-1960	92.8 (97)	77.8 (72)	71.7 (46)	67.2 (125)	74.5 (51)	80.7 (83)	80.0 (55)	81.3 (75)	60.2 (201)	71.4 (266)
1960-1965	95.7 (140)	80.7 (83)	73.8 (61)	80.7 (150)	(76)	84.1 (113)	79.1 (86)	81.5 (92)	65.2 (227)	76.7 (292)

Obs.: The figures in parenthesis are the total number of workers in the occupation in the year of origin.

TABLE II-12

INTER-PERIOD OCCUPATIONAL STABILITY

1940 - 1965

	MOVERS (%) (a)	STAYERS (%) (b)	N_t (c)	N_{t-1} (d)	NEW ENTRANTS (e)
1940	93.6	56.4	481	-	-
1945	39.9	60.1	643	458	185
1950	38.6	61.4	854	614	240
1955	36.0	64 0	1.112	821	291
1960	32.4	67.6	1.361	1.071	290
1965	26.4	73.6	1.547	1.320	227

(a) Workers who changed occupations in the previous five years interval.

(b) Workers who did not change occupations.

(c) Measured at terminal year (Sum of the next two columns).

(d) Workers in Monterrey's labor market in the previous period and who continued in the Market until the present period.

(e) New entrants into Monterrey's labor force.

TABLE II-13

CLASSIFICATION OF MOVES - 1940 - 1965

	Stayers	Movers Down	Movers Up	Total Number of Moves	Left the Labor Force
1940-45	65.5[a]	8.0[b]	26.5[c]	458[d]	23[e]
1945-50	69.5	6.4	24.1	614	29
1955-60	73.1	7.6	19.3	1 071	41
1960-65	78.2	7.0	14.8	1 320	41

a: were in same occupation at base and terminal years

b: Moved to an occupation bellow the main diagonal

c: Ibid: above the main diagonal

d: Refers only to the number of workers who were already in the Montera[illegible] L. F. at the base year

e: Workers who were not included in the next period's sample – either because they left the L.F., were only working part-time, were sick , or failed to declare an occupation.

TABLE II-14

PERCENTAGE OF WORKERS WHO DID NOT CHANGE OCCUPATION

(BY GROUP OF OCCUPATIONAL EXPERIENCE)*

	WORKERS WITH 5-9 YRS. OF EXPERIENCE									
Occupation:	1	2	3	4	5	6	7	8	9	10
1940-1945	100.0[a] (10)[b]	100.0 (7)	75.0 (3)	66.7 (12)	72.7 (8)	81.8 (9)	84.6 (11)	87.5 (7)	53.1 (17)	66.7 (24)
1945-1950	100.0 (13)	91.7 (11)	50.0 (3)	82.6 (19)	46.2 (6)	100.0 (11)	90.9 (10)	92.9 (13)	69.2 (18)	68.9 (31)
1950-1955										
1955-1960	96.2 (25)	75.0 (21)	85.7 (12)	69.0 (29)	62.5 (10)	79.2 (19)	66.7 (10)	87.5 (14)	62.3 (43)	61.5 (32)
1960-1965	91.7 (33)	76.2 (16)	80.0 (12)	72.1 (31)	- (0)	80.0 (20)	76.7 (23)	84.2 (16)	64.7 (44)	62.8 (27)

* Measured at terminal year (destination)

a: % of total number of workers who were in that occupation at origin

b: Number of cases.

another way of looking at this problem. Here we have first divided the sample into movers (people who changed occupations or jobs within an occupation, during the 5 year interval) and stayers, and then measured the association between the educational and occupational distributions for the various years. While the association is greater for each of the sub-groups individually than for the whole sample combined, the difference between movers and stayers is neither large nor systematic.

The final table of this section (Table II-16) presents the disaggregation of types of moves, for movers only. Once again, the overwhelming tendency is towards occupational "improvement". Curiously, however, as time passes the proportion of workers who triangulate between occupations (ie: moved, in the same period, first to another occupation and then back to the same one) increases. Certainly, this is an indication of the arbitrariness of the cut-off point, set at 5 year intervals. In other words, there is great heterogeneity within the occupational cells.

Table II-17 summarizes the foregoing discussion. It presents the total number of workers for all occupational groups in each period, as well as their composition, ie: stayers, movers and new entrants. In all cases the proportion of movers is sufficiently high to justify the estimation of a binary choice problem of the type: probability of moving vs probability of staying. The sample sizes are not hower large enough to permit an estimation of the complete mobility matrices (See Appendix Table 2).

4 - Occupational Immobility 1941-1965: One possible explanation for the inordinate number of stayers in

TABLE II-15

SCHOOLING AND OCCUPATION

(Measures of Association = 1940 - 1965, based on ϕ^{2a})

	Movers[b]	Stayers[c]	TOTAL
1940	1.350	1.340	.990
1945	1.312	1.330	1.062
1950	1.106	1.297	1.004
1955	.909	1.031	.828
1960	.967	.929	.831
1965	.992	.867	.791

a = $\phi^2 = X^2/N$

b = Workers who changed occupations in the intervalo: 1936-40; 1941-45; 1946-50; 1951-55; 1956-60; 1961-65.

c = Workers who did not change occupations.

TABLE II-16

CLASSIFICATION OF MOVERS

1940-1965

	MOVER STAYERS (a)	MOVERS DOWN (b)	MOVERS UP (c)	TOTAL NUMBER OF MOVES (d, e)
1940-45	5.2	23.9	70.9	134
1945-50	8.2	18.3	73.5	170
1950-55	13.0	22.2	64.8	193
1955-60	11.5	20.9	67.6	244
1960-65	12.5	26.2	61.3	256

(a) Workers who triangulated, i.e., moved to another item, moved to same occupation in the interval.

(b) Workers who moved to occupations above the main diagonal

(c) Workers who moved bellow

(d) Number of workers who changed occupations in the period - must have been in Monterrey's LF at the beginning of the period.

(e) Figures do not match with those of Table due to moves during 1940-1, 1945-6, 1950-1, 1955-56, 1960-61.

TABLE II-17

COMPOSITION OF OCCUPATIONAL LABOR FORCE
1940-1965

		1940-45	1945-50	1950-55	1955-60	1960-65
Occ 01	Stayers[a]	48.8	60.0	60.4	63.8	67.3
	Movers[b]	26.8	24.6	23.8	23.4	18.1
	New Entrants[c]	24.4	15.4	15.8	12.8	14.6
	TOTAL[d]	41	65	101	141	199
Occ 02	Stayers	43.2	54.9	54.2	64.4	68.4
	Movers	48.6	23.5	23.6	21.8	15.3
	New Entrants	8.1	21.6	22.2	13.8	16.3
	TOTAL	37	51	72	87	98
Occ 03	Stayers	36.8	29.3	54.3	51.6	51.7
	Movers	21.1	36.6	28.3	28.1	25.3
	New Entrants	42.1	34.1	17.4	20.3	23.0
	TOTAL	19	41	46	64	87
Occ 04	Stayers	45.8	50.0	58.0	54.5	69.5
	Movers	30.6	18.6	21.4	22.1	20.7
	New Entrants	23.6	31.4	20.6	23.4	9.8
	TOTAL	72	102	131	154	174
Occ 05	Stayers	41.7	35.0	58.5	48.7	64.6
	Movers	33.3	50.0	18.9	30.8	25.6
	New Entrants	25.0	15.0	22.6	20.5	9.8
	TOTAL	36	40	53	78	82
Occ 06	Stayers	57.5	55.7	61.9	58.3	66.4
	Movers	30.0	31.1	28.2	23.5	21.7
	New Entrants	12.5	13.2	17.9	18.2	11.9
	TOTAL	40	61	84	115	143
Occ 07	Stayers	60.0	52.8	62.7	50.0	68.0
	Movers	34.3	28.3	22.0	36.4	23.0
	New Entrants	5.7	18.9	15.3	13.6	9.0
	TOTAL	35	53	59	88	100

TABLE II-17 (Cont.)

		1940-45	1945-50	1950-55	1955-60	1960-65
Occ 08	Stayers	50.0	58.5	67.5	64.9	76.5
	Movers	32.5	26.2	20.0	26.6	15.3
	New Entrants	17.5	15.3	12.5	8.5	8.2
	TOTAL	40	65	80	94	98
Occ 09	Stayers	40.2	38.6	47.6	52.2	61.9
	Movers	25.9	25.5	17.5	17.2	23.0
	New Entrants	33.9	35.9	34.9	30.6	15.1
	TOTAL	112	153	206	232	239
Occ 10	Stayers	47.4	55.2	53.6	61.7	68.5
	Movers	11.8	7.2	8.6	11.4	11.0
	New Entrants	40.8	37.6	37.8	26.9	20.5
	TOTAL	211	223	280	308	327

a) Workers who were in same occupation at base and terminal years (%)

b) Workers who had another occupation at base year than the one they had at the terminal year (%)

c) Persons joining the Monterrey labor force, includes both those who were already in Monterrey at base year (but not working) and new migrants (%)

d) At terminal year - number of workers in occupation.

each period is that the relevant periodization is not a 5 year span but some greater interval. This is, in fact, partially the case. Taking what admittedly is a long view we observe, in Table II-17, that over the 25 year span encompassed by the data the proportion of movers exceeds that of stayers. The only noticeable exception is for workers in Occupation 1 where, we repeat, the occupational mobility path is not linked to occupational change.

TABLE II-18

OCCUPATIONAL DISTRIBUTION OF STAYERS
(1941-1965)

OCCUPATION	1	2	3	4	5	6	7	8	9	10
Stayers[a] (%)	76.2	50.0	11.8	23.1	20.0	44.0	40.0	54.5	13.5	24.1
Movers (%)	23.8	50.0	88.2	76.9	80.0	56.0	60.0	45.5	86.5	75.9
N	21	18	17	52	25	25	25	22	96	145
Left the LF[b]	1	-	-	5	1	4	2	2	9	11

a/ Workers who did not change occupation during the 1941--1965 period.

b/ See note e in Table II-13.

FOOTNOTES - INTRODUCTION

1 - Paulo Vieira da Cunha: "Occupational Mobility and Labor Market Segmentation in Monterrey, Mexico: Research Proposal", Berkeley, July, 1975.

2 - "Occupational Mobility and Labor Market Segmentation in Monterrey, Mexico: The Occupational Classification", Berkeley, October, 1975.

3 - The work in this project came abruptly to an end already on two occasions: from January to June of 1976 and from August 1976 to March 1977. The second interruption was particularly costly since it was due to the destruction of all of the previous files, containing not only the bulk of the material now finally presented in this report, but also all of the variables and file definitions necessary for any empirical work.

4 - We are thankfull to Prof. Charles Mauski of Carnegie--Mellon University for sending us a copy of his program U-LOGIT, which will be used in estimating the multinomial logit regressions linking the attributes of both workers and occupations (in a given period) to their probability of occupational mobility (by the next period).

5 - See, "Occupational ...: The Occupational Classification", op. cit., Tables E-3. These Tables also indicate the results of testing not only against Occupational group 10, but one group against the others, and possible combinations of the others.

6 - Recall that, when taken together, both these Occupations form a single group, at least from the statistical point of view.

FOOTNOTES - PART I

1/ The latter is in fact a bimodal distribution, with peaks at categories 3 and 5.

2/ The theoretical issues related to this question are explored in greater detail in our previous report: Occupational Mobility and Labor Market Segmentation The Occupational Classification.

3/ See: J.Balain, J. Browming and E. Jelin - Men in a Developing Society (Austin - University of Texas Press, 1974), Appendix B

4/ Including Groups 4 (Food and beverage store salesmen, Specialized office employees, Truck and bus drivers, etc.) and 5 (Unspecialized office workers, other drivers, Barmen and waiters, Hairdressers and alike, etc.)

5/ Encompassing; Electricians, Mechanics, Construction machine operators, Craftsmen in Printing and Paper, and Other Industrial Craftsmen.

TABLE A-1

OCCUPATIONAL CLASSIFICATION

DESCRIPTION OF OCCUPATIONS

OCCUPATIONAL GROUP	ORIGINAL CODE	DESCRIPTION
1	10-19	Profisionistas
	30-33	Gerentes, administradores, directores
2	20-24	Técnicos en varios ramos
	35	Gerentes de pequenas empresas
	39	Agentes de ventas, representantes, etc.
		Profesores secundarios
	65	Pilotos, navegantes, oficiales de navegación, etc.
3	05	Suboficiales de fuerzas armadas
	25-29	Profesores primarios, bibliotecarios, artistas, etc.
	34	Gerentes de est. comerciales
	37	Vendedores en un local (no alimentos, etc)
	46-47	Jefes de obreros y de oficina
	57	Proprietarios de tierras de mas de 50hec.
4	36	Vendedores en local (alimentos, bebidas, etc.)
	40	Cajeros, cobradores, etc. (Empleados de Contabilidad)
	41-44	Taquicrafos, mecanografos, etc. (Empleados de oficina)
	62-64	Choferes de camion, de transporte interurbano, etc.
	66	Maquinistas de tren
5	02	Piluqueros
	04	Barmen,
	45	Inspectores, Despachadores empleados de almacen, etc.
	48	Empleados de oficina (sim discriminacion)
	60-61	Choferes de taxi (empleados), otros choferes urbanos
	69	Otros choferes y conductores
	86	Empacadores en linea de montaje

6	76-77	Operarios y artesanos en electricidad/Mecanicos
	79-80	Operarios de motores fijos en construcción, etc.
	85	Operarios en manuf.papel, Artesanos en impresión
	87	Otros artesanos industriales
7	70-71	Operarios y artesanos textiles
	75	Operarios y artesanos en metales
	78	Mecanicos de instrumentos
	81	Operarios y artesanos en fundición
	83	Operarios y artesanos químicos
8	72-74	Albañiles, ajalejistas, trabajadores en madera
	82	Operarios en ceramica, vidrio
	84	Operarios de la industria alimentícia
9	06-07	Obreros en servicio de protección
	88-89	Obreros sin especificar
	95-96	Obreros de limpieza, veladores, porteros
	92-94	Obreros auxiliares en servicios
	03	Cantineros
10	01	Serviço domestico
	08	Empacadores manuales
	09	Trabajadores sin tarea fija
	38	Vendedores ambulantes
	49	Musicos ambulantes
	68	Conductores de vehiculo de tracción animal
	90	Ayudantes en construcción
	91	Estibadores, cargadores, etc.
	93	Obreros auxiliares en la industria

FOOTNOTES - PART II

1) The theorical model which lead us to the selection of these variables is discussed in an earlier repot: Occupatioanl Mobility and Labor Market Segmentation: Purpose, pp. 31-47

2) This showed not be construed as evidence that there was no training, It merely suggests that whatever training there was, was informal. For a more complete discussion of this apparent contradition see: S.A. Morley, et. alii., "Evidence on Internal Labor Market During a Process of Rapid Growth", Mimes ,1977.

3) Originally there were up to 13 possible categories, from Aprendiz to Mayordomo, supervisor o capataz.

4) The proportions are:(1940) 13.9%, (1945) 14.02%, (1950)13.3%, (1955)10.4%, (1960)11.52%, (1965)7.2%.

5) See: S. Trejo: "El incremento de al producción y el empleo industrial en Mexico" Demografia y Economia, vol. 4. nº1, (1970), pp. 102-120, also: Industriallización y Emples en México (México D.F., Fondo de Cultura Economica, 1973), Capitulo III and Apendice I.

6) The comparable figures (Phi-square) are:

1940-45	: 3.790	3.523
[illegible]-50	: 4.147	3.737
1950-55	: 4.936	4.240
1955-60	: 4.492	4.268
1960-65	: 5.187	4.811

7) The corresponding figures (Phi-square) are:

1940-45 : 2.485
1945-50 : 2.632
1950-55 : 2.880
1955-60 : 2.980
1966-65 : 3.444

7 cont.) Those figures are not comparable with those of footnote (6) since the value of Phi-square is affected by the size of the table.

8) The comparability of the classification is given by:

Occupation	7	=	9 +10
	6	=	8 +5
	5	=	7
	4	=	4 +6
	3	=	3
	2	=	2
	1	=	1

9) See: Occupational Mobility ad Labor Market Segmentation: The Occupational Classification,

Chapter II

II. 1 Introduction.

The analysis of the previous chapter was largely based on descriptive two-way contingency tables. There is much to be learned from this type of comparisons but much more so if we can go beyond the simplest two-way tables and consider more complex structures for the data. Ultimately, our interest lies in the mobility process understood as a relationship between, on the one side, a set of personal a and structural characteristics and, on the other, the observed occupational outcomes. Moreover, we fully acknowledge the fact that we are dealing with a heuristic process. We limit ourselves to sample data and, at the individual level a proper specification of the process of change will not do without recourse to some element of chance. We are therefore also concerned with the formal theory of hypothesis testing, extendend to the case of more complex types of multidimensional contingency tables.

Such tables present special problems of analysis and interpretation. As Fienberg has noted, when faced with multidimensional cross-classifications, most researchers would handle the problem by analysing various two-dimensional marginal totals, "that is, by examining the categorical variables two at a time". Yet, such an approach, "(a) confuses the marginal relationship between a pair of categorical

variables with the relationship when other variables are present, (b) does not allow for the simultaneous examination of the pairwise relationships, (c) ignores the possibility of three-factor and higher order intearctions among the variables".[1]

Recent work on the development of loglinear models for the analysis of multidimensional contingency tables permits us to free ourselves from some, if not all, these limitations.[2] It should at once be made clear that our specific interest is in a particular type of loglinear model: one where a distinction is made between explanatory variables and (in this case) a single response variable; furthemore, one where at least some of the explanatory variables are continuously measured and not counted. This would call for the use of logit or linear logistic models, in which one predicts log-odds quantities involving the dependent variable using a linear combination of effects due to the explanatory variables. But, in fact, these models are - as we shall demonstrate - transformed expressions of the general log-linear model. For this reason the presentation of the method

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(1) Fienberg (1977) p.1

(2) Fienberg (1977) pp.4-6, presents a brief historical background to the development of loglinear models. His book is an excellent and concise presentation of the basic method and properties of loglinear models. A more complete theoretical presentation can be found in Bishop, Fienberg and Holland (1975), (see also the review article of Nerlove and Press (1977), and in Haberman (1974). An early and influential application to the mobility problem is Goodman (1969).

is organized in the following way. First we introduce the loglinear notation to the simple two-dimensional table, later extending it to the general case. We then discuss the problems of statistical inference in loglinear models, and, finally, show how the logit formulation can be derived as a special case of the general loglinear model.

II. 2 Biographical time and choice of models. There are however two prior questions that should be briefly adressed. The issue of time in biographical analysis. Also, the question of why our choice of loglinear models for contingency tables over the more familiar. (at least in the economic literature) conditional logit analysis.(3)

The treatment of time is a fundamental albeit intractable problem in mobility research. Undoubtedly, for the analysis of occupational change it would be best to treat an individual's career as the relevant unit of observation. Instead, our choice has fallen on time-discrete occupational changes.

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(3) McFadden (1976a) surveys the relevant literature. Boskin (1973) and Schmidt and Strauss (1975) deal with models of occupational choice that might at first be thought, erroneously, similar in character to our specific problem. These analyses do not explore the process of occupational change. Instead, they attempt, within a cross-section, to predict the probabilities of being is one of j occupational given a vector of individual characteristics. Their explicit aim is to "test" a theory rather than explore the structure of the process.

In part this is due to our interests. Since we seek to associate occupational outcomes with, among other things, changes in the structure of production, we must set equal dates of comparison for all workers in the sample. There is also another reason. Models based on continuous sequences of occupations are either empirically impracticable or conceptually simplistic. If time is treated as a quasi-continuous variable the sample sizes in the corresponding cells of the table became too small to be of any use.[4/] And even if the samples were larger it would be difficult to justify such an inordinate amount of work for so small a gain! Of course an alternative would be to impose a probabilistic model of change, such as a Markov chain.[5/]

4/ The Monterrey occupational data is reported on a year-by-year basis so that the exact date of change, and possible changes that occur within a year, are not available. In fact, given the method of data collection this information could not have been reliably recovered from the subject. A timely discussion of the methodological issues in time-dependent occupational comparisons can be found in Duncan (1966).

5/ In their original analysis of the Monterrey data, Balán, Browning and Jelín (1973) present still another alternative. Their work is mostly based on longitudinal career models of the type developed by Blau and Duncan (1967). The formal models of Chapter 10 have as observatons the respondent's first occupation and, depending on the cohort, occupation at age 25, 35, 45 and 55. Thus, although inter-cohort comparisons are possible, the analysis does not consider explicitly the link between the varying pattern of labor demands and the process of occupational change. Further work on the so-called "models for the socioeconomic career" is reported in Sewell and Hauser (1975).

Lately there been a flurry of activity in this direction.(6) For the most part however such efforts have lacked substantive content. Rather then analysing the process of mobility, they have addressed the question: if the system has an elementary stochastic structure, what will the future be? Not surprisingly, these attempts as futurology have usually failed.(7)

On the other hand, once the models are modified to take account of the problems of nonstationarity and heterogeneity of the transition matrices, (viz. Spilerman (1972)) the suggested estimation techniques apply only for the one-step transition probabilities. What is more, they are

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(6) For an excellent survey, see Stewman (1976) and for a formal presentation of the "state of the art", Singer and Spilerman (1976). The pioneering work on semi-Markov processes was that of Blumen, Kogan and McCarthy (1955), with important contributions by Prais (1955), Hodge (1966), McFarland (1970), Spilerman (1972), Theil (1972) - Capter 5, and Sorensen (1975). A review and a suggested model to be applied to the Monterrey data can be found in Vieira da Cunha (1975). Modified mover stayer models were applied to the mobility process between income classes by McCall (1973), and Shorrocks (1976). Lillard and Willie (1978) in a stimulating article both criticize this approach and suggest a new model for income dynamics that is, not, however, Markovian.

(7) After surveying the straight Markov chain applications, Ginsberg concluded: "In the area of mobility, Markovian models of the industrial mobility of labor... are unrelated to studies of industrial structure and economic growth. Nor is there any connection between Markovian models of intergenerational mobility and studies of economic and educational opportunity, life style, class organization, etc. ... we have elaborate mathematical analysis of the stochastic structure of the process explicitly ignoring its determinantes...", Ginsberg (1972) p.66.

based (or should be based) on loglinear or logistic models of the kind to be proposed herein.[8] Attempts to build regular Markov models with time-invariant matrices formed by "averaging" the time constrained one-step matrices are doomed to failure. Quite apart from the problem of estimation (that would be monumental) it must be recognized that occupational mobility involves moves which are fundamentally determined by the structure of labor demands. The Markov model, with its limiting of "steady state" distribution, does not mirror his situation at all. In the Markov model, the transition probabilities determine the occupational distribution uniquely, contrary to the notion that the availability of jobs in different occupational groups determines the chances of moving into these occupations. Thus in the Markov model it is the mobility that determines the structure rather than the structure that determines the mobility.[9]

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(8) Nontationarity refers to the fact that in analysing occupational change the matrix of transition probabilities varies with time. Heterogeneity refers to the fact that the matrix is not same for all individuals but is assumed do differ in response to a known vector of individual characteristics. In his 1972 article Spilerman advocates the use of a linear probability model to estimate the individual, time specific probabilities. Applications of the linear probability model with continous exogeneous variables lead to biased and inefficient estimates of the relevant probabilities, a result already pointed out in Theil (1970) and elaborated in Kohn (1976) pp.19-22. The equivalence in estimating techniques in formally demonstrated in Mackae (1977); see also Wise (1975)p.921.

(9) See Singer and Spilerman (1974).

Turning now to the question of loglinear vs condicional logit models it must at once be recognized that what separates them is not estimating technique. Inspite of the lingering conceptual differences in formulating the probability problem, the actual estimating technique is the same no matter which theoretical formalization happens to be chosen. Paraphrasing McFadden it could be said that the protopypical experiment (for workers in a given occupation and year) is one in which individual characteristics and actual occupational moves are observed for a sample of subjects. The moves reflect attributes of possible occupational destinations, as well as differences in individual characteristics. Supposing that the number of occupations is limites (ie: discrete) we can postulate that the actual outcomes are observations from multinominal distributions with selection probabilities conditioned on the occupation of origin, the observed values of individual characteristics and attributes of alternatives.(10)

The difference between the two models lies in the fact it is possible to derive the conditional logit specific-

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(10) McFadden (1976 b) p.511. In this regards, the approach differs from the technique of discriminant analysis, "which postulates that the observed values of individual characteristics and atributes of alternatives are drawings from posterior distributions conditioned on actual responses", (Ibid). The use of discriminant analysis to estimate logistic regression models will usually lead to biased results, (Ibid pp.517-521, Press and Wilson (1978) p.701).

ation from the economic (neoclassic) theory of individual choice; that is, if one supposes that the stochastic terms in the individual utility functions are independently, identically distributed with the reciprocal exponentical, or Weibull, distribution.(11) Loglinear models, on the other hand, are simple mathematical descriptions of contingency tables. By making some assumptions about the relationship between the variables in the table, expressed in terms of the joint probability distribution for each observation in the sample, it is possible to transform loglinear into logistic models. In this case, the use of the logit specification involves no restrictive assumption about the distribution of unobserved differences among individuals.

Since we explicitly do not wish to tax our empirical model with the burden of an axionomatic theory of choice we prefer the second alternative. Even if we chose to ignore the methodological critique that may be addressed to the

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(11) See Lemma I in McFadden (1972) pp.8-9. There is no "economic" reason for this choice: "Unfortunately, this specification must be made on the grounds of computability since only (this) probability distribution is known to lead to a likelihood function of any simplicity" (Kohn, Manski and Mundel (1976) p.395. Within the context of the neoclassical theory of utility maximization, the primary disadvantage of the functional form providing the basis of conditional logit is a property termed the "independence of irrelevant alternatives". According to McFadden (1976a, p.369) "this axiom states, roughly, that the relative odds in a binary choice will remain the same for these alternatives when additional alternatives because available". This property has, justifiably, been questioned. See, for example, Hausman and Wise (1978).

concepts of utility maximization and subjective choice we still could not adopt the theory. The necessary formal theoretic framework is simply not available. What would be needed in this case in an operationally valid, dynamic theory of utility maximization with optimal occupational choices. We certainly do not have the capability of inclination to develop it. And although there are some attempts in this direction, the underlying restrictions are too heroic to make the models attractive for empirical use.(12)

Moreover, in the theory of stochastic choice of the econometric literature it is the characteristics of the choices that enter the logit function, while the parameters refer to the characteristics of the decision-maker. In our use os the logit transformation the variables are the characteristics of the workers (subjects), and the characteristics of the choices (occupational destiny) are expressed by the parameters. Even if we wanted to, we could not estimate a model of conditional choice. Apart from the information used to classify the occupations, there is no data in our

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(12) The most influential work in this direction is Ben Porath's article. More recent developments can be found in Heckman (1976), Rosen (1976), and Haley (1976), among others. For a scathing and brilliant criticism of the assumptions of utility maximization in neoclassical theory see Hollis and Nell (1975), also Himmelweit (1977). Still, for those who wish, it will always possible to interpret our results - heuristically - within the context of constrained utility maximization.

sample about the characteristics of the choises themselves.[13] We cannot possibly know how much a worker would have if he had moved to this or that occupation, or how much training he would have received, etc. Futhermore, we have no interest in these exercises. They abstract from what for us is of utmost importance: the given structure or production and of labor demands.

II. 3 The Loglinear model.[14]

Suppose we consider an occupational mobility table between two consecutive periods and that for ease of presentation we temporarily aggregate the 10 occupational groups in only two categories. In doing this we would have classified the sample of N individuals (n = 1, 111, N) into two mutually exclusive and exhaustive groups. Senote by A_1 and A_2 the occupational distributions at origin and destination, respectively, and by I_1 (i_1 = 1,2) and I_2 (i_2 = 1,2) the categories in each distribution. If we then count how many in each distribution fall into each group we could produce a string of observed counts $\{x_{i_1 i_2}\}$ such that

(13) As Barr and Hall (1973) have pointed out, "the discussion of McFadden and others... may have given rise to some confusion on this point" (p.14). Potential users should be warned that the computer programs listed in footnote 4 of McFadden (1976a) will not be operational unless for a given individual the attributes of the choice-set measured.

(14) This section draw heavily from Chapter 2 and 6 in Fienberg (1977) and Chapter 2 in Bishop, Fienberg and Holland (1975). Its purpose is to selectively present the theoretical basis of the staristical methodology to be used in our analysis of the Monterrey data. Needless to say it contains no new results.

$$\{x_{i_1 i_2}\} = (x_{11}, x_{12}, x_{21}, x_{22},)$$

where

$$\sum_{i_1}^{I_1} \sum_{i_2}^{I_2} x_{i_1 i_2} = N.$$

The classified counts can be arranged in a 2 x 2 table where the underlying variables actually have the same categories and simply represent measurements on one variable at two points in time.

If we make the further supposition that the randomly selected individuals of the population all fall into one of the two categories with probability $p_{i_1 i_2}$ $(i_1 = 1, =; i_2 = 1,2)$ are $\sum_{i=1}^{I_1} \sum_{i=j}^{I_2} p_{i_1 i_2} = 1$, then the p's will reflect the relative frequency of each category in the population, and

$$p_{i_1 i_2} = \frac{m_{i_1 i_2}}{N} = i_1 = 1, =; \quad i_1 = 1, 2 \tag{2.1}$$

where

$$m_{i_1 i_2} = E(x_{i_1 i_2}).$$

Consider now the contingency table describing the joint probabilities of the two events, A_1 and A_2:

		A_2		TOTAL
		1	2	
A_1	1	p_{11}	p_{12}	p_{1+}
	2	p_{21}	p_{22}	p_{2+}
	TOTAL	p_{+1}	p_{+2}	1

The condition for independence of A_1' and A_2 implies that

$$p_{i_1 i_2} = p_r \{\text{row category} = i_1 \text{ and column category} = i_2\}$$
$$= p_r \{\text{row category} = i_1\} p_r \{\text{column category} = i_2\}$$
$$= p_{i_1} + p_{+i_2}$$

for $i_1 = 1, 2$ and $i_2 = 1, 2$. From (2.1), the expected value of $x_{i_1 i_2}$ is $m_{i_1 i_2} = Np_{i_1 i_2}$, and under the model of independence $m_{i_1 i_2} = Np_{i_1} + p_{+i_2}$. If we substitute the observed row proportion $x_{i_{1+}}/N$ as an estimate of $p_{i_{1+}}$ and the observed column proportion x_{+i_2}/N for p_{+i_2}, we get the well-know formula for the estimated expected probability value in the (i_1, i_2) cell under the model of independence:

$$\hat{p}_{i_1 i_2} = \frac{x_{i_1+} x_{+i_2}}{N} \quad i = 1,2; \; j = 1,2. \tag{2.2}$$

Taking the natural logarithm of both sides of equation (2.2),

$$\log \hat{p}_{i_1 i_2} = \log x_{i_{1+}} + \log x_{+i_2} - \log N; \tag{2.3}$$

and thinking in terms of an $I_1 \times I_2$ table with I_1 rows and I_2 columns reveals a close similarity to analysis-of-variance notation. Following the idea that the total variation in a table between two independent variables may be exactly decomposed into the sum of an overall effect, a row effect and

a column effect, the parameter $p_{i_1 i_2}$ may be expressed as[15]

$$\log p_{i_1 i_2} = u + u_{1(i_1)} + u_{2(i_2)}, \quad i_1 = 1,2; \; i_2 = 1,2. \tag{2.4}$$

where u is the grand mean of the logarithms of the expected probability - values,

$$u = \frac{1}{I_1 I_2} \sum_{i_1=1}^{I_1} \sum_{i_2=1}^{I_2} \log p_{i_1 i_2} \tag{2.5}$$

$u + u_{1(i_1)}$ is the mean of the logarithms of the expected values in the I_2 cells at level i_1 of the first variable,

$$u + u_{1(i_1)} = \frac{1}{I_2} \sum_{i_2=1}^{I_1} \log p_{i_1 i_2} \tag{2.6}$$

and similarly for the i_2^{th} level of the second variable:

$$u + u_{2(i_2)} = \frac{1}{I_1} \sum_{i_1=1}^{I_1} \log p_{i_1 i_2} \tag{2.7}$$

because $u_{1(i_1)}$ and $u_{2(i_2)}$ represent deviations from the grand mean u,

$$\sum_{i_1} u_{1(i_1)} = \sum_{i_2} u_{2(i_2)} = 0. \tag{2.8}$$

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(15) See Fienberg (1977) pág.14. Clearly, since N is given we could do the same thing with the decomposition of the probabilities p_{ij} instead of the expected counts m_{ij}. This is, in fact, done in Bishop, Fienberg and Holland (1975) pág, 17.

If we think of the two variables interacting, we can add an "interaction term" to the independence model, in which case

$$\log p_{i_1 i_2} = u + u_{1(i_1)} + u_{2(i_2)} + u_{12(i_1 i_2)} \tag{2.9}$$

where

$$u_{12(i_1 i_2)} = \log p_{i_1 i_2} - \frac{1}{I_2} \sum_{i_2=1}^{I_2} \log p_{i_1 i_2} +$$

$$+ \frac{1}{I_1} \sum_{i_1=1}^{I_1} \log p_{i_1 i_2} + \frac{1}{I_1 I_2} \sum_{i_1=1}^{I_1} \sum_{i_2=1}^{I_2} \log p_{i_1 i_2} \tag{2.10}$$

and now, in addition to (2.8), we have

$$\sum_{i_1=1}^{I_1} u_{12(i_1 i_2)} = \sum_{i_2=1}^{I_1} u_{12(i_1 i_2)} = 0. \tag{2.11}$$

The model in equation (2.9) is a complete description of the 2x2 table: its estimated cell probabilities are / identically equal to the observed cell proportions. Since the model has a many independent parameters as the table has cells, it is called a <u>saturated</u> (or full-rank) model.

Since we will need them later, we now define the expressions.

$$\alpha_1 = \upsilon_1 \ (i); \quad \alpha_2 = \upsilon_2 \ (i_2); \quad \beta = \upsilon_{12} \ (i_1 \ i_2) \qquad (2.13)$$

$$\log p_{11} = u + \alpha_1 + \alpha_2 + \beta$$

$$\log p_{12} = u + \alpha_1 - \alpha_2 - \beta$$

$$\log p_{21} = u - \alpha_1 + \alpha_2 - \beta$$

$$\log p_{22} = u - \alpha_1 - \alpha_2 + \beta .$$

Where $-u = \log \{\exp(\alpha_1 + \alpha_2 + \beta) + \exp(\alpha_1 - \alpha_2 - \beta) +$

$$+ \exp(-\alpha_1 + \alpha_2 - \beta) + \exp(-\alpha_1 - \alpha_2 + \beta)\}$$

In general, if we have a sample of N observations on q categorical random variables $A_1 \ldots A_Q$ we might arrange these in an $I_1 \times I_2 \ldots \times I_0$ table of counts corresponding to a similar arrangement of the expected values in the $(i_1, i_2, \ldots i_q)$ cells

$$m_{i_1 i_2 \ldots i_q}, \quad i_1 = 1 \ldots I_1, \quad i_2 = 1 \ldots I_2, \quad \vdots \quad i_q = 1 \ldots I_Q$$

Taking logarithms and arranging the log $m_{i_1,\ldots,i_q}$'s in an ANOVA + type notation, we can write:

$$\begin{aligned} \log m_{i_1 \ldots i_q} = u &+ u_{1(i_1)} + u_{2(i_2)} + \ldots + u_{Q(i_q)} \\ &+ u_{12(i_1 i_2)} + \ldots + u_{Q-1,Q(i_{q-1}, i_q)} \qquad (2.15) \\ &+ u_{123(i_1 i_2 i_3)} + \ldots + u_{Q-2,Q-1,Q(i_{q-2}, i_{q-1}, i_q)} \\ &+ \ldots \\ &\vdots \\ &+ u_{1,\ldots,Q}(i_1, \ldots, i_Q) \end{aligned}$$

where the terms $u_{1(i_1)}$ to $u_{1,\ldots,Q}(i_1\ldots,i_q)$ satisfy the usual ANOVA constraints:

$$u_{1(.)}=u_{2(.)}=\ldots=u_{q(.)}=0$$

$$u_{12(i_1,.)}=0;\quad u_{12(.,i_2)}=0;\quad \ldots u_{Q-1,\,Q(.,q)}=0 \qquad (2.16)$$

$$u_{123(i_1,i_2,.)}=0;\quad \ldots u_{Q-2,Q-1,Q(.,\,q-1,\,q)}=0$$

$$\vdots$$

$$u_{1,\ldots,Q(i_1,\ldots i_{q-1},.)}=0;\quad \ldots u_{1,\ldots Q(.,i_2,\ldots,i_q)}=0$$

where the dot used in place of an index denotes summation over that.(17) The parameters $u_{1(i_1)}$, etc have the usual ANOVA interpretation: u denotes an overall effect; $u_{1(i_1)}$ denotes an effect due to "level" i_1 of variable A_1; $u_{12(i_1,i_2)}$ denotes a second-order interaction effect betwen A_1 and A_2 (at "levels" i_1, and i_2, respectively) controlling for the remaining variables; and $u_{1,\ldots,Q}(i_1,\ldots,i_q)$ denotes a q-order interaction among $A_1,\ldots,A_Q$ (at "levels" $i_1,\ldots,i_q$, respectively); etc.

As Fienberg has observed, what makes this approach to the analysis of contingency tables particularly attractive is the fact the "each subscripted u - term in the general loglinear model can be expressed as a linear combination of the logarithms of the expected values (or equivalently the logarithms of the cell probabilities), where the weights or

(17) See Nerlove and Press (1976) pp. 8-9.

coefficients used in the linear combination add to zero".[18]

On the other hand, it can also be shown that, if the counts are observations from independent multinomial distribution, then the MLE, $\hat{m}$, of each expected cell frequency m (or equivalently, $\hat{p}$, of p) under the loglinear model exists and is, in most cases, unique.[19]

Taken together, these conditions (theorems) provide us with estimates for all the u-terms in the general model.

This is not, however, enough. Since a given result of the model depends on a simultaneous combination of u-terms, we need additionally to know something about their <u>joint</u> distribution. For this purpose we make use of the following fact. If, in a large sample, the $\{x_{i_1,\ldots,i_q}\}$ follow a multinominal sampling model, then the <u>joint</u> distribution of the linear contrasts corresponding to each of the u-terms in the model, and defined by restriction (2.16), is approximately multivariate normal with know (ie, consistently estimatable by ML techniques) mean and variance.[20]

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(18) Fienberg (1977) p.70. Such linear combinations are known as <u>linear contrasts</u>.

(19) This result can be extended to other distributions. See Fienberg (1977) Appendix II pp. 131-134; or Bishop, Fienberg and Holland (1975) Chapter 13 pp. 455-456 for a more complete statement of the proofs. It is important to note that in all but the 2 x 2 tables some of MLE need to be estimated by iterative procedures.

(20) See Theorem 5.1 in Fienberg (1977) pp.71-72; or, Theorem 14.6-2 in Bishop, Dienberg and Holland (1975) pp. 493-494. This result also holds for some other distributions.

II. 4 Test of significance for the general loglinear model.

Expression (2.9) is a complete representation of the simple mobility table of the type constructed in Chapter I; expression (2.15), on the other hand, is the generalization for multidimensional tables. As we have seen, the u-terms in a loglinear model reflect ordered interactions among the variables in the table. Hypothesis concerning the structure of an $I_1 \times I_2 \times \ldots \times I_q$ table can therefore be introduced simply by altering the specification of the general loglinear model for the table. More precisely, a certain a priori structure can be imposed by setting some of the interaction effects equal to zero. In effect, by changing the ANOVA constraints given by (2.16).

The maximum likehood estimates for the cell-probabilities of the new model can then be computed - for it can be shown that, in most cases, the new restrictions do not affect the global concavity of the joint likelihood function.(21)

Large sample tests based on the central chi-square distribution are available for testing the fit of any hypothesized model versus the saturated alternative whose estimates are exactly equal to the observed cell values in the table. Define the likelihood ratio as

$$\lambda = L_R/L_S,$$

(21) This is strictly true only in cases where there are no empty cells in the table due, not to the structuring of the data, but to the nature of the sampling process. See Theorem 7 in Nerlove and Press (1976) pp.38-42.

where L_R is the maximum value of the likehood function for the restricted model, and L_u the corresponding value for the unrestricted version. Then, if the null hypothesis is correct, and the total sample size is large,(21) the quantity $\lambda^* = -2 \log \lambda$ has an aproximate chi-square distribution with degrees of freedom given by(22)

d.f.= (Nº of constraints in the saturated model)
- (Nº of constraints in the restricted model).

In the general log linear model of equation (2.15) subject to restriction (2.16), successively higher-order u-terms measure deviations from lower-order terms. Therefore,

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(21) There is no clear definition of how large is "sufficiently large". A rule of thumb for most applications is to interpret it to mean that the total sample size is at least ten times the number of cells in the table (Fienberg (1977) p.37 or that the smallest expected frequency in any cell is in the neighborhood of 5 (Blalock p.285, also Reynolds (1977) p.159. Generally, the smaller the number of cells and the more nearly equal are all marginal / totals, the smaller the total N can be. Whenever there are grounds to doubt the adequacy of the aproximation, it is advisable to make a correction for continuity. However, as Blalock points out: "Corrections for continuity cannot easily be made in the case of the general contingency table. If the number of cells is relatively large and if only one or two cells have expected frequencies of 5 or less, then it is generally advisable to go ahead with chi-square tests eithout worrying about such corrections". (Blalock (1972) p. 286.

(22) Alternatively, we could use the Pearson chi-square statistic given by

$$X^2 = \sum_{i=1}^{Q} \frac{(\text{Unrestricted estimates} - \text{Restricted estimates})^2}{\text{Unrestricted estimates}}$$

where is the number of parameters in the model. X^2 is asymptotically equivalent to G^2, however, in making tests, from the most general form of the model to the most restrictive, is it generally true that G^2 (most restrictive) > G^2 (least restrictive), a result that does not necessarily hold for X^2. See Fienberg (1977) p.49, also the discussion in Reynolds (1977) Chapter 6.

by limiting our hypothesis to models in which higher-order terms may be included only if the related lower-order terms are included, we form a hierarchical set of hypothesis.(23) For such a set, the likelihood ratio test statistics are independent of one another, at each "level" of the hierarchy. Thus we can, with the same general method, test the significance of a succession of hypothesis without compromising the power of our test.(24) Moreover, and more generally, if of two linear models, model (2) contains only a subject of the terms contained in (1),(that is, is nested in 1)), then the statistic λ^* of model (2) can be broken down into additive parts. The total can be partitioned similar to the sum of squares in the usual analysis variance model: (i) a measure of the distance of the estimates $\{\hat{m}_i^{(2)}\}$ from those obtained under model (1), $\{\hat{m}_i^{(1)}\}$; (ii) a measure of the distance of the estimates for model (1) from the actual cell-observations, $\{\hat{x}_i\}$. Therefore,

$$\begin{aligned}\lambda^*(2) &= -2\{L(\hat{m}^{(2)}) - L(x)\}\\ &= -2\{L(\hat{m}^{(2)} - L(\hat{m}^{(1)})\} - 2\{L(\hat{m}^{(1)}) - L(x)\}\\ &= \lambda^*\{(2)/(1)\} + \lambda^*(1),\end{aligned}$$

---

(23) Thus, in a hierarchical set, u_{123} cannot be included in a model unless u_{12}, u_{13} and u_{23} are all in the model. See Bishop, Fienberg and Holland (1975) pp.67-68.

(24) The seminal work on hierarchical testing methods for multitimensional contingency tables is Goodman's (1970) paper. A most readable presentation of the subject can be found in Davis (1974).

where $\lambda^*\{(2)/(1)\}$ is the conditional measure for model (2) given model (1). It can be shown that, since $\lambda^*(2)$ and $\lambda^*(1)$ are assymptotically distributed as chi-square with v(2) and v(1) degrees of freedom, respectively, then $\lambda\{(2)/(1)\}$ is also assymptotically chi-square with v(2) - v(1) degrees of freedom.(25) If, for example, the two models differ only by a single u-term a test of the difference in goodness-of-fit statistics between the two models may be found by fitting a model with and without this u-term and comparing the value of $\lambda^*D = \lambda^*(2)-\lambda^*(1)$ against an appropriate chi-square table.(26)

Since the joint distribution of the MLE of the u-terms in a loglinear model is assymptotically multivariate normal, a test of the hypothesis H_o: $\hat{u}_k = u_k^o$ can utiliza the fact

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(25) See Theorem 149.8 in Bishop, Fienberg and Holland (1975) p.525. This result is analagous to the usual F-test in stepwise regression procedure, and has a similar interpretation.

(26) An alternative test, due to wald, is particularly convenient, since it requires fitting the model only under the alternative hypothesis (in contrast to the likelihood-radio test, which requires fitting the model twice. For this reason it has been used in many applications; for example in Growder and Grob (1975). However, as Hauck and Donner (1977) have shown, Wald's test has the following undersirable features "(1) for any sample size, Wald's test statistic decreases to zero as the distance between the parameter estimate and null value increases; (2) the power of Wald's test ... decreases to the significance level for alternatives far from the null value", (p. 851).There is therefore a tendency to accept the null hypothesis in situations where the value of likelihood ratio would indicate rejection.

that the statistic

$$\frac{\hat{u}_k - u_k^o}{(\mathrm{Var}\ (\hat{u}_k))^{1/2}}$$

is distributes asymptotically as the Student's "t" distribution.(27)

II. 5 The logistic transformation

Inspite of its comprehensivenss and ease of manipulation, the general loglinear model as expressed in equations (2.15) and (2.16) is not really adequate for out purposes. Of interest is the relative occurance of moves for the two occupational groups between the terminal years of a given period; that is, the change in distribution A_2 relative to A_1.

In considering the mobility problem we take the row marginals m_{1+} and m_{2+} to be fixed by design and are interested in the relative frequency of cases in each of the column / categories. The number of workers in each occupation at the initial year is given, what varies is their distribution by the end of the period. If the row totals are given, then we

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(27) See Theorem 14.3-5 in Bishop, Fienberg and Holland (1975) p.471. An identical result can be derived for the corresponding logistic model. For this, see McFadden (1972) Lemma 6 p.22. The test is in some ways similar to the usual "t-test" of normal regression theory. Note, however, that in the general loglinear model the relationship between two variables is expressed not through a / single parameter β but by means of a vector of parameter values: $u_1^{(\ )}, u_{12}^{(\ )}, u_{123}^{(\ )}, \ldots, u_{1,\ldots,Q}^{(\ )}$.

must relate to another sampling scheme. In particular, we are supposing that sample of N_1 individuals is taken from the first category of variable A_1, N_2 from the second, etc. A table is then generated by counting how many fall into the different categories of variable A_2. In this case, the paired observations $\{A_1 = i_1, A_2 = i_2\}$ for the i_1^{th} category of A_1 and i_2^{th} category of A_2 independent multinomial variables taking values $i_1 = 1,\ldots,I_1$; $i_2 = 1,\ldots,I_2$ with

$$P_r\,(A_1 = i_1, A_2 = i_2) = P_{i_2(i_1)}, \text{ for } n_i = 1, 2,\ldots, N_i$$

and $\sum_{i_2} p_{i_2(i_1)} = 1.$ (28)

Clearly, there are as many such probabilities as there are categories in variable A_1.

In the simple 2 x 2 example, with $i_1 = i_2 = 1, 2$ the of expected counts becomes

(28) We use capital letters to indicate these probabilities do differentiate them from those corresponding to the general linear model. For the latter, $\sum_{i_1 i_2} p_{i_1 i_2} = 1$. Such sampling schemes are equivalent to what Manski and Lerman (1977) call exogenous sampling. "In exogenous sampling, the analyst draws a decision maker t characterized by the attributes Z_t according to the density g and then observes the choice made by this decision maker from the choice set C, " (p.1979).

		1	A_2 2	TOTAL
	1	m_{11}	m_{12}	N_1
A_1	2	m_{21}	m_{22}	N_2
	Total	$m_{.1}$	$m_{.2}$	N

Corresponding to this table, there is a table of probabilities $P_{i_2(i_1)}$ the probability of being in category i_2 of A_2 for sample i_1 of A_1 Therefore,

$$P_{i_2(1)} = \frac{m_{1i_2}}{N_1}$$

$$\text{for } i_2 = 1,2 \qquad (2.17)$$

$$P_{i_2(2)} = \frac{m_{2i_2}}{N_2}$$

Instead of the four probabilities summing to 1, we have

$$P_{1(1)} + P_{2(1)} = 1$$

$$P_{1(2)} + P_{2(2)} = 1 \qquad (2.18)$$

The <u>logit</u> for the ith row is defined as,

$$L_{i_1} = \log \frac{P_{1(i_1)}}{1 - P_{1(i_1)}} = \log \frac{m_{i_1 1}}{m_{i_1 2}} \qquad (2.19)$$

where the second identity follows from expressions (2.17) and (2.18). Note that the RHS of equation (2.19) can be expressed ad

$$L_{i_1} = \log m_{i_1 1} - \log m_{i_1 2}$$

$$= \log p_{i_1 1} - \log p_{i_1 2}$$

since N_1 is fixed.

But from (2.9) we know that.

$$\log (p_{i_1 1}) = u + u_{1(i_1)} + u_{2(1)} + u_{12(i_1 1)}$$

$$\log (p_{i_1 2}) = u + u_{1(i_1)} + u_{2(2)} + u_{12(i_1 2)},$$

so that

$$L_{i_1} = u_{2(1)} - u_{2(2)} + u_{12(i_1 1)} - u_{12(i_1 2)}$$

$$= 2u_{2(1)} + 2u_{12'i_1 1)} \tag{2.20}$$

since from conditions (2.8) and (2.10), $u_{2(1)} = u_{2(2)}$, and $u_{12(i_1 1)} = - u_{12(i_1 2)}$. Letting $w = 2\ u_{2(1)}$ and $w_{1(i)} = 2\ u_{12(i_1 1)}$ equation (2.16) can finally be written as,

$$L_i = w + w_{1(i)} \tag{2.21}$$

where in the subscript indicating the first variable (A_1, the occupational group at the year of origin) is suppressed since the LHS of (2.21) is just the log-mobility ratio. As defined, $\sum_i w + w_{1(i)} = 0$.

Recalling definitions (2.13) we note that, when $i_1 = 1$, (2.21) may alternatively written as

$$L_{i_1} = 1 \log p_{11} - \log p_{12} = 2\ (\alpha_2 + \beta) \qquad (2.22)$$

so that

$$P_{1(1)} = P_r\ \{A_2 = 1/A_1 = 1\} = \frac{1}{1 + \exp\{-2(\alpha_2 + \beta)\}} \qquad (2.23)$$

which is in the (unstandardized) logistic cdf from in $(\alpha_2 + \beta)$, for a dichotomous categorical variable.

Indeed, since we are interested in the occurance of mobility <u>withing a given row</u> of the table (i.e., from a given occupation of origin) it is reasonable for us to transform the occupational variables (A_1 and A_2) into a single / dichotomous mobility variable. That is, <u>for a given category i_1 of A_1</u> we define a new variable Y_i $(i = 1, 2, \ldots, I_1)$ taking value 0 when the worker is in the same occupational group in A_2 as he was in A_1 and, 1 otherwise. Let $\{Y_i\}$ such that $\{Y_i\} = (Y_1, Y_2, \ldots, Y_{N_i})$, denote the set of observation in sample N_i. The $\{y_i\}$ are independent binary random / variables taking values 0 or 1, with

$$P_r\ (y_i = 1) = P_i,\ i = 1, 2, \ldots, N_i \qquad (2.24)$$

where the P_i's are distributed as in (2.23).

It is likely however that this probability of / movement be influenced by other factors, in addition to the interaction between past and present occupation. Suppose we want to consider the relationship between Y_i and the remaining variables $A_3, A_1, \ldots A_Q$ - which we might take to be a vector of personal attributes and job characteristics of the population

sampled in A_1. Since Y_i refers only to category $\underline{i}$ of A_1 we must transform rearrange the remaining A - variates into a new set of variables, whose values are conditional on the worker having been at occupational group $\underline{i}$ in A_1. For the nth individual in the sample, we call this vector / Z_i, $(i = 1, 2, \ldots, I_1)$, where for each i, $Z_i = Z_{i1}, \ldots, Z_{ik}$; Z_{i1} corresponding to the rearranged value of variable $A_3 \ldots Z_{ik}$ to the vector rearranged value of variable A_Q.(29)

Denoting a particular $Y_i - Z_{i1} - \ldots - Z_{ik}$ combination as the $i_y, \ldots, i_k$ cell in the $I_y x \ldots x\ I_k$ multidimensional - / contingency table, <u>and making the supposition that the</u> Z - <u>variates in vector</u> Z <u>are conditionally independent given</u> Y_i, we can express this table by means of the following log-linear model

$$\log P_{i_y \ldots i_k} = u + u_{y(i_y)} + u_{1(i_1)} + u_{1(i_1)} + \ldots + u_{K(i_k}$$
$$+ \ldots + u_{K(i_k)}$$
$$+ u_{y1(i_y, i_1)} + u_{y2(i_y, i_2)}$$
$$+ \ldots + u_{YK(y,k)} \qquad (2.25)$$

---

(29) Note that if we were to construct a $2 \times I_1 x \ldots x I_k$ table corresponding to the two values of variables Y_i and the $i_1, \ldots, i_k$ values of the $Z_1, \ldots, Z_k$ variables, then the column marginals for each of the Z - variates would be exactly equal to the respective marginals in a $2 \times I_3 x \ldots x I_Q$ table of the $i_1, i_3, \ldots, i_q$ values of variables $A_1, A_3, \ldots, A_Q$. In other words the former would be a <u>partioned</u> version of the latter.

subject to the constraints,

$$u_{y(.)} = u_{1(.)} = \dots = u_{K(.)} = 0$$

$$u_{y1(i_y,.)} = 0; \quad u_{y1(.,i_1)} = 0;$$

$$u_{YK(.,i_k)} = 0$$

in this case,

$$\log \frac{m_{i_y=1,i_1\dots i_k}}{m_{i_y=2,i_1\dots i_k}} = Li_1\dots i_k = \{u_{y(1)} - u_{y(2)}\} +$$

$$+ \{u_{y1(1,i_1)} -$$

$$- u_{yk(2,\, i_1)}\} + \{u_{y2(1,i_2)} - u_{y2(2,\, i_2)}\} + \dots$$

$$+ \{u_{YK(1,\, i_k)} - u_{YK(2,\, i_k)}\} \qquad (2.26)$$

$$= \{2\, u_{y(1)} + u_{yi(1,i_1)} + \dots + u_{YK(1,i_1)}\}$$

$$= W + W_{1(i_1)} + \dots + W_{K(i_k)}$$

where, as before, in the last line of (2.20) the subscript indicating the Y variable (mobility) is suppressed since the LHS is just the log-mobility ratio. As defined, the sum $(W + W_{1(i_1)} + \dots + W_{K(i_k)}$ over all values of Y_i is zero.

Model (2.26) is a <u>logit</u> model and specifics that there are additive effects on the log-mobility ratio due to the influence of the Z - variates, but there are no two-factor effects due to any pair of Z - variates taken jointly. In other words, the model specifics a linear relationship between the log-odds of the dichotomous dependent variable Y_i and the vector Z_i of independent variables.

Now, suppose we set

$$\alpha_1 = Z_i(1)' \gamma(1)$$
$$\alpha_2 = Z_i(2)' \gamma(2)$$
$$\beta = Z_i(3)' \gamma(3)$$

where $Z_i(1)$, $Z_i(2)$, $Z_i(3)$ are each vectors of the K independent variables, $\gamma(1)$, $\gamma(2)$, and $\gamma(3)$ are vectors of weights and the γ's and β are defined by (2.13).

But, from (2.22)

$$L_{i_1,\ldots,i_k} = 2(Z_i(2)' \gamma(2) + Z_i(3)' \gamma(3)$$
$$= Z_i'\gamma^* \qquad (2.27)$$

where $Z_i' \equiv (Z_i(2)', Z_i(3)')$

$\gamma^* \equiv (2\gamma(2), 2\gamma(3))$,

and

$$P_{i_1,\ldots,i_k}(1) = P_r\{A_2=1/A_1=1, Z_1=i_1\ldots Z_k = i_1\}$$
$$= \frac{1}{1 + \exp Z_1'\gamma^*} \qquad (2.28)$$

Note that $\sum_{j=1}^{I_Y} Z'_{ij} \gamma^* = 0$.

The model in (2.26) can easily be extended to situations in which, for each layer in the table, there are more than two categories of the dependent variable. This is the case, for example, with our analysis of the Monterrey data where, from a given occupation in the year of origin, the worker can (in theory) move to any of 9 other alternatives by the end of the period. The <u>logit</u> for the ith row of Y_i would then be defined as:

$$L_{i_1,\ldots,i_k} = \frac{m_{i_y=l,i_1,\ldots,i_k}}{m_{i_y=j,\,i,\ldots,i_k}} = \frac{P_{i_1,\ldots,i_k}(l)}{\sum_j P_{i_1,\ldots,i_k}(j)} \qquad (2.29)$$

where $l,j = 1,\ldots,I_y$. The logistic expression for the P_i's, analogous to (2.28), would be $L_{i_1,\ldots,i_k} = Z'_{ij}\gamma^*$, with

$$P_{i_1,\ldots,i_k}(l) = \frac{\exp Z'_{il}\,\gamma^*}{\sum_j \exp Z'_{ij}\,\gamma^*}, \qquad (2.30)$$

and $\sum_{j=1}^{I_Y} Z'_{ij}\gamma^* = 0$

The equivalence between models (2.26) and (2.27), (or their polytomous counterparts (2.29) and (2.39)) has an important implication for maximum likelihood estimation in contingency tables. Because any one-to-one transformations of ML estimates are the ML estimates of the same transformation of the parameters, we have the option of fitting the logistic effects directly by solving (2.27) (or alternatively, (2.30)). This is particularly desirable because if we were to consider an ever finer grid of values for the catogorical explanatory variables, we would approach a situation in which the explanatory variables are, in fact, treated as continuous. In this situation, if the sample size is fixed, it is possible that we end up with a set of tables whose row marginals are either zero or one. This would mean that the standard large sample theory utilized to derive the MLE of the u-terms for the loglinear models of equations (2.26) or

(2.29) no longer applies.[30]

It is possible, however, to estimate by maximum likelihood the general polytomous logit model of (2.30) with the probabilities expressed as linear functions of unknown parameters. Following the presentation in Nerlove and Press (1973), we define:

$P_{nl}^* = P_r$ (the nth worker in the ith sample will fall in category 1 of the dependent variable)

where $P_{nl}^* = \dfrac{\exp \theta_{nl}}{\sum_j \exp \theta_{nj}}$, $l,j = 1,\ldots,I_y$, $n = 1,\ldots, N$;

$\sum_j \theta_{nj} = 0$, and $\theta_{nj} \equiv Z'_n \gamma_j^*$, for fixed values of variables $A_3,\ldots,A_Q$.

Setting $v_{nl} = 1$ if the nth worker in the ith sample is in category l of the dependent variable, and $v_{nl} = 0$ otherwise, the log-likelihood function is[31]

$$L = \prod_{n=1}^{N} \prod_{l=1}^{I_Y} v_{nl} P_{nl}^*$$

with $\sum_{l=1}^{I_Y} P_{nl}^* = 1$, $\sum_{l=1}^{I_Y} v_{nl} = 1$.

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(30) In this case, the theorem alluded to in footnote 9 would no longer hold. See, however, Bishop, Fienberg and Holland (1975) Chapter 5.

(31) Nerlove and Press (1973) p. 19.

The function as defined is strictly concave, with a Hessian matrix which is independent of the observed responses. Consequently, efficient iterative computer programs can be written to produce the estimates.(32) As in the case of the general loglinear model, the theory of maximum - likelihood estimation establishes that such estimates are consistent, i.e., they converge to the population values as the sample size becomes indefinitely large, and their joint distribution is approximated by the multivariate normal distribution with mean equal to the population value and variance - covariance matrix equal to the negative inverse of the matrix of second derivatives of the likelihood function. Also, because the variances may be shown to be the minimum attainment by any unbiased estimator, the maximum likelihood estimators are said to be asymptotically efficient. There is, however, no guarantee of unbiasedness or efficiency is small samples.(33)

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(32) For our estimates we rely on the program LOGLIN-III developed by Prof. Marc Nerlove at Northwestern University. A short description of an earlier version of this program can be found in the Appendix to Nerlove and Press (1976). The main advantage of this program, for our purpose, is its use of the iterative method developed by W.Davidon, R.Fletcher, and M.Powell for optimizing the maximum value of the likelihood function. This method appears to be more efficient and exact than the usual Ralphson-Newton algorithms.

(33) Details of the maximum likelihood method applied to multinomial logit, including its statistical properties, are discussed in Nerlove and Press (1973), (1976); McFadden (1973); Bock (1975) Chapter 8; among others. With regards to the question of sample size, there is usually no problem provided one is using ML techniques, (see footnote 21). Indeed, in a letter responding to my apprehensions about the small number of observations in some cells, Prof. Nerlove kindly advised me to proceed without fear".

CHAPTER III

III.1 The overall performance of the mobility model.

We begin our discussion of the empirical results by examining the overall performance of the logistic mobility model as applied to the Monterrey data.

In regression analysis this would be a simple task; one measure of the fit of the model is R^2, the multiple correlation coefficient. Although it can be misleading in its own way, this index tells how much of the variation in the dependent variable is attributable to the independent variables. If R^2 is numerically small, one infers that the independent variables have little explanatory power, even though the relationship may be statistically significant. The interpretation of goodness-of-fit is in this sense unambiguous.

The difficults with our model is that the method of measuring goodness-of-fit in regression - the comparison of "explained" to total variation - cannot be used. In this case, the "dependent variable" (paths of mobility) is not a quantity and we do not have an accurate measure of its varation. The absence of a yardstick-like variation makes it even harder to determine how well the empirical results conform to the theoretical hypotheses. A significant chi-square means that the expected frequencies do not conform to the observed data. It does not say whether or not the particular cross-classification (that is, choice of variables)

is meaningful in a theoretical sense. For this reason we prefer not to use R^2 - like transformation of the chi-square statistic: inspite of this aparent similarity, the results would not be comparable.(1)

We choose a different route. Clearly, one of the simplest tests of adequacy is correctness in classification; that is, the capability of the model to accurately assign an individual into one of several groups of movers on the basis of his measured attributes. Since we know the actual groups to which each observation belongs we can compare predicted to observed results and produce a measure of goodness-of-fit.(1a) This is done in Table III-3-1, below.

In the majority of cases the model correctly predicts more than three-quarters of the moves - a very satisfactory result considering the contrast between the relatively simple structure of the model and the real complexity of the occupational mobility process. As a rule, the classification rates improve in more recent periods, still, the intra-period variation is sufficiently large to cast doubts on any simplistic association between "freshness" of information and quality of results.

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(1) McFadden (1973) p.23, proposes such an analogue. Theil (1972) and Kohn (1976) prefer entropy based measures of uncertainty that are also constrained to the 0-1 interval.

(1a) See: Press and Wilson (1978), Crowder and Grob (1975). A third and more comprehensive approach would be to examine residuals, as suggested in Whitney and Boots (1978) pp.163-164.

TABLE III-3-1

Classification Rates[1] : 1940-1965

PERIOD	Occupation(s) of origin			
	3-4-5	6-7-8	9	10
1940-45	77%	-	73%	80%
1945-50	77	-	71	83
1950-55	88	89%	57	86
1955-60	82	87	74	84
1960-65	94	90	75	90

(1) % of cases correctly classified by the model (evaluated at the means of the independent variables).

It is worth noticing that for all periods the model is least efficient in predicting moves originating in Occupation 9: for the years 1950-55 only 75% of the cases were correctly classified. This may in part be due to the large proposition of stayers in that particular occupation and period (67% of workers in Occupation 9 in 1950 were in the same occupational group by 1955) combined with the specially poor predictive capacity of the model for the group (the estimated proportion of stayers in 82%.[2]

In fact, the proportion of stayers in sistematically over-represented in all periods for all occupations.

(2) A comparable error (a difference of 15% between predicted and observed distributions) occurs in the 1940-45 period, but here, the observed proportion of stayers is 59%.

This result can readily be seen in Table III-3-2 which presents the ratio of estimated to observed proportions for each of the possible moves, given the occupation of origin. The overestimation of the elements of the main diagonal of the transition matrix indicates that, if the mobility process were reduced to its modelled version, the number of stayers would be greater than what was in fact observed. Yet the relationships behind any occupational move are, without exception, more complex than what appears in the model.

Were we to approach the subject from an individual view point, rather than in search of structural determinants, it is likely that our conclusion in the regard would be that occupational changes have to do mainly with immanent personal and/or family characteristics, some of which are not completely captured in the model.(3) Being at the "right place in the right time", who does the potential mover know, what influence can be mustered in his support, etc., would appear to be more decisive elements than market demand, occupational standing or work capability.

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(3) See, for example, L. Lomnitz ( ).

Table III-3-2

Ratio of Estimated[1] to Observed Proportions by Occupation of Origin: 1940 to 1965

		Occupation 10	Occupation 9	Occupation 8-7-6	Occupation 5-4-3	Occupation 2-1
Occupation 10	1940-45	1.15	0.92	0.64	0.53	
	1945-50	1.13	1.03	0.65	0.56	
	1950-55	1.10	0.87	0.82	0.42	
	1955-60	1.11	1.04	0.49	0.78	
	1960-65	1.07	0.98	0.45	0.79	
Occupation 9	1940-45	0.70	1.29	0.61	0.97	
	1945-50	0.42	1.25	0.69	0.85	
	1950-55	0.55	1.23	0.54	0.52	
	1955-60	0.64	1.22	0.76	0.60	
	1960-65	0.77	1.19	0.43	0.79	
Occupations 8-7-6	1950-55	0.79	0.02	1.06	0.80	
	1955-60	0.14	0.11	1.08	0.72	
	1960-65	0.17	0.67	1.06	0.77	
Occupations 5-4-3	1940-45		0.43		1.18	0.73
	1945-50		0.18		1.14	0.72
	1950-55		0.71		1.08	0.64
	1955-60	0.65		0.76	1.12	0.61
	1960-65	0.68		0.23	1.10	0.39

(1) Estimated at the means of all independent variables.

Undoubtedly, there is some truth in this proposition; and even more so if we conceive the above mentioned elements as complements to the process specified by the model. At such, they could influence - but, in this case, erratically - the path of mobility: their systematic effect would already be captured by the variables explicitly included in the analysis. If we accept this view of the model's limitations, then the findings in Table III-3-2 have a coherent explanation. Without the added influence of ideosyncratic elements, actual mobility would be smaller than what is actually is - and this applies both to upward and downward moves. Some of the observed changes reflect particular circunstances that escape, but do not invalidate, the norm.(4)

There are, nevertheless, disturbing results in Table III-3-2. In a number of cases the estimated proportion is close to half the observed one, (for example in moves from Occupation 10 to Occupations 8-7-6 for 1955-60 and 1960-65, to Occupations 5-1 for 1945-50, 1950-55 and 1955-60), in others, the ratio falls below a third, (for example in moves from Group 8-7-6 to Occupation 10 for 1950-55 and 1955-60), and, in some instances, to little better than 10%! It should

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(4) It should be pointed out that a much more difficult to explain bias, in the reverse direction (i.e.: underestimation of the elements in the main diagonal), is the most common result of the application of simple Markov Chain models to intragenerational mobility data. In their analysis, Kogan and McCarthy(1955,pp.60-65) noted a severe underestimation of the elements of the main diagonal, which increased over time. It was this result which led them to propose the mover-stayer distinction in their later models. See also MacFarland (1970) and Stewman (1976) for a discussion of these, and similar, results.

be pointed out, however, that in all such cases the observed proportions were very small themselves. In other words, the data-base which served as raw material for the estimates contained few cases of workers making these kinds of moves, during the relevant periods. Thus, a very large discrepancy between estimated to observed proportions can, in fact, be accounted by only a few misclassified cases.(5) On the other hand, since for every period in all occupational categories stayers were the predominant group, it stands to reason that a relatively small overestimation of the probability of staying would be associated with a larger number of misclassified cases. The greater the proportion of stayers in the sample, and the overestimation of this proportion, the larger the error of underenumeration in the other cells of the estimated mobility matrix. Typically, this is what happens from mover originating in Occupation 8.7.6.

It is surprising to note that none of these objections could have been detected simply from looking at the more common measure of goodness-of-fit used to assess the performance of linear models. Table III-3-3 reports the values of the likelihood statistic λ^* for the estimated / equations. Even allowing for only a 1% margin of error, all

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(5) For example, there were only 5 workers who, during the years from 1950 to 1955 moved from a job in either of Occupations 6, 7 or 8 to another in Occupation 9. The estimated model accounted for only 1 of these - leaving misclassified 4 out of a total sample of 170 for the sum of these Occupations in 1950.

are significantly larger then the corresponding value of the chi-square distribution evaluated at the appropriate degrees of freedom. Thus, in all cases, we can confidently reject the hypothesis that the underlying mobility process could be described equally well without reference to the independent variables.As expected the value of λ^* increases with the number of observation but decreases as the number of cells in the table increases

In sum, even though the predictive capacity of the models for some kinds of moves appears to be rather poor, its overall performance seems to be more than adequate. The overall proportion of misclassified cases is, on the whole, small, so that in every period the classification rates are tolerably good.What is more important, the estimated models are, without exeption, statistically significant.Inspite of the randomness and incompletness in the empirical specific -ation of the mobility process, the results indicate a strong relationship between the values of the independent variables and the occupational outcomes. This does not mean that all variables in the model are equally signficant or quantitatively important. To assess this individual impact we must consider some additional results, a task we now turn to.

Table III-3-3

Likelihood Ratio Statistics (λ^*) for the Estimated Mobility Models

		Number of Observations	λ^* (1)	d.f.
Occupation 10	1940-45	153	161.02	30
	1945-50	199	193.08	30
	1950-55	211	256.72	30
	1955-60	266	332.69	30
	1960-65	292	396.43	30
Occupation 9	1940-45	97	78.80	30
	1945-50	105	99.60	30
	1950-55	147	192.67	30
	1955-60	201	214.89	30
	1960-65	227	272.91	30
Occupations 6,7,8	1950-55	170	304.36	27
	1955-60	213	418.06	27
	1960-65	291	522.91	27
Occupations 3,4,5	1940-45	94	91.19	18
	1945-50	122	142.31	18
	1950-55	177	203.74	18
	1955-60	222	316.53	27
	1960-65	287	546.85	27

(1) All figures are significant at the 1% level.

III.2 Independent variable effects and the mobility process statistical significance of individual variables.

In evaluating the individual contribution of each variable to the mobility process at least two questions must be answered. Can the influence of the variable be isolated among all other variations in the data? What is the association between changes in its value and changes in the probability of a particular kind or occupational move? This section addresses the first of these questions.

This is by no means a simple task. To begin with, we must recognize that the issue of statistical significance itself involves a double proposition, namely: what is the nature of the true relationship between the variables and how can this be assessed; what happens when we observe this relationship though a limited sample of the population. The first aspect involves nothing less than the whole problem of model design, something we have already discussed and that, at this stage, must be taken as given. If the mobility process has been inadequately specified, there is no hope for our results. Yet, even if our specification is acceptable (and the earlier results seem to indicate that it is) it still may be the case that, given the characteristics of the sample, either some relationships do not hold, or they cannot be clearly discerned from the other variations in the data. Given our hypotheses about the probability distributions of the parent populations for the variables in the analysis, these last propositions can be tested. Following the methodology

outlined in Chapter II, we an create a new, set of semi-artificial data that has some properties identical to the data in the original model (the same marginal distributions and the same grand total of cases) and one big diference - in the new model we supress the effects of one or more variables. That is, we force them to be statiscally independent of the dependent variable. We then compare these results with the original data obtained from estimating the full model, and if there is a significant discrepancy - if the new model does not fit - we say that there is an association between the variables. A signficant failure is equivalent to rejecting the null hypotheses that the independent variable effect is inconsequential.

An examination of the results displayed in Table III-4 suggests that, with few exeptions, all variables included in the statistical analysis are significantly related to the mobility process. In an overall comparison, schooling appears as the strongest influence, followed by occupational experience, specialization, and general experience, in order of decreasing importance. Although both background and enterprise variables are, in more cases than not, significantly related to the probability of movement, the strength of their relationship is weak - and particularly so, in the case of the enterprise (establishment size) variables.

There is of course, more to be obtained from Table III-4-1. Nevertheless, before proceeding with the presentation of these results it is only suitable to consider some of

Table III-4-1

Likelihood ratio statistics (λ^{**})[1] for the estimated mobility models with systematic supression of independent variables effects

		Experience		Occupational Experience		Schooling		Specialization		Background Variables		Enterprise Variables	
		λ^{**}	df	λ^{**}	df	λ^{**}	df	λ^{**}	df	λ^{**}	df	λ^{**}	df
Occupation 10	1940-45	13.81[a]	3	13.24[a]	3	52.82[a]	3	11.29[b]	3	10.05[d]	6	9.92	6
	1945-50	12.64[a]	3	56.92[a]	3	35.07[a]	3	12.82[a]	3	16.37[b]	6	8.56[a]	6
	1950-55	5.86	3	13.85[a]	3	50.63[a]	3	11.78[a]	3	14.25[b]	6	3.26	6
	1955-60			4.67	3	25.44[a]	3	8.26[b]	3	18.46[a]	6		
	1960-65	4.63	3	10.17[b]	3	37.29[a]	3	7.95[b]	3	7.66	6	15.14[b]	6
Occupation 9	1940-45	22.16[a]	3	23.05[a]	3	52.67[a]	3	22.61[a]	3	2.34	6	14.70[b]	6
	1945-50	10.36[a]	3	41.26[a]	3	67.45[a]	3	17.55[a]	3	22.25[a]	6	6.50	6
	1950-55	47.16[a]	3	28.62[a]	3	21.82[a]	3	48.61[a]	3	20.71[a]	6	29.65[a]	6
	1955-60	13.22[a]	3	23.11[a]	3	22.86[a]	3	30.22[a]	3	99.24[a]	6	14.12[a]	6
	1960-65	34.15[a]	3	45.61[a]	3	203.67[a]	3	29.06[a]	3	9.09	6	4.51	6
Occupations 8-7-6	1950-55	7.13[c]	3	3.95	3	11.56[a]	3	-	-	11.85[c]	6	3.75	6
	1955-60	19.71[a]	3	5.36	3	13.52[a]	3	-	-	12.00[c]	6	12.27[c]	6
	1960-65	4.08	3	22.68[a]	3	33.73[a]	3	-	-	16.10[b]	6	9.14	6
Occupations 5-4-3	1940-45	6.39[b]	2	64.86[a]	2	18.32[a]	2	-	-	10.56[b]	4	1.72	4
	1945-50	6.65[b]	2	20.05[a]	2	64.29[a]	2	-	-	15.06[a]	4	6.33	4
	1950-55	2.04	2	21.85[a]	2	na	na	-	-	9.00[c]	4	1.86	4
	1955-60	14.37[a]	3	76.92[a]	3	14.04[a]	3	-	-	10.88[b]	6	7.29[c]	6
	1960-65	15.10[a]	3	132.88[a]	3	51.90[a]	3	-	-	25.26[a]	6	6.38[c]	6

Notes:

[1]Corresponds to -2 times the difference in the log likelihoods between the full model and the model estimated with the corresponding parameters values replaced by zeroes. This statistic is distributed asymptotically as chi-square with as many degress of freedom as coefficients set equal to zero. See: Nerlove and Press (1976) p.46. a = statistically significant at the 1% level; b = at the 5% level; c = at the 10% level; d = at the 20% level. Variables not included in the analysis are denoted by -. Cases for which the likelihood function could not by maximized are denoted by na.

their limitations. The more general remarks concerning the logic of this approach have been dealt with elsewhere in this monograph,[7] but other limitations arise from familiar problems in any multivariate significance-testing enterprise.

First, one should remember that in the analysis all relationships are partials. Any effect has the implicit phrase "all other variables held constant". And, in practice, especially when working with causal models, one may wish to control different variables at different stages in the analysis. For example we noted earlier that it our results the background variables failed to exert the same kind of sistematic influence on mobility as did schooling. Yet at an earlier phase of the worker's life, socioeconomic and geographic origins were important influences on the quantity (to say nothing of the quality) of schooling received.[8]

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(7) See Chapter II, Part 1.

(8) Luckily for us, Balán, Browning and Jelin (1973) have extensively treated this subject in their study of the Monterrey data. Father's and mother's education, as well as father's occupation, all have important and significant influences on the respondent's education. Size of community of origin also show a positive and significant contribution. The effects vary, however, depending on the age of the worker. Over time, there is a decline in the effects of socioeconomic origin and community on educational attainment, and the proportion of the variance in education "explained" by these / variables drops from 51 to 42%. (Balán, Browning and Jelin (1973) pp. 270-274). According to the authors "the decline in importance of father's occupation ... is consistent with the hypothesis of decreasing importance of economic differentials in the determination of educational opportunities" (Ibid, p.274). Much of this is due, of course, to the expansion of the public system of free education. The impact of socioeconomic origin on education is also documented, for a sample of almost 2500 workers in Mexico City, by Muñoz, Hernandez and Rodriguez (1978).

Both in the case of background and enterprise variables this problem would show up in the form of multicollinearity among the "independent" variables.[9] A true test of the joint influence of all related variables would call for the exclusion, in the first instance of background and schooling variables and, in the second, of enterprise, occupational experience and specialization variables. Clearly, we would then decisively reject the null hypothesis in all periods for all occupations. So the question is not that background and enterprise variables are irrelevant, or less important, in the analysis of the mobility process; rather, that, given the other variables, their additional contribution appears to be smaller.

This brings us to a second limitation: one should not forget the elementary principle that significance tests are sensitive to sample size as well as to strength of effect magnitudes. When working with extremely large samples, even the most trivial effect can be significant; but, if the expected number of cases in a particular cell is small, the very adequacy of the chi-square test is in question. This means that we should be cautious in making comparisons across samples os different sizes. Truly, if a given likelihood ratio statistic is of greater value for a smaller sample, (as is, for example, the case with schooling in Occupation

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(9) Discuss the more serious issue of misspecification. See Bowles etc...

10 for the periods 1950-55 ($N = 211$, $\lambda^{**} = 50.63$) and 1955-60 ($N = 266$, $\lambda^{**} = 25.44$)) then this result must be robust. Nevertheless, it may be that a particular cell in the mobility matrix has fewer elements in a more recent period, even though the overall number of workers in the sample continously / increases as we approach 1965. If this is the case, and if the cell in question is of critical importance in determining the strength of the relationship, the two results are not really comparable.(10).

A third limitation is the perpetual problem that when generalizing beyond the sample in hand, the chi-square test assumes that the cases are a simple multinomial random sample. This is seldom the case with social science data and clearly not the case in our experiment. Given that the data originates from retrospective life-histories it is impossible to know the sample properties for the years other than 1965.(11) This is not, however, a unique feature of our data - the untested sampling hypothesis is, as we have said, common in most applications. The "reasonableness" of our results will, hopefully, depend on their logical consistency, not alone on their statistical strength.

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(10) This is in fact what happens in the preceeding example, as will became clear when we turn our attention to the individual parameter results and the corresponding t statistics.

(11) Moreover, even for this year, the data comes from a sample based on an income - geographic location lesign, with a clear quota feature in the distribution of cases. On this, see Balán, Browning and Jelin (1973), pp

Fourth, significance tests need to be supplemented by more descriptive statistics that convey the magnitude and, when appropriate, the direction of the relationship. This we pretend to do at a later stage in our analysis.

Returning to Table III-4-1, we may now proceed with a more detailed account of its results. On the whole, schooling and occupational experience are the variables more closely associated to the observed mobility patterns begening in Occupation 10. Nevertheless, for the period 1950-60, the strength of this relationship diminishes substantally to the point that variations in occupational experience no longer are significantly related to the distribution of occupational outcomes. Instead, personal background characteristics, that are in other periods weakly although significantly related to mobility, now appear in a position of more important rank. Specialization is, in all periods, significantly related to the observed mobility pattern, but this does not seem to be the case with the enterprise variables.

The results for moves starting from Occupation 9 are not very different, except, perhaps, for the generally more subdued performance of the occupational experience variable. The special role of background influences during the 1955-60 period is observed once again; in this case, it even extends to the 1950-55 period. General experience exhibits throughout a stronger relationship with the dependent variable and, for the 1950-55 period, it surpasses both schooling and occupational experience in relative rank. It

is work noticing that, in most periods, the strength of all relationship increase as one changes from Occupation 10 to 9.

This is certainly not the case with the values of λ^{**} for Occupations 6-7-8. Not only are the values of the likelihood ratio statistic in Table III-4-1 lower but, in the case of occupational experience for 1950-55 and 1955-60, insignificant, as well. Schooling, experience and background are, in this order, the variables whose distributions more closely conform to the observed mobility patterns.(12) The prevailing arrangement reappears, however, for moves originating in Occupations 3-4-5. In fact, in these moves and for most periods, occupational experience ranks first in terms of associative strength. Schooling, background characteristics and general experience usually follow in decreasing order and without interruptions for the 1950-55, or 1955-60 periods.

In sum, although observed results tend to agree with postulated hypotheses, there is evidence of considerable heterogenerity in the relationships. The variables singled out for analysis are all significantly related to the mobility process. The strength of their bond varies, nevertheless - both between occupations and across time periods for a given occupation. Moreover, with few exceptions, there are

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(12) For the 1960-65 period, occupational experience replaces general experience in the list of the most strongly associated variables. This suggests a possible problem of multicollinearity between the variables. We shall return to this aspect shortly.

no trends in the variations. The link between schooling and mobility did not noticeably diminish with time; nor, for that matter, did the connexion between experience (general or occupational) and mobility grow stronger.It seems likely, therefore, that any attempt to theoretically order the magnitude of these influences is doomed to failure.That is, unless other things are taken into considerations; something we propose to do in the next chapter. Taken together education, training and both forms of experiences appear to be in all cases, much more strongly related to mobility than either background or enterprise characteristics.Nevertheless since background is a prior influence on education and the nature of the enterprise a prior determinant of the quality of experience, such single equation results are to be expected. Much more interesting is the fact that, contrary to prevailing opinion, schooling and training are not always the single most important relationship.

III-3 Independent variable effects and the mobility process - Statistical significance of individual parameters.

Up to this point we have examined the strenght of relationships between distributions. We were concerned with the whole occupational pattern and not with a particular outcome. Notwithstanding its own importance,this view is incomplete since a given relatioship may be strong for one occupational prospect but not for another. For example, schooling may be significantly related to upward moves from

Occupation 10, but may not influence the decision to remain in the same occupation.

A possible, albeit limited, indication of the significance of a particular parameter can be obtained from the following result of the theory of maximum likelihood estimation applied to loglinear models. When the postulated model fits the data, the large-sample variance - covariance matrix is given by the negative of the inverse of second derivatives of in evaluated at $\hat{\beta}$ (the vector of parameter estimates), that is,

$$\sqrt{(\beta)} = - \left[\frac{\partial^2 \ \ln}{\partial\beta \ \ \partial\beta'} \right]^{-1}_{\beta=\hat{\beta}}$$

Since the distribution of β is assymptotically normal, the positive square roots of the diagonal elements of this matrix (i.e., the standard errors of the estimated coefficients) may be used to construct the t - test of standard regression theory.(3)

The limitations of the usual t - test are well known. Its logistic analogue is penalized bu the same constraints, only more so! The hypothesis of normality is only asymptotically valid and the effects of multicollinearity - biasing upwardly the estimates of the standard errors - are much more severe

(13) See Chapter II, Section 1 -

because of the iterative estimations precedure.[14] Since near collinearities are common among our variables (viz. schooling and background, experience and occupational experience, etc.) we should tread warily through these results.

Tables , in the Appendix, present the relevant data.

It is at once apparent that, while almost all the variables in all periods were found to be significantly related to mobility, many of the individual parameter values are not statistically different from zero. That is, the individual variable effects are not equally significant for different moves from a common origin. The results are not however methodical and defy any ambitious generalization.

Consider, for example, the case of moves originating in the hierarchichally lowest Occupation 10. For these, we find that Geographic Origin exerts in every period a weak yet systematic influence on upward mobility to Occupations 1-5, but not, in any period, on mobility to Occupation 9. A similar thing happens with Occupational Experience. Excluding its important role in the 1945-50 equation, this variable is never significant for moves to the industrial Occupations 8-7-6 although it often is for moves to Occupations 1-5 or 9. Schooling is very significantly related to the probability

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(14) See Kohn (1976) esp p.15. The inverse of $\sqrt{\beta}$ becames numerically unstable and small changes in the P_i from iteration to iteration cause large changes in the inverse.

of moving from Occupation 10 to the white collar Occupations 1-5, in all periods up to 1955. It is less strongly related to moves directed to Occupations 8-7-6. And, with regards to changes to Occupation 9, aggregating the lower manual jobs, schooling is only significant in the 1950-55 equation Specialization, on the other hand, is most frequently significant in moves to Occupations 8-7-6 less so in those directed to Occupations 1-5 and, least of all in moves destined to Occupation 9.

The situation is somewhat analogous for moves originating in the lower manual Occupation 9. Only now, schooling is consistently significant for destinations in groups 10 (downward) or 1-5 (upward) but, once again not for moves ending in Occupations 8-7-6. Specialization and employment in the Modern-Sector are, however, more frequently significant in upward moves to this last group than either to Occupations 1-5 or 10.

Individual variable results for occupational changes initiated in the industrial Occupations 8-7-6 or in the white collar jobs of Occupations 5-1 display an equally irregular pattern. In at least two of three equations, Geographic Origin and Occupational Experience are significantly related to the probability of movement out of Occupations 8-7-6 and into Occupations 10 (downward) or 1-5 (upward). They are not in any period, significantly related to downward moves ending in Occupation 9. By the same taken, Experience and Enterprise Size are more systematically significant in moves to

Occupation 9 than either to Occupations 1-5 or 10. For changes originating in the middle - level white collar Occupations 5.4.3 although schooling is steadily significant for both upward and downward moves, Socioeconomic Origin is most strongly associated with downward moves while Geographic Origin with upward ones.

The previous discussion has illustrated an important conclusion: not only the significante of a particular parameter varies with destinations it varies for the same destinations in different periods. In other words, any single equation for a given period is not representative of the mobility / process for all periods. A dramatic, but not isolated example of this discrepancy are the results for changes from / Occupation 10 to Occupation 9, in periods 1940-45 and 1945-50. During the first half of the decade, variations in Experience (both general and occupational), Specialization, Socioeconomic Origin and Enterprise Size, all seemed to be significantly related to the mobility effort away from the worse-off jobs and into the next better ones in the ladder. Not so for the next five years. The changes that occurred between 1945 and 1950 - and there were more of them - appear to have been significantly related only to variations in the Socioeconomic Origin of the workers!

Later on we shall argue that, in general, such variations reflect cyclical changes in the product markets accompanying more fundamental alterations in the structure of production and of labor demands. Nevertheless, we must admit that these

inconsistencies may also be due to sampling variation and, specially, to sample-specific multicollinearity among the variables. It might be said that if a variable is significant in at least one of the five samples, (covering tye years from 1940 to 1965), this is sufficient proofs of its significance in all equations.(15) By this criterion, almost all parameters in the model would be significant, in every type of move.(16) Still, as we shall see, the magnitude and even the direction of their influence would very from period to period.

(15) We are not, of course, discussing the issue of specification. Quite clearly the model would be mispecified if we left out variables known to be relevant but that, perchance, happened to be significantly different from zero.

(16) The few cases were this would not be true are instances of conflict between the t-tests for the sequence of changes (ie: excluding the equation for stayers) and the chi-square test for all "moves", including stayers. Examples are: Occupational Experience for moves out of Occupation 10 in 1945-50 and 1950-55.

Table:

Means of the independent variables in the probability model

	Occupation 10					Occupation 9				
	1940	1945	1950	1955	1960	1940	1945	1950	1955	1960
Number of years of:										
Experience	11.05	12.09	16.23	18.69	22.40	8.23	11.91	13.22	16.48	21.11
Occupational Experience[1]	6.54	7.67	9.54	10.26	11.80	5.05	6.23	6.64	7.66	8.93
Schooling[2]	3.32	3.42	2.96	2.77	2.70	4.95	4.75	4.48	4.40	4.37
Proportion of workers with:										
Specialization[3]	42.5	50.8	49.8	51.9	49.0	30.9	36.2	32.7	23.9	26.4
Non Lower-Manual SEO[4]	36.6	38.7	32.2	26.7	26.4	57.7	44.8	38.1	39.8	42.3
Non Rural Origins[5]	77.1	72.9	68.2	62.8	61.6	80.4	79.1	75.5	69.2	65.6
Proportion of workes that were:										
Employees (6 to 49 workers)	22.9	21.6	19.4	25.2	20.2	33.0	33.3	29.3	27.9	30.4
Employees (50 or more workers)	44.4	48.7	48.3	39.8	43.1	26.8	34.3	40.5	43.3	39.7
Working in "dynamic" activities[6]	32.7	30.7	27.0	24.1	23.0	28.6	35.2	39.5	42.8	40.5
Total Number of Workers	153	199	211	266	292	97	105	147	201	227

	Occupations 8-7-6			Occupations 5-4-3				
	1950	1955	1960	1940	1945	1950	1955	1960
Number of years of:								
Experience	19.17	21.00	21.92	11.00	13.30	16.78	18.71	19.79
Occupational experience[1]	8.58	9.94	10.29	5.27	6.50	7.02	8.45	8.77
Schooling[2]	4.62	4.73	4.84	7.33	6.98	6.76	6.73	6.73
Proportion of workers with:								
Specialization[3]	-	-	-	-	-	-	-	-
Non-lower-manual SEO[4]	58.2	58.2	51.6	67.0	62.3	65.5	62.2	61.3
Non rural origin[5]	78.8	77.0	71.8	69.1	76.2	75.7	75.2	74.9
Proportion of workers that were:								
Employees (6 to 49 workers)	38.8	37.6	30.6	38.3	37.7	33.3	30.2	28.6
Employees (50 or more workers)	42.9	43.7	47.8	36.2	37.7	37.9	36.9	41.5
Workers in "dynamic" activities[6]	41.2	41.8	48.8	37.2	34.4	34.5	32.9	38.3
Total number of workers	170	213	291	94	122	177	222	287

Notes:

[1]Number of years (not necessarily continuous) spent in the present occupation, since joining Monterrey's labor force.

[2]Excluding reëtitions of the same grade.

[3]Workers who are either "aprendizes" or "auxiliares de artesanos".

[4]Workers whose fathers (when the respondent were 20 years of age) were not agricultural laborers, miners, unskilled manual workers in industry, manual help in commercial and service activities or, if in self-employment were not street vendors or alike. See: Balán, Browning and Jelin (1973), p.98.

[5]Origin communities in with less than 5.000 inhabitants at the time the respondent lived in them, between ages of 5 and 15 years. Data refers to closest Census estimates. See: Balán, Browning and Jelin, op.cit., p. 62.

[6]See text for definition of "dynamic" activities.

Table:

Coefficients of the probability model - Occupation 10

1 - Constant[1]

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	1.875	2.186	1.545	1.296	2.081
Occ 9	0.301 (0.469)	1.403[a] (2.775)	0.697[d] (1.454)	-1.201[a] (-2.740)	0.004 (0.010)
Occs 8-7-6	-0.797 (-1.079)	-0.737[d] (-1.584)	-0.169 (-0.340)	-0.405 (-0.993)	-1.468[c] (-1.809)
Occs 5-1	-1.379[c] (-1.823)	-2.852[a] (-4.517)	-2.073[a] (-3.468)	0.310 (0.676)	-0.618 (-1.113)

2 - General Experience[*2]

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.0755	0.0146	0.0167	0.0339	0.0200
Occ 9	0.0657[b] (2.067)	-0.0216 (-1.058)	0.0014 (0.075)	0.0231[d] (1.592)	0.0008 (0.067)
Occs 8-7-6	-0.0554[c] (-1.726)	-0.0448[b] (-2.056)	-0.0085 (-0.481)	-0.0004 (-0.032)	-0.0483[a] (-3.031)
Occs 5-1	-0.0858[c] (-1.878)	0.0518[b] (2.224)	-0.0096 (-0.443)	-0.0566[a] (-3.183)	0.0275[b] (1.988)

3 - Occupational Experience*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.0107	0.0176	0.0677	0.0194	0.0144
Occ 9	-0.1155[c] (-1.716)	-0.0226 (-0.636)	-0.0433[d] (-1.467)	0.0269[d] (1.394)	0.0065 (0.390)
Occs 8-7-6	-0.0126 (-0.207)	-0.0369 (-1.020)	-0.0269 (-0.868)	-0.0830[a] (-2.666)	0.0194 (1.123)
Occs 5-1	0.1388[c] (1.670)	0.0419 (1.147)	0.0025 (0.060)	0.0367[d] (1.350)	-0.0403[b] (-2.232)

4 - Schooling*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.1015	-0.1731	-0.1350	-0.1432	0.0098
Occ 9	-0.0312 (-0.447)	-0.0768 (-1.262)	-0.1097[c] (-1.656)	-0.0109 (-0.206)	0.0111 (0.213)
Occs 8-7-6	-0.1132[d] (-1.483)	-0.0718 (-1.192)	-0.1142[c] (-1.692)	0.1433[a] (2.670)	-0.0412 (-0.775)
Occs 5-1	0.2459[a] (2.634)	0.3217[a] (3.867)	0.3589[a] (4.053)	0.0108 (0.206)	0.0203 (0.370)

5 - Specialization**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.151	-0.504	0.687	-0.315	0.161
Occ 9	-0.680[c] (-1.924)	-0.138 (-0.520)	-0.612[b] (-1.947)	0.028 (0.121)	0.756[a] (2.725)
Occs 8-7-6	1.621[a] (3.991)	0.831[a] (2.965)	0.831[a] (3.671)	0.511[b] (2.194)	0.250 (0.798)
Occs 5-1	-1.092[a] (-2.804)	-0.189 (-0.614)	-0.906[a] (-2.678)	-0.224 (-0.963)	-1.167[a] (-2.846)

6 - Socioeconomic origin (father's occupation when respondent was 20 years old): non-manual**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.193	-0.309	-0.358	-0.246	-0.314
Occ 9	-0.661[c] (-1.895)	-0.855[a] (-2.865)	0.240 (0.876)	0.214 (0.797)	-0.515[c] (-1.783)
Occs 8-7-6	1.030[a] (2.856)	0.242 (0.842)	0.161 (0.573)	0.448[c] (1.723)	0.752[a] (2.498)
Occs 5-1	-0.562[c] (-1.700)	0.922[a] (2.878)	-0.043 (-0.144)	-0.416[d] (-1.445)	0.077 (0.299)

7.- Geographic origin: Non-rural**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.443	0.901	0.418	0.755	-0.172
Occ 9	0.038 (0.096)	-0.063 (-0.191)	-0.123 (-0.401)	0.316 (1.219)	-0.065 (-0.274)
Occs 8-7-6	-0.191 (-0.470)	-0.136 (-0.425)	0.435 (1.268)	-0.936[a] (-3.421)	-0.195 (-0.781)
Occs 5-1	0.596[d] (1.398)	-0.702[d] (-1.639)	-0.731[d] (1.597)	-0.135 (-0.453)	0.432[d] (1.564)

8 - Employees: in enterprises with more than 5 but less than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.502	-0.888	-0.416	-0.378	-0.922
Occ 9	-0.576 (-1.189)	-0.295 (-0.754)	-0.035 (-0.090)	0.321 (1.051)	-0.741[b] (-2.014)
Occs 8-7-6	0.688[d] (1.448)	1.028 (2.290)	-0.465[d] (-1.267)	0.677[b] (2.099)	1.993[a] (2.767)
Occs 5-1	0.390 (0.973)	0.155 (0.409)	0.916[c] (1.899)	-0.620[c] (-1.769)	-0.330 (-0.801)

9 - Employees: in enterprises with more than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.554	-0.894	-0.577	0.237	-0.732
Occ 9	0.603[d] (1.475)	0.004 (0.011)	0.205 (0.645)	-0.505[d] (-1.457)	-0.193 (-0.579)
Occs 8-7-6	0.303 (0.758)	1.167[a] (2.548)	-0.512[d] (-1.612)	0.280 (0.939)	1.397[c] (1.994)
Occs 5-1	-0.352 (-1.013)	-0.277 (-0.642)	0.884[b] (2.219)	-0.012 (-1.457)	-0.472 (-1.225)

10 - Sector: workers in "dynamic" activities**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.088	-0.069	-0.329	-0.596	-0.166
Occ 9	0.357 (1.105)	-0.215 (-0.706)	0.089 (0.304)	0.129 (0.460)	-0.067 (-0.245)
Occs 8-7-6	-0.196 (-0.604)	0.511[c] (1.672)	0.270 (0.906)	0.268 (0.955)	0.320 (1.148)
Occs 5-1	-0.073 (-0.228)	-0.227 (-0.762)	-0.030 (-0.099)	0.199 (0.722)	-0.087 (-0.317)

Notes:

[1]The figures in parentheses are assymptotic t - values.

[2]Variables followed by an asteric (*) were measured in years, those followed by a double asterisc (**) as dichotomies.

[3]Letters in the superscript denote rejection of the null hypothesis, (Ho: $\beta x = 0$), at the following significance levels: (a) = 1% or more; (b) = 5%; (c) = 10%; and (d) = 20%.

Table:

Coefficients of the probability model: Occupation 9

1 - Constant

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	1.880[b] (2.451)	1.630[b] (2.045)	2.776[a] (4.031)	-0.477 (-0.755)	1.094[b] (2.195)
Occ 9	0.327	0.621	0.608	1.103	0.902
Occs 8-7-6	-1.155[d] (-1.484)	0.232 (0.287)	-1.114[c] (-1.725)	1.054[b] (1.985)	-0.419 (-0.861)
Occs 5-1	-1.052[d] (-1.288)	-2.483[a] (-2.722)	-2.270[a] (-3.699)	-1.680[a] (-2.972)	-1.577[a] (-3.090)

2 - General Experience*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.113[b] (-2.502)	-0.011 (-0.360)	-0.076[a] (-3.371)	-0.043[a] (-2.819)	0.012 (0.858)
Occ 9	0.072	0.011	0.066	0.056	0.038
Occs 8-7-6	0.023 (0.532)	-0.073[b] (-1.959)	-0.034[d] (-1.292)	-0.024[d] (-1.454)	-0.070[a] (-2.868)
Occs 5-1	0.018 (0.410)	0.073[b] (2.243)	0.044[c] (1.870)	0.011 (0.667)	0.020[d] (1.352)

3 - Occupational Experience*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.093 (1.075)	-0.240[a] (-2.688)	0.017 (0.470)	0.029 (1.149)	-0.991[a] (-3.486)
Occ 9	-0.002	0.080	0.053	0.021	0.912
Occs 8-7-6	-0.047 (-0.548)	0.062 (0.996)	0.023 (0.617)	-0.060[b] (-2.104)	0.045[d] (1.288)
Occs 5-1	-0.044 (-0.471)	0.098[c] (1.758)	-0.093[b] (-2.062)	0.010 (0.402)	0.034[d] (1.376)

4 - Schooling*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.315[a] (-3.431)	-0.463[a] (-3.960)	-0.250[a] (-3.127)	-0.214[a] (-3.171)	-0.319[a] (-4.228)
Occ 9	0.165	-0.001	0.029	-0.075	-0.025
Occs 8-7-6	0.073 (0.895)	0.083 (0.924)	-0.068 (-0.764)	0.054 (0.971)	0.110 (1.878)
Occs 5-1	0.077 (0.877)	0.381[a] (3.849)	0.289[a] (3.334)	0.235[a] (4.013)	0.234[a] (3.696)

5 - Specialization**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-2.020[a] (-3.341)	-0.503[d] (-1.289)	0.094 (0.288)	0.184 (0.479)	0.430 (1.227)
Occ 9	0.189	-0.402	-0.469	0.346	-0.715
Occs 8-7-6	2.440[a] (4.613)	1.829[a] (4.037)	1.898[a] (4.453)	1.663[a] (5.081)	1.647[a] (5.182)
Occs 5-1	-0.609[d] (-1.417)	-0.924[b] (-2.053)	-1.523[a] (-3.284)	-2.193[a] (-4.023)	-1.362[a] (-3.697)

6 Socioeconomic origin: Father's occupation when respondent was 20 years old = Non-manual**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	-0.370 (-0.984)	-0.103 (-0.262)	-1.354[a] (-3.181)	0.756[a] (2.600)	-0.119 (-0.419)
Occ 9	-0.237	-0.381	-0.189	-0.234	-0.325
Occs 8-7-6	0.343 (0.849)	0.919[b] (2.115)	0.084 (0.241)	-0.507[c] (-1.757)	0.260 (0.924)
Occs 5-1	0.264 (0.671)	-0.435 (-1.123)	1.459[a] (3.856)	-0.015 (-0.054)	0.184 (0.661)

7 - Geographic origin: Non-rural**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.597 (1.266)	1.848[a] (2.856)	-0.436 (-1.010)	-0.602[b] (-1.959)	0.722[a] (2.437)
Occ 9	-0.035	0.451	0.154	0.316	0.242
Occs 8-7-6	-0.302 (-0.634)	-1.634[a] (-3.025)	0.106 (0.245)	-0.494[d] (-1.513)	-0.919[a] (-2.710)
Occs 5-1	-0.260 (-0.544)	-0.665[d] (-1.419)	0.176 (0.435)	0.780[b] (2.176)	-0.045 (-0.159)

8 - Employees: in enterprises with more than 5 but less than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.236 (0.444)	-0.523 (-1.107)	-0.920[b] (-2.311)	2.308[a] (4.254)	-0.210 (-0.658)
Occ 9	-0.145	0.514	0.249	-0.372	0.364
Occs 8-7-6	-1.935[a] (-2.684)	-0.421 (-0.854)	-0.212 (-0.535)	-1.042[a] (-2.889)	0.275 (0.804)
Occs 5-1	1.844[a] (2.865)	0.430 (0.915)	1.381[a] (3.411)	-0.894[b] (-2.245)	-0.429[d] (-1.283)

9 - Employees: in enterprises with more than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.484 (0.822)	-0.118 (-0.215)	-0.631[d] (-1.346)	1.523[b] (2.536)	0.371 (1.018)
Occ 9	-0.647	0.938	-0.279	-0.359	-0.136
Occs 8-7-6	-1.164[c] (-1.701)	-0.367 (-0.652)	1.366[a] (2.746)	-0.722[c] (-1.826)	0.014 (0.041)
Occs 5-1	1.327[c] (1.813)	-0.453 (-0.781)	-0.456 (-0.941)	-0.442 (-1.060)	-0.249 (-0.719)

10 - Sector: workers in "dynamic" activities**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occ 10	0.006 (0.012)	-0.142 (-0.279)	-0.382 (-0.990)	-0.200 (-0.636)	-0.365 (-1.239)
Occ 9	-0.970	-0.680	0.795	0.314	0.279
Occs 8-7-6	1.823[a] (3.015)	0.310 (0.575)	-0.560[d] (-1.445)	-0.090 (0.283)	0.418[d] (1.408)
Occs 5-1	-0.859[c] (-1.664)	0.512 (1.076)	0.145 (0.370)	0.604[c] (1.880)	-0.332 (-1.111)

Notes: See table

Table:

Coefficients of the probability model: Occupations 8-7-6

1 - Constant

	1950-55	1955-60	1960-65
Occ 10	1.370[c] (1.661)	-0.299 (-0.157)	-1.625[c] (-1.905)
Occ 9	-1.150 (-0.830)	-7.814[a] (-2.871)	0.622 (1.023)
Occs 8-7-6	1.848	6.657	2.472
Occs 5-1	-2.068[c] (-1.809)	1.456 (0.592)	-1.469[b] (-2.516)

2 - General Experience*

	1950-55	1955-60	1960-65
Occ 10	-0.009 (-0.247)	0.023 (0.891)	-0.028[d] (-1.321)
Occ 9	-0.118[a] (-2.876)	0.125[a] (3.553)	0.019[d] (1.282)
Occs 8-7-6	0.078	-0.063	0.021
Occs 5-1	0.049[c] (1.584)	-0.085[a] (-3.011)	-0.012 (-0.711)

3 - Occupational Experience*

	1950-55	1955-60	1960-65
Occ 10	0.031 (0.853)	-0.114[b] (-2.097)	-0.094[b] (-2.164)
Occ 9	-0.048 (-1.268)	-0.031 (-0.873)	-0.014 (-0.489)
Occs 8-7-6	-0.007	0.084	0.031
Occs 5-1	0.024 (0.699)	0.061[d] (1.591)	0.077[a] (2.694)

4 - Schooling*

	1950-55	1955-60	1960-65
Occ 10	-0.102 (-1.171)	-0.183[a] (-2.587)	-0.476[a] (-3.283)
Occ 9	-0.058 (-)	0.472[a] (3.7071)	0.138[c] (1.707)
Occs 8-7-6	0.019	-0.210	0.054
Occs 5-1	0.141 (-)	-0.079 (-0.936)	0.284[a] (4.053)

5 - Socioeconomic origin: Father's occupation when respondent was 20 years old = Non-manual**

	1950-55	1955-60	1960-65
Occ 10	1.002[d] (1.449)	0.456 (1.032)	0.151 (0.531)
Occ 9	-4.252 (0.167)	-1.396[b] (-2.507)	-0.906[a] (-2.856)
Occs 8-7-6	1.360	0.251	0.484
Occs 5-1	1.890 (0.157)	0.689[c] (1.850)	0.271 (0.958)

6 - Geographic origin: Non-rural**

	1950-55	1955-60	1960-65
Occ 10	-1.051[b] (-2.172)	-2.191[a] (-4.078)	1.389[a] (3.215)
Occ 9	-0.068 (-0.099)	0.598 (1.012)	-0.379 (-1.219)
Occs 8-7-6	0.182	0.220	-0.248
Occs 5-1	0.937[d] (1.382)	1.373[c] (1.952)	-0.762[b] (-2.568)

7 - Employees: in enterprises with more than 5 but less than 50 workers**

	1950-55	1955-60	1960-65
Occ 10	-0.942[d] (1.559)	1.684 (0.823)	1.579[d] (1.517)
Occ 9	2.781[c] (1.696)	2.706[d] (1.503)	-2.180[a] (-3.874)
Occs 8-7-6	-0.754	-2.870	-0.338
Occs 5-1	-1.085[d] (-1.429)	-1.520 (-0.742)	0.939[d] (1.459)

8 - Employees: in enterprises with more than 50 workers**

	1950-55	1955-60	1960-65
Occ 10	-1.135[c] (-1.952)	1.985 (0.895)	1.461 (1.132)
Occ 9	2.650[c] (1.653)	0.870 (0.535)	-1.036[c] (-1.566)
Occs 8-7-6	-0.644	-2.268	-0.984
Occs 5-1	-0.871 (-1.113)	-0.587 (-0.289)	0.559 (0.991)

9 - Sector: workers in "dynamic" activities**

	1950-55	1955-60	1960-65
Occ 10	0.252 (0.509)	-0.280 (-0.864)	0.986[b] (2.552)
Occ 9	0.954[b] (2.096)	-0.256 (-0.845)	-0.388 (-1.130)
Occs 8-7-6	-1.029	0.244	-0.178
Occs 5-1	-0.177 (-0.386)	0.292 (0.977)	-0.420[d] (-1.569)

Notes: See table

Table:

Coefficients of the probability model - Occupations 5-4-3

1 - Constant

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				2.061[a] (3.472)	1.939[b] (2.694)
Occs 8-7-6	0.871 (1.242)	-1.086 (-0.522)	0.642 (1.037)	-0.372 (-0.509)	-2.337[d] (-1.577)
Occs 5-4-3	1.669	1.950	0.704	1.987	2.939
Occs 2-1	-2.540[a] (-3.430)	-0.864 (-0.727)	-1.346[b] (-2.271)	-3.676[a] (-5.336)	-2.541[a] (-2.907)

2 - General Experience*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				0.010 (0.676)	-0.058[a] (-3.094)
Occs 8-7-6	0.046 (1.235)	-0.142[a] (-3.054)	-0.020[d] (-1.356)	-0.031[c] (-1.728)	0.022[d] (1.443)
Occs 5-4-3	-0.001	0.047	0.038	0.017	0.021
Occs 2-1	-0.045 (1.211)	0.095[a] (2.848)	-0.018 (-1.099)	0.004 (0.294)	0.015 (0.984)

3 - Occupational Experience*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				-0.066[b] (-2.364)	0.023 (0.631)
Occs 8-7-6	-0.216[a] (-2.724)	0.108[c] (1.696)	0.019 (0.701)	-0.019 (-0.826)	-0.111[b] (-2.028)
Occs 5-4-3	0.045	0.016	0.013	0.012	0.060
Occs 2-1	0.171[b] (2.032)	-0.124[b] (-2.275)	-0.032 (-1.193)	0.073[a] (2.886)	0.028 (0.984)

4 - Schooling*

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				-0.231[a] (-4.215)	-0.103[d] (-1.482)
Occs 8-7-6	-0.413[a] (-3.335)	-0.223[a] (-3.234)	-0.306[a] (-3.291)	-0.041 (-0.806)	-0.299[a] (-3.398)
Occs 5-4-3	0.023	0.032	0.073	0.020	-0.026
Occs 2-1	0.390[a] (4.513)	0.191[a] (3.171)	0.232[a] (3.734)	0.252[a] (4.572)	0.428[a] (6.565)

5 - Socioeconomic origin: Father's occupation when respondent was 20 years old = Non-manual**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				-0.765[b] (-2.413)	-0.203 (0.745)
Occs 8-7-6	1.475[a] (2.910)	-1.523[a] (-3.593)	0.192 (0.573)	1.177[b] (2.124)	0.190 (0.693)
Occs 5-4-3	-0.681	0.779	-0.674	-0.268	-0.215
Occs 2-1	-0.794[c] (-1.939)	0.744[b] (2.022)	0.482[d] (1.315)	-0.144 (-0.463)	0.228 (0.863)

6 - Geographic origin: Non-rural**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				0.167 (0.523)	-0.189 (-0.719)
Occs 8-7-6	0.276 (0.636)	3.665[d] (1.600)	0.222 (0.761)	-1.344[a] (-2.854)	0.376[d] (1.410)
Occs 5-4-3	0.350	-1.626	0.480	-0.349	-0.005
Occs 2-1	-0.626[d] (-1.545)	-2.039[c] (-1.682)	-0.702[b] (-2.280)	1.526[a] (3.179)	-0.182 (-0.718)

7 - Employees: in enterprises with more than 5 but less than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				-0.378 (-1.096)	-0.779 (-1.237)
Occs 8-7-6	0.002 (0.005)	-0.344 (-0.844)	0.221 (0.525)	0.369 (1.077)	3.248[c] (1.895)
Occs 5-4-3	-0.334	-0.105	-0.230	0.080	-0.862
Occs 2-3	0.332 (0.795)	0.449 (1.138)	0.009 (0.024)	-0.071 (-0.227)	-1.607[b] (-2.251)

8 - Employees: in enterprises with more than 50 workers**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				-1.196[a] (-3.025)	-1.029[c] (-1.706)
Occs 8-7-6	-0.578 (-1.231)	0.300 (0.596)	0.104 (0.294)	1.028[b] (2.230)	3.309[c] (1.874)
Occs 5-4-3	0.163	0.485	-0.245	0.216	-0.770
Occs 2-1	0.415 (0.886)	-0.785[d] -1.472	0.141 (0.425)	-0.048 (-0.148)	-1.510[b] (-1.978)

9 - Sector: workers in "dynamic" activities**

	1940-45	1945-50	1950-55	1955-60	1960-65
Occs 10-9				0.353 (1.102)	0.650[b] (2.385)
Occs 8-7-6	0.935[c] (1.746)	0.524[d] (1.448)	0.058 (0.226)	-0.598[d] (-1.612)	-0.539[c] (-1.757)
Occs 5-4-3	-0.834	-0.597	-0.283	-0.102	0.095
Occs 2-1	-0.101 (-0.232)	0.073 (0.210)	-0.341 (1.275)	0.347 (1.203)	-0.206 (-0.767)

Notes: See table

III-4 Independent variable effects and the mobility process - Magnitude and direction of individual parameters;

Our discussion so far has been wholly concerned with the adequacy of the estimated equations, a tedious task that despite its weight allows few substantial conclusions. We shift now to a hopefully more illustrative presentation of the actual quantitative results. In doing this we face an initial problem of interpretation. Since the relationship between the independent variables and the probability of change is not linear, we must first of all specify a point of comparison and, then, adopt a measure of sensitivity of change at the point. Following accepted custom, we shall base our comparisons on estimates calculated at the means of all independent variables. The question of which measure to use is however more complex.

On the one hand some variables are continuous and have differing ranges of values between periods. This is the case with experience, occupational experience and schooling. In contrast, the remaining variables have equal ranges in every period, but are discrete. For the former, we can define measures such as the marginal effect $(\frac{\partial X_i}{\partial Y})$ or the elasticity of probability which have straightforward interpretations.(17) But it would be wrong to impute an elasticity to a discontinuos variable whose values are necessarily discrete. For these, what should be estimated is the difference in probability values when a particular variable (or combination of variables) is either on or off. Calculating the values of the probabilities

(17) Given that $P_i = \dfrac{\exp(Z_i)}{\sum_k \exp(Z_k)}$

where $k = 1,\ldots,i,\ldots,m$ is the index for the possible occupations of destiny, and where Z_i is a linear function of the X's.

$$m_{ij} = \frac{\partial P_i}{\partial X_j} = \left[\frac{\exp(Z_i)}{\sum_k \exp(Z_k)} \frac{\partial Z_i}{\partial X_j}\right] - \left[\frac{\exp(Z_i)}{(\sum_k \exp(Z_k))^2} \sum_k \exp(Z_k) \frac{\partial Z_k}{\partial X_j}\right]$$

$$= A,$$

so that $\Sigma_{ij} = \dfrac{\partial P_i}{\partial X_j} \dfrac{X_i}{P_i} = X_j \dfrac{\sum_k \exp(Z_k)}{\exp(Z_i)}$ (A)

$$= X_j \left[\frac{\partial Z_i}{\partial X_j} - \frac{\exp(Z_i)}{\sum_k \exp(Z\ )} \frac{\partial Z_i}{\partial X_j} + \ldots + \frac{\exp(Z_m)}{\sum_k \exp(Z\ )} \frac{\partial Z_m}{\partial X_j}\right]$$

$$= X_j \frac{\partial Z_i}{\partial X_j} - \sum_k P_k \frac{\partial Z_k}{\partial X_j} .$$

Since $\dfrac{\partial Z_i}{\partial X_j} = \hat{\beta}^i_j; \ldots; \dfrac{\partial Z_m}{\partial X_j} = \hat{\beta}^i_j,$

$$\varepsilon_{ij} = X_j \left(\hat{\beta}^i_j - \sum_k P_k \hat{\beta}^k_j\right) .$$

can however be a tiresome chore, specially if it means repeating the procedure more than 500 times! For our purposes, comparisons based on the values of the coefficients reported in Appendix Tables will suffice.[18]

General and occupational experiences. As expected, experience more often than not is a deterrent to occupational mobility. The elasticities reported in Tables III-6-1 and III-6-2 are consistently negative for both upward and downward moves from any given occupation of origin and period.[19]

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(18) Occasionally, we'll use "elasticity" measures in relation to binary variables. When used, these values should be interpreted as the probability effects of marginal changes in the composition of the sampled population. They do not, we repeat, represent percentage-of-probability estimates of variations in individual attributes. The percentage of Monterrey natives in the local labor market may change from year to year, but a native will never be anything else than a native.

(19) We base our conclusions on the corresponding sign of the elasticity measure. In most cases this is also the sign of the logit coefficient, but not necessarily. A quick look at the elasticity formula in footnote 17 will show that, if β_j in positive but less than a positive sum $\sum_k P_k \beta_j$, the elasticity value will be negative.

Alternatively, if β_i is negative but less than a negative sum $\sum_k P_k \beta_i$, the elasticity value will be positive. The advantage of using the elasticity value (or, for that reason the marginal effect) in that it captures the influence of other alternative destinations from a common origin.

They are, however, overwhelmingly positive in the probability estimates for occupational stayers. The significant exception is the result for moves from middle-level white collar occupations to top-level profissional and manegerial jobs. And even then, the exception holds only for a very particular period the years from 1945 to 1950.(20)

If it is true that the accumulation of experience - and specially occupational experience - is an element of mobility at an early stage in a worker's career it must be remembered that, in the first place, this type of mobility most likely involves short-distance moves within a closely spaced sequence of jobs. That is, in most cases it does not involve inter-occupational changes. It is precisely this difference that helps explain the conflicting direction of the effects. Moreover, we must not forget the fact that all values are estimated at the means of the corresponding variables. In other words, our "prototype" is a relatively mature worker who probably neither wishes to risk a move to an altogether new occupation nor, for that matter, is likely to be considered a "good bet" by interested employers. This result points to an important conclusion.

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(20) For moves from Occupation 10 to all of the middle and upper-white collar jobs, the elastiticity of Occupational Experience is significantly positive for the 1940-45 and 1955-60 equations. Nevertheless, for these periods the elasticity of general Experience is significantly negative, and larger.

Fundamentally, these are two ways through which the occupational structure is modified. There are changes in the types of jobs held successive cohorts entering the labor force, and then, there are changes due to occupational mobility during the worker's careers. In assessing the relative importance of these forces, our estimates reinforce the opinion of Balan, Browning and Jelín. They wrote:

> "One of the principal findings of the Monterrey study has been that the basic mechanism for the transformation of the occupational structure, even in a society as rapidly changing as Mexico's, is provided by a succession of age cohorts, each of which enters the labor force at higher occupational levels on the average than the previous ones.

Moreover,

> the reasons for this progression are the successively higher level of educational attainment by cohort and the tendency of new industries to recruit their new workers from among younger men".(21)

This conclusion was based on two kinds of complementary evidence. First and foremost is the fact that, as the authors observe, "six of every ten of our men did not cross an (occupational) category during a twenty year period (from age 26 to 45)."(22) Clearly, such a high proportion of stayers can be compatible with rapid changes in the occupational

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(21) Balán, Browning and Jelín (1973) p. 320.

(22) Ibid, p. 146: specify the occ. classification.

structure only if the principal mechanism of change is the incorporation of new members into new types of jobs. Yet, this finding does not explicitate the role of experience in the mobility process; nor does the second type of evidence used by the authors of the Monterrey Mobility Study.

Their conclusion was also based on the empirical fit of a series of life-cycle models considering, for each of four cohorts (men born in groups of 10 years between 1905 and 1944), the sequence of occupations at ages 25, 35, 45 and 55. The model associates the respondent's occupation to his previous occupation, education and father's occupation. The results show that as one moves from the second to the last occupation (corresponding to the "aging" of the cohort) the importance of the previous occupation continuously increase, while that of the other variables and of the "residual" component decreases.(23)

The analysis is however open to some rather obvious criticisms. Since it fails to explicitate either the occupation of origin or of destiny it cannot capture differences between types of occupational moves. The same could be said about the lack of a definite time constraint; without it, we cannot differentiate between changes due to variations in personal characteristics and those due to changing conditions in the labor market.

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(23) Ibid, pp. 277-280.

Moreover the homogenization by cohorts on the one hand does not allow for the full impact of age differences upon mobility and, on the other, leaves differences of up to 10 years in age unaccounted for.

Our analysis draws upon an explicit model of occupational mobility between two fixed points in time; one which treats separately, but simultenously, all possible moves from a common origin to known and specified destinies. Thus, while in the life-cycle model the effects of experience enter implicitly and are the same for all types of move, here we can systematically isolate their contributions.

Nevertheless, the important aspect of the new evidence is that corroborates the earlier results. It shows that, even after disaggregating by kinds of moves and considering the totality of the relevant supply, (ie: the full sample of workers who in a given year shared a common occupational origin), the same pattern holds: most of the change in the occupational structure is produced through new incorporations into the labor force. Once the worker is recruited the longer his work experience and the time he spends in the same occupation, the smaller his probability of change. Even after including all the ogher relevant variables in the model, the basic result of Table remains: immobility increases with increases not only in age but also in experience.

There is however another aspect to our finding. If increases in the length of experience ten to exert a positive influence in the probability of remaining in an occupation,

the magnitude of this effect is nevertheless small. More precisely, the probability of staying is inelastic with respect to either kind of experience. Typically, as the results in Table III-6-1 and 2 indicate, a one percent increase in experience provokes a change in the probability that is only about half as great.[23]

In analysing these results we must call attention to the very specific ways in which general and occupational experience were defined. Since the counting begun only after the worker joined the Monterrey labor force, migrants with previous work experience are included in the same cohort as natives who had just joined the labor force in the particular year. Therefore, the variance of age for any given year of experience as measured in our model is larger than it would have been under the more common definition. This of course makes our results stronger - there was, a priori, less reason to predict such a clearly negative relationship.

Moreover, by (potentially) combining workers at different stages in their life-cycles, the form of measurement would also influence the values of the elasticities. Note, however, that given the evidence that older men are less mobile, this effect would be - if anything - to increase the

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(23) That is, a change of about 0.5 percentage points in the percentage of workers who remained in the same occupations. Yes, in dealing with probabilities, the elasticity measure refers to percentage points of a percentage! For example, if the probability is 70% and the elasticity is 2.0, the contribution of the effect is to increase the probability to 71.4%.

absolute value of the elasticity measure. So, once again, our results are robust in the sense that the bias, if it exists, should have worked against our interpretation.[23a]

As we have seen, increases in experience tend to decrease the probability of movement out of an occupation. Now we ask: just how systematic is this deterring effect? Certainly, it would seem as if some general pattern of response would emerge from the data. Yet, if there is one, we could not find it. There seems to be no single answer to the question. The magnitude of the effect varies depending on the occupation of destiny, the origin and even the period. It also differs between the two kinds of experience. To sustain our claim, we next proceed to survey the numerical panorama.

For <u>downward</u> moves <u>ending</u> in Occupation 10, (the lower manual and menial occupations), the general experience elasticities of probability reported in Table III-6-1, are all greater than or equal to one - <u>if</u> we disregard those values based on statistically insignificant parameters.

(23a) Two notable exceptions in Table III-6-2 are nonetheless worth mentioning. During 1960-65, the elasticity values for occupational experience in Occupation 9 are extraordinarily high <u>in all kinds of moves</u>. For stayers, a 1% increase in occupational experience would, if our figures are correct, call forth a 9% change in the probability. No doubt, this result partly reflects the high mean value of the variable for the period (close to years). Additionally, the contribution of experience of any kind tends to be elastic for workers staying in Occupation 8-7-6, but not so much so and particularly not for the 1960-65 period.

Table: III-6-1

Experience: elasticities in the probability models[1]

		1960-65	1955-60	1950-55	1945-50	1940-45
Occ 10	10	0.458	0.657	0.286	0.257	0.836
	9	-0.337	-0.006	-0.172	-0.387	0.192
	8-7-6	-1.474	-0.485	-0.348	-0.693	-1.278
	5-1	0.282	-1.597	-0.356	0.635	-1.525
Occ 9	10	-0.298	-1.354	-1.737	-0.132	-1.326
	9	0.874	1.003	0.915	0.227	0.685
	8-7-6	-2.138	-1.037	-1.150	-0.967	-0.052
	5-1	-0.122	-0.399	-0.055	0.885	-0.091
Occ 8-7-6	10	-1.022	1.815	-1.580		
	9	0.022	3.961	-3.665		
	8-7-6	0.469	-1.235	1.440		
	5-1	-0.688	-0.553	-0.401		
Occ 5-4-3	10-9	1.546	-0.074	-0.867	-2.556	0.603
	8-7-6	0.074	-0.864			
	5-4-3	0.439	0.316	0.677	0.552	0.057
	2-1	-0.056	-0.189	-0.844	0.737	-0.507

Notes:

[1]Estimated at the mean value of experience in the years of origin.

Table: III-6-2

Occupational experience: elasticities in the probability models[1]

		1960-65	1955-60	1950-55	1945-50	1940-45
Occ 10	10	0.172	0.204	0.709	0.118	-0.020
	9	-0.052	0.149	-0.894	-0.172	-0.750
	8-7-6	0.099	-1.056	-0.723	-0.421	0.015
	5-1	-0.631	0.247	-0.417	0.225	1.062
Occ 9	10	-2.477	0.150	-0.144	-1.974	0.535
	9	8.846	0.191	0.379	0.434	-0.020
	8-7-6	-5.208	-0.560	-0.102	0.019	-0.266
	5-1	-5.301	-0.004	-0.922	0.282	-0.259
Occ 8-7-6	10	-1.305	-2.527	0.307		
	9	-0.483	-1.398	-0.380		
	8-7-6	0.271	1.107	-0.082		
	5-1	0.512	-0.450	-0.252		
Occ 5-4-3	10-9	-0.293	-0.690	0.072	0.677	-1.483
	8-7-6	-1.479	-0.269			
	5-4-3	0.516	0.083	0.104	0.160	0.123
	2-1	-0.247	0.563	-0.310	-0.912	0.763

Notes:

[1]Estimated at the mean values of occupational experience in the years of origin.

Moreover, the same result holds if one applies an equal criterion to the occupational experience elasticities. Only now, the effects for moves originating in Occupation 9 and 8-7-6 tend to be larger. Thus it appears that greater experience, particularly in occupations other than 10, is, at least, a hedge against the worse kind of downward mobility.

In downward moves to semi-skilled jobs in Occupation 9, from the industrial Occupations 8-7-6, there are no less than three different results: one for every period. For changes based in 1950, the probability is very elastic with respect to increases in general experience but inelastic with respect to occupational experience. The elasticities increase during the next five years and much more so far gains in occupational experience. Surprisingly, however, the effect of general experience is positive and significant: a 1% increase would raise the probability of downward mobility by 4%.The impact of small increases in experience is, in contrast, quantitatively irrelevant for moves which begun in 1960 and ended in Occupation 10 sometime by 1965. The bahavior expected from theory is observed only once. During the 1955-1960 period, more experienced, older workers had a greater than avarage propensity to loose their jobs and be forced into lower industrial tasks; but not if they had been able to acquire this experience in the very same occupations from where they were to move.

As the figures in Table III-6-1 indicate,the effect of experience is negative and large in upward moves to Occupation

8-7-6, from either one of the lower manual Occupation 9 Or 10. A more than avaragely experienced worker, who tried this move from Occupation 9 some time between 1960 and 1965, would most likely find that for every percentage gain in general experience his probability os success would decrease by 2%.For every comparable gain in occupational experience, the results of Table III-6-2 suggest that the probability would drop by 5%! Curiously,the equivalent impact for workers who began their move in Occupation 10 is smaller - as it is through out the five periods.This may reflect the fact that the average probability of completing this move is,to begin with smaller. In any case, both results indicate that more experienced workers had comparatively greater difficulties in moving up to the industrial occupations.The findings are in agreement with our theoretical discussion. Considering the fact that workers were more likely to move, into an expanding firm, we can conjecture that the typical industrial organization of production would be one that prized internally developed skills and rules of performance, at the same time that it rejected old skills and traditional attidutes. On the other hand, in the more informally organized tasks of the lower occupations, the skill and position acquired by more experienced workers would discourage them from seeking only marginally superior, alternative forms of employment.

If the goal was a job in the top echelon white-collar occupations, the probability of achieving it was, to begin with, so small that even the more experienced workers (in other occupations) were not particularly disadvantaged. On

the whole the link was inelastic, the value randomly ranging from 0.1 to 0.9. It was however more sensitive (in the negative direction) for workers deparating from the botton occupations during 1940-45 and 1955-60.

In sum, the length of general and occupational experience not only diminished the probabilities of upward and downward movement among the occupations, but often did this in a quantitatively important way. In contributing towards occupational stability it displayed a more attenuated influence. But in neither case was this contribution stable from period to period.

Schooling and Specialization: schooling and specialization, as we have seen in Chapter II, play a key role in the process of occupational mobility, serving as intervening variables between past and future occupations. When considered simultaneously with, but in addition to experience, schooling reflects the formal (and most important) component of an individual's qualifications. It is perhaps the most commonly used criterion for differentiating workers. Apart from the fact that a more schooled worker is likely to have better developed cognitive abilities, schooling is a proxy for a host of other desirable traits from the employer's point of view. The educational process is organized along lines not too different from the typical production system of a modern enterprise, and it is similarly based on well defined rules of discipline and conduct. Schools and firms tend to operate

with unilaterally imposed and administred criteria for rewards. Futhermore, in a labor market where most workers are migrants, the schooling system serves an important socializing capacity, adapting (and even molding) individuals to the functioning of an industrial society.[24] And, although the supply of educational facilities is scarcer and of poorer quality, it is a well documented fact that rural school's curricula-and more importantly, teacher's preferences and attitudes - are heavily biased towards the goals and ideology of industrial (and therefore) "urban" work performance.[25]

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(24) A classic study of this relationship, following the "functionalist" tradition in modern sociology, is Kerr, Dunlop, Harbinson and Myers' (1960) which specifically discusses the Mexican post-war experience. A more critical view of the "achievements in mobility", but one that also emphasises the problem of transforming rural workers into urban wage employees is developed in Lopes' (1961) study of migrant workers in São Paulo. Although the authors of Men in a Developing Society discuss in detail the individual process of educational attainment they only briefly analyze the broader links between industrialization and schooling. Yet, for several of the advanced industrialized countries, Offe (1976), Althusser (1972), Bowles and Gintes (1976), among others, have argued persuasively for a structural relationship between the changing phases of capitalist enterprise and the dissemination and changing functions of schools.

(25) The urban and specifically "modern" orientation of Mexican schools is discussed in Ekstein (1977). In excelent survey of Mexican educational "necessities" Latapí concludes: "... preocupa la manera como la educación mexicana ha venido resolviendo el problema de su orientación en relación con la conservación o el cambio cultural. Las razones de esta preocupación son dos: por un lado la unilateralidad excesivamente "política" com que la filosofía educativa vigente ha procurado la unidad e integración nacional; por otro, el esquema educativo indeferenciado que se ha derivado de esta filosofía, sin atender a las exigencias de les subscritivas del país." (Latapi, (1974) p. 352). This phenomenon is not however restricted to Mexico. It is very well documented, for the Brazilian case, in Nunes Schwartzman and Urobel (1976).

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In the context of capitalist production, work performance is, as we have previously discussed, a guiding principle for structuring the use of wage labor. It is part of a persuasive ideology of "modern" management and, as such, a social / mechanism of control. Performance justifies management policies in terms of a system of beliefs and aspirations that is shared by both workers and managers. To this extent, it seeks to legitimize the established social order in production. For, (as Reinhard Bendix clearly recognized), management ideologies

> are attempts by bodies of enterprises to justify the privilege of voluntary action and association for themselves, while imposing upon all subordinates the duty of obedience and the obligation to serve their employers to best of their ability... (they) interpret the facts of authority and obedience so as to neutralize or eliminate the conflict between the few and the many in the interest of a more effective exercise oe authority.(26)

Among other things, shools contribute to disseminate, reproduce and, variously reinforce the normative value of work performance - which is by no means homogeneously interpreted. It doesn't have to, nor should it be.

Wage-labor occupies varying positions in the hierarchy of work and performs different tasks in production. At the same time that it strives to establish a minimal bond of

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(26) Bendix (1966), quoted in Anthony (1977) p.2.

"responsible citizenry" between all workers, the educational system with its gradations of quantity and quality of schooling is instrumental in promoting the differentiation of labor. In the sphere of work, these differences commonly serve as foundations for the internal, architecture of the firm.(27) Thus, despite their sometimes conflicting interpretations,all influences jointly give better-schooled workers an initial advantage in securing hierarchichaly superior positions.They add up to make better schooled workers more eager as well as more likely to achieve upper mobility.(27a)

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(27) This point has been exploited and developed in the current literature on labor market segmentation - and has ed to the proposal of a theoretical and empirical separation between upper and lower tiers in primary (i.e, more priviledged internal markets. Of particular interest in this direction is the work of Edwards (1975) - and (1976).

(27a) Which is not to say that schooling, as such, promotes or even significantly contributes to social mobility. In his previously referred survey, Latapí argues that the available Mexican evidence does not point to a notable educational effect: "En México las fuertes desigualdades sociales y economicas gravitan fuertemente no solo sobre la igualdad de aceso a las oportunidades educativas sino también sobre la igualdad de perseverancia en la educación, sobre la igualdad de aprovechamiento en la escuela y sobre la igualdad de éxito social y economico en relación con la educación recebida. La gratuidad de la educación publica ha actuado más como apaciguador social (al satisfacer el "factor esperanza") para los pobres, que como medio para la realización efectiva de una justa distribución de educación", (Latapí (1974) p.340). Later on, we shall show that our results support his main conclusion concerning the role of education in mobility.

Our first task, therefore, will be to explore how much schooling independently contributes to the probability of occupational change. It should be recognized that, in doing this, we are not capturing its full impact on the occupational distribution. There are two main reasons for the discrepancy. In the first place, since the school's model of a learning process is to some degree informally replicated in many on-the-job training situations, workers who are more familiar with the model enjoy a competitive advantage. That is, to the extent that good performances in training situations (however, informal) often lead to promotions. These workers may also find the training easier, hence less costly and more complementary with previous qualifications. In other words, they may be more motivated to search for training opportunities — a fact somewhat perversely explored by the human capital literature to explain why those that are better-off continue to improve, while the worse - off stagnate. More the point, the firms themselves may learn from practice and explore the advantage of association. They may use schooling, instead of direct monitoring, as a cheap and efficient "screen" for selection into training programs or into jobs with a high "training-and-promotion" component.

These effects, while potentially significant, would nevertheless be more relevant in a study of income variations, or closely-spaced job changes. In an analysis of occupational mobility such as ours, the single most important indirect (and thus unmeasured) contribution of education is the fact it discriminates workers not only in terms of outcomes but

also in terms of origins. Our samples are stratified by categories of the dependent variable, that is, by occupational destinies. Since this procedure affects the range and distribution of schooling, our estimates cannot capture the variable's full effect on the occupational hierarchy.(28)

In any case, this is not what we are after. What interests us is the degree to which differentially schooled workers, sharing comparable jobs have unequal mobility prospects. This we can explore with our results. Admittedly the fact that some occupational groups are relatively homogeneous with respect to schooling may hinder our comparisons. It will be recalled that our analysis is based on comparable, occupationally specific cohorts of workers defined with respect to schooling and experience, (controling for the types of schooling and the kinds of experience). Yet, at the base of the lower-echelon occupations, the entry tasks into what is a more or less stagnant career may themselves, be so trivial, and the extent of schooling so insignificant, as to do-away with the association between qualification, acess to marginally better jobs and gradual redifferentiation of labor. This is not to say that in these jobs there are no mechanisms other than chance, inherited traits and general experience to promote the gradation of labor. To begin with, more schooled workers employed in the lower occupations may find this advantage

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(28) In discussing some preliminary results of the literature on labor market segmentation, Cain (1976) first drew attention to this / problem, already well known in the theoretical econometric literature but, until then, largely ignored in a variety of empirical applications dealing with truncated samples.

irrelevant for the kinds of jobs they currently perform, but not so in the chances of moving to other occupations. Moreover, some workers do, inspite of all, acquire new trades. Only, in this case, we cannot rely on occupational experience as a proxy for training and must, necessarily, count on direct evidence to specify who are the workers with special training.

Providentially, the Monterrey Mobility Files contain this information, and it has been included in our model.(29) We shall, therefore, discuss the results for schooling in Occupations 10 and 9 conjunctly with those for a binary variable indicating whether or not the worker was an apprentice to a trade, at the time the mobility period begun.

In Appendix Tables and in Table III-6-3, estimates for the parameters and elasticities based on the various origin occupations and periods are presented. For the reasons discussed earlier, in dealing with the continuous schooling variable, we prefer the elasticity measure. Looking at the line corresponding to stayers in Occupation 10, we see, in Table III-6-3, that schooling had a negative effect, meaning that it had a positive contribution on mobility, at least

(29) We have already mentioned the fact that, among the lower occupations, (groups 9 and 10), specialization can be clearly defined only with respect to auxiliary tasks in integrated production efforts, such as helpers in construction, some of whom do acquire the rudiments of a trade. It makes no sense do define the specialization of manual laborers who casually change from being delivery-men, to domestic-help, to truck loaders, etc. The same applies to very low level service activities such as street peddlers, doormen, watchmen, etc.

up to 1960. The contribution was nevertheless inelastic, and schooling had - inspite of this generally sluggish result - a most positive and elastic influence on the probability of moving up to white-collar office and personal service jobs. In moves to the industrial occupations the signs of the coefficients are not consistent; in any case, with the possible exception of the 1955 quinquennium, the probability of change was hardly sensitive to variations in schooling.

On the other hand, being a specialized workers in Occupation 10 mattered, and a lot. The influence was strongest in early moves and decreased abruptly during the last period. Workers who had specialized in some industrial trade displayed, expectedly, a smaller probability of moving to the white collar occupations.(30)

The results for moves begining in Occupation 9 are in some ways similar. Schooling exerted a positive and very elastic push for those moving to the top-echelon jobs. / Specialization did exactly the reserve. However, it strongly contributed for a successful move into an industrial occupation, while for this, schooling hardly counted. More schooled workers had smaller chances of falling into the bottom-line jobs as did, apparently, workers who had some specialization.

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(30) Considering the effects of small changes in the proportion of workers with industrial specializations, the contribution towards the probability of change was, nevertheless, inelastic both for moves ending in Occupation 5-1 and 8-7-6.

These findings meet our expectations. They underline the importance of an apprentiship system in moves to industrial jobs. They indicate that among the least schooled, schooling was nevertheless a significant and important attribute for occupational mobility. Not for moves into manual jobs, even the better ones. An expressive result in that schooling was found to be important only in moves to the white collar occupations, precisely those that are more likely to use educational attainment as a screening device. This, together with the preponderant advantage of the specialized (but not necessarily more schooled) in completing moves to the upper manual positions. Seen in the light of our earlier discussion, both results serve to illustrate the complex and contradictory role of education, one that goes much beyond the usual human capital interpretation.

As has already been noted schooling can be a powerfull deterrent against downward moves, and those begining in Occupations 5-4-3, the middle level white collar occupations, are not exceptions. A percentage unit increase in mean schooling levels cuts by 4% the probability of downward mobility in 1940-45. This magnitude tends to decrease with time, but it remain relevant throughout. Schooling is also a significant and very elastic influence on the probability of movement from middle to upper level white collar occupations. For example, during the years from 1940 to 1945, and again from 1960 to 1965, a worker who was slightly-better-than averagely schooled had a 3% larger chance of completing the desired move. The mean level of schooling and the total probability

of movement were however greater in 1940 than in 1960, which means that the overall impact of the variation was larger. (See Apendix Tables). Although the difference of 0.6 years in mean schooling levels cannot be said to be significant, when considered together with the larger variance of schooling in 1960, it is indicative of the growing heterogenelity of labor in middle-level white collar occupations.(31) This perhaps helps explain the decreasing sensitivity of the average elasticity measures reported in Table III-6-3: calculated with 1960 coefficients but 1940 mean, the elasticity value drops to 2%, calculated with 1940 coefficients but 1960 mean, the value rises to close to 5%. The difference is striking, and even more so if it is noticed that the (estimated) avarage probability of upward movement in 1940 was 17.87% against a mere 3.38% in 1960.

The results of Table III-6-3 for the industrial occupations (8.7.6, in our classification) are not so clear. The more schooled, when schooling is relevant, appear to have a smaller probability of downward mobility. Nevertheless, for moves ending in Occupation 9, in 1960, a one percent addition to the average level of schooling would most likely provoke a 3% increase in the probability! On the other hand, except for moves during the 1960 to 1965 period, when the contribution was unitary elastic, the effect of schooling on upper mobility was, although apparently positive, inelastic.

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(31) See Chapter I, Section for a discussion of the trends in average schooling within and between occupations.

In a way, these findings reinforce our views concerning the special nature of mobility to and from the industrial occupations. The closer tie between hierarchical positioning and internally (to the enterprise) developed skills diminishes the importance of schooling. Upward moves most likely are the result of transference to administrative positions, and in this process schooling exerts an important but roundabout influence. Some of the downward moves - particularly to Occupation 9 - can come about from an attempt of the relatively more schooled to seek specific advantages for their / personal characteristics. While the gains due to meager improvements in schooling are minimmal in industrial jobs, they may be significant in less structured occupations, where success does to a greater degree depend on individual initiative.

In conclusion, we (not surprisingly) find schooling to be a positive and quantitatively important contribution to upward mobility and a negative but equally important deterrent to downward mobility. Somewhat in disagreement with the more usual results, we observe that in disaggregating the types of moves the first part of the preceeding statement applies only to mobility towards the white-collar occupations. For moves to typically industrial tasks, the direct effects of schooling are negligable if at all significant.

Personal background and enterprise characteristics: The variables in this last group are dichotomons and the measurements of socioeconomic and geographic origin are, furthermore, casually prior to all others in the model. In this circumstance,

it would be misleading to think of their contemporaneos effects as "contributions" to mobility; rather, they should serve to differentiate the samples. By capturing some of the unmeasured residual variation in the model they could indicate the enduring influence of background difference in the sampled population. Enterprise characteristics are, on the other hand, included as controls for qualitative differences in measured attributes. In particular, given the central role of experience in the mobility process, it would seem to be important to distinguish between types of experience: in autonomous versus hired work, in small versus large enterprise, in stagnant versus rapidly exparding activities.

Empirically, however, it is impossible to distinguish between the two sources of influence, that is, without estimating the full interdependent system of relations. We have already emphasized the close link between quantity of schooling and socioeconomic origin, a fact that could tend to make both variables collinear. But this is not all. Parental background also influences the quality of schooling, the premium placed on school performance and the ability to acquire the intellectual skills students need to do well in school. These, in turn, weigh on the occupational choices individual make and on their ability to carry them through.(32) Thus,

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(32) The most complete discussion of these interrelationships, that for a while dominated the North American debate on the economic impact of schooling, still in Jensk's (1972). In Chapter 6 of his book, he concludes that occupational status is strongly related to educacional attainment and, on a comparison between catholics educated in parochial (better quality) and public schools, that the former have an advantage-even after controling for parenteral background. (See comments by Blaug in JEL (1976)).

if in a mobility model schooling is measured without reference to variations in quality and individual performance, the contemporaneous inclusion of an index of socioeconomic background acts as a filter, removing (although imperfectly) the effects of these differences on schooling's contribution to mobility.(33)

The same thing could be said about the inclusion of geographic origin. In part, the variable's coefficient captures the lasting impact of rural upbringing on urban careers. Additionaly, it separates urban from rural schooling - and, for that matter, geographic differences at equal measurements of socioeconomic background.

The juxtaposition of these influences makes it very difficult to define the variables. Let us consider first the specification of background influences. Considering the limitation inherent in the use of a single index, the evidence are that the inheritability of occupational priviledges is stronguest, (and hence best captured), if it is measured

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(33) Recall our discussion, in Chapter II, concerning the interpretation of the coefficients in a structural equation resulting from a recursive system. A respondent is said to be from a high SEO if his father's occupation was not in rural manual work, unspecialized manual jobs, street peddling activities, etc. Admittedly, this procedure is not the most desirable since it leaves unaccounted a substantial variation in backgrounds. For a discussion on the problems with the measurement of background see Bowles (1972).

at the level both fathers and sons had when the son was 20 years of age.[34] That is, at an age when most workers in our sample had already left the school system. Since the father's career is likely to have progressed (or deteriorated) since his first son finished school, the influences at age 20, and at this earlier age, would be different. They would be compatible if the effects of background on schooling, (represented by a single indicator of father's occupational standing), are adequately measured by considering "mature" parental positions, where "maturity" is defined by the fathers having at least one son aged 20.[35] Implicitly,

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(34) Some would argue that the measurement is best taken at the son's first occupation, given that subsequent occupations will be partly dependent on the initial one. However, there is necessarily a certain degree of arbitrariness in any definition of entry into the labor force. Different analysts would use different definitions (see , for example, Blau and Duncan (1967), p.446, Ornstein (1976), p.24. As is pointed out in Balán, Browning and Jelin (1973), "the transition from not working to working is for many men a blurred one. Work and non work are not opposite and contradictory terms. This is especially so in the underdeveloped countries, where the social definition of the position and roles of a young boy is not as clearly established as in highly developed societies" (p.117). For all these reasons, the choice of an early point in a worker's career seems to be the most reasonable one, remembering, of course, that the father's career may be progressing alongside with his son's.

(35) This fact draws attention to the importante of siblings and of father's age in determining the educational, and later, occupational, prospects of a worker. For the Monterrey sample the quantative differences in mean years of schooling between oldest, youngest and middle brothers are, nevertheless, very small. Only male sons happen to have an advantage, but, even then, of less than a year in mean schooling levels. Respondents whose fathers'died when they where 5 years old (or less) are the most severely penalized, having on the average 2 years less in schooling than respondents with living fathers, or whose fathers died after they were 21 / years old. (See Table 4-10, p.103, in Balán, Browning and Jelin (1973)). On the whole, however, the differences did not seem to justify the inclusion of an additional control for the presence of living fathers.

we are making this assumption in our model.

In measuring geographic origin we face similar although reversed problems. About 70 percent of the workers in the sample are migrants. Some of, them may, however, have migrated at a very early age, accompanying their families. Their formative years would already have been spent in Monterrey and it would be misleading to label them as migrants. This is why we, following the original users of the Monterrey file, have defined community of origin as the place of residency between the ages five and fifteen. This of course, coincides with the period of most intensive schooling. Therefore, if we accept the limitation of treating both effects, jointly, there is nothing to worry about in this choice of measurement.(36)

There is however something to ponder about the measurement of enterprise characteristics. Yet, here, we simply cannot do differently. From the theory in Chapter II, we gathered that the best would be to specify the organizational / characteristics reflecting the social relations of production in the enterprise. Lacking this information, the empirical definition adopted was limited to a distinction between employers in "organized" work environments and others, com

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(36) The question of whether or nor the effect of these variables on the probability of mobility can tolerably well be aproximated by a linear and additive term is something quite different. We have already discussed this issue in Chapter II, when chosing the / model's specification.

plemented by establishment size. It includes additionaly sectoral characteristics reflecting the differential rates of expansion of the various activities during each quinquennium. Despite these difficulties, the measured impact, if any, has a clear enough interpretation: the labor-power of workers whose origins, and immediately preceeding occupational experience, were in large-sized, rapidly-expanding establishments is qualitatively different. The net impact of this difference on their mobility prospects is nonetheless indeterminate, and for the reasons already discussed. In a period of expanding demands if the workers occupy low-level occupations their chances of-upward mobility would be better, and their incentives higher; but, if they could have progressed whithin the occupation they would most likely have done so. When small firms are expelling redundant workers, their employers may continue to use them, but not if they work in entry-level positions where replacement costs are small.

This indeterminacy makes it uninteristing for us to discuss the variables' contribution in detail. They are important, and should be included when determining the shape of the mobility function. But it is hazardous to venture into any analysis of their isolated effect on the probability of change. We will therefore concentrate our remarks to the two backgound variables.

It is startling to observe that rural migrants from low socioeconomic origins appear to have an advantage in moves, up from the bottommost jobs, to the white-collar occupations.

Rural migrants were also favoured in moves, up to the industrial occupations but, in this case, workers with non-lower-manual origins had a significant lead. Together, these results may nevetheless have an acceptable interpretation. Let us observe more closely the coefficients of Variable 7 in Table for periods from 1945 to 1960. Most migrants from rural origins worked' in smaller urban areas before reaching Monterrey. The advantage they enjoy may therefore be an indication of positive selectivity. As Balán, Browning and Jelin point out, "a greater proportion of migrants than the census population (for the communities of origin) have six of more years of schooling and were employed in nonagricultural activities".(37) The occupational datum is of particular relevance. While, in the model, the quantitative impact of differential schooling is captured by the variable's coefficients, the contribution of premigratory training is, by definition, excluded from the measurement of experience. Nonetheless, some types of pre-migratory activities may be advantageously transplanted to the large urban setting, particularly that of the low, menial, occupations.

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(37) Balán, Browning and Jelin (1973) p.144. In another study about the same data Balán firmly rejected the idea that rural parental background inhibits mobility: "The adult farm worker, when moving to a large city, may still have few chances of moving up the occupational ladder; however, his move may be effective in promoting his son's upward mobility by providing him with the opportunity to grow up in an urban environment". (Balán (1968) p. 173).

And, although apparently contradictory, the positive and significant coefficients for 1940-45 and 1960-65 are, in fact, consistent with this interpretation.

Let us accept, as a reasonable aproximation, that the sucessful movers out from Occupation 10 are predominantly the recently arrived. After all, we have seen that the experience is a deterrent to mobility and the more so far the older worker. Before 1940 there were few men in rural and small urban areas of northeastern México who had acquired a relatively good education or relevant work experience. Priviledged as they were with respect to their fellow neighbours, they were imitially disadvantaged with respect to Monterrey residents. These were followed, during the fifties, by a stream of migrants who had both beneffited from the extension of rural educational programs during the Cárdenas era, and suffered from the devastating deterioration of small-scale agriculture in Monterrey's region of influence. Their displacement had the double effect of deteriorating the rural, and increasing the urban, attributes of the working population.

This was not the case with the new arrivals of the sixties. Increasingly pushed-out of their rural environments the migratory population gradually lost their selectivity with respect to what was in any case becaming a generally deteriorating reservoir of surplus urban labor. Due to the impressive immobility in the occupational structure, the accumulation of rural migrants into the lower-rung occupations

increased. If in 1940, they made up 23% of the workers by 1960, they were 38% of the total.

We must not forget that during the forties the population of Monterrey grew a 5.9 percent per annum, 61 percent of which due to net-immigration. The massive geographic movement continued, albeit somewhat subdue, during the fifties when the total growth rate of the city increased to 6.3 percent while the share due to migrants decreased to a still respectable 52 percent.(38) Not surprisingly, by the early sixties there are increasing evidences to the effect that the best of the rural working population had left their place of origin - and not only to Monterrey but also to the expanding town in the American border. The recent rural arrivals were, if anything, worse-off than equally placed urban natives.

This explanation leaves unanswered the puzzle of socio economic background. It is not difficult however to interpret the empirical result. White-collar occupations are not necessarily the most desirable ones from the perspective of someone uset to manual labor - and, in any case, certainly not the only sought-after positions. Since potential movers consider simultaneously the possibilities of a move to all of the available occupations - indeed, their pros- and -cons can only be assessed comparatively - the results for any one occupation reflect those for the others. The point being

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(38) See Unikel (1968).

that workers in lower manual jobs and with lower manual socioeconomic backgrounds were very much discriminates against in moves to the industrial occupations.

Industrial employers in Monterrey apparently placed great emphasis in modes of behavior and presentation; that is, in personal characteristics which were not met by those with the lowest origins. Perhaps they required personal recomendations and formal interviews for job placements. These procedures are less common in some of the low-lovel service and commercial activities that take place in more fluid and personalized environments. Work patterns and selection criteria are, most likely, based on easily perceived credentials such as schooling, weighed by demonstrated ability to perform padronized tasks; for example waitering tables, servicing shoppers, completing simple accounting procedures, and the like. Although personal appearance and conduct is likely to be important in some functions, for working in contact with a generally poor population having been, or still being, poor is not necessarily an obstacle. Being shut-out of the industrial jobs, workers with low socio-economic origins flocked ro white-collar positions where they were, at least, competitive. This explains the negative coefficient for the variable.

Moreover, as the very large and significant positive coefficient for 1945-50 indicates, in a period of widespread increases in demand employers recruiting workers from lower

positions do not necessarily "lower" their hiring standards. They shift towards simpler procedures. Objective screening gives way to simple signaling devices such as socioeconomic origin.(39)

Movers who begun in Occupation 9 experienced very much the same influences as did those from Occupation 10. In moves to the white-collar occupations rural migrants tended to have an advantage, if only because they faced high / obstacles in reaching industrial jobs. Lower-manual backgrounds strongly hindered the latter kind of move and, from this origin, also the former. By 1945 these was a dramatic increase in the proportion of workers with low socioeconomic origins (up almost 30% from 1940, completing more than half the total supply in the occupation). This change most likely followed through do the probability estimates: at 1950, when demand expanded, workers with low socioeconomic origins / enjoyed a brief advantage.

Having a father in non-lower-manual activities helped those who succeeded in moving from industrial (Occupations 8-7-6) to white-collar (Occupations 5-1) jobs. At least that is what we can learn from estimates based in the period 1950

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(39) In Table , the proportion of workers in Occupation 10 those father's were office workers increased substantially between 1940 and 1945. Since fathers can be instrumental in securing jobs for their sons, this fact can also help explain the sudden reversal and increased importance of the coefficient.

to 1965. It also helped against the possibility of a downward move - but, curiously, not to the bottommost occupations. Here, again, we must entertain joint events. Supposing that a worker had lost his job, background appears to have forestalled the drop towards positions in Occupation 9, with the effect of increasing the chances of employment in Occupation 10. Given the small number of downward movers in the sample of industrial workers, it is possible that this result - indicating a "preference" for destinations in Occupation 10 - is unduly influenced by the few cases when a change in activity also implied a change in employment situation: workers who prefered to work on their own rather than accept a lower-level positions.(40)

On the whole, however, the stronguest contribution of background was to discourage mobility away from industrial

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(40) For the three periods considered the situations was as follows (in number of workers):

WORKERS in Occ 8.7.6 WHO MOVED TO:	Occ 9 LOW-SEO	TOTAL	Occ 10 LOW-SEO	TOTAL
1950-55	5	5	4	7
1955-60	2	5	4	7
1960-65	9	12	4	5

In can readily by seen that, in all cases, the proportion of workers from low socioeconomic origins experiencing downward moves exceeded their mean proportion in the sample. In other words, takem as a whole, the group was disadvantaged. Note, algo, that during the period the move to self-employment was significant even for those who remained in the industrial occupations. In 1965, 16% of the workers were self-employed a small employers, (See Table

Table: III-6-3

Schooling: elasticities in the probability models[1]

		1960-65	1955-60	1950-55	1945-50	1940-45
Occ 10	10	0.025	-0.420	-0.364	-0.576	-0.344
	9	-0.009	0.257	-0.007	0.123	0.130
	8-7-6	-0.141	0.712	-0.022	0.161	-0.155
	5-1	0.034	0.322	1.440	1.580	1.108
Occ 9	10	-1.418	-0.814	-1.295	-1.916	-2.143
	9	-0.102	-0.378	0.123	-0.502	0.947
	8-7-6	0.601	0.458	-0.435	0.432	0.042
	5-1	1.195	1.311	1.266	2.051	0.081
Occ 8-7-6	10	-2.649	0.081	-0.593		
	9	0.344	3.188	-0.375		
	8-7-6	0.155	-0.975	0.061		
	5-1	1.126	0.556	0.588		
Occ 5-4-3	10-9	-0.619	-1.801	-2.628	-1.871	-3.670
	8-7-6	-1.924	-0.451			
	5-4-3	-0.107	0.080	0.454	0.138	-0.217
	2-1	3.071	1.667	1.227	1.162	2.853

Notes:

[1]Estimated at the mean values of schooling in the years of origin.

jobs. The same could be said about geofraphic origin. Workers with urban origins tended to remain in their occupations. Certainly they were the least likely to edperience downward mobility to the bottom-layer jobs; and, the coefficients of Table also suggest that, at least for a while, they were favoured in moves up to the white-collar occupations.

Within these, in moves to the more priviledged managerial positions, the overwhelming majority of urbanites (making up 75% of the total) seem nevertheless to have been at a loss, except during the next to the last quinquennium. The measured impact is largest in the period 1945-50 and all the more significant given the high mean value for the variable. The result is surprising. It evinces positive rural migrant / selectivity and may be influenced by the large, but decreasing, proportion of self-employed professionals consultants and managers.

We know, from Table , that between 1940 and 1965 the share of self-enployment in top-level white-collar occupations decreased from 50 to 37%, while in middle-level / positions, it increased from 26 to 30% of the total. At the same time, for these, the relative weight of workers with rural origins diminished from approximately 30 to 25%. / Significantly, the three tendencies were established early on by the results of the 1940-45 period. All together, these bits of evidence would support the hypothesis that, in the case of rural origins, the upward move tended to be, / simultaneously, a shift in employment status. Specifically,

a change from autonomons to salaried work.

While there is no actual confirmation of this hypothesis in our results, the available results do indicate one thing. By the early sixties, a move to the top echelon jobs was / markedly more difficult for white-collar employees than for self-employed workers in comparable positions. At least that is what the coefficients of Table indicate.

For the white-collar occupations the period from 1940 to 1945 was remarkle in still one other aspetc. Considering the aggregate of workers with fathers in manegerial, professional or office employment, their proportion in total occupational supply diminished from 55 to 79%, in the case of Occupation 2-1, and from 25 to 16% for Occupation 5-4-3.

This last result may help explain the negative, large and significant coefficient of socioeconomic background for upward moves from the white-collar occupations during the period. It indicates that tertiary sector employers, who rapidly expanded their activities between 1940 and 1945, were inclined to hire new entrants over experienced workers, disregarding the fact that the former, and not the latter, tended to be from lower socioeconomic backgrounds.

The remaining results in Table , for socioeconomic rather than purely geographic origin, are closer to the / expected. White-collar workers with lower-manual ancestry had smaller probabilities of reaching the top. Not surprisingly, the coefficient for the variable in largest and most significant

during the boom years of the immediate post-war period: When demand exceeds the available reservoir of new entrants and, indeed, is generalized to the point of requiring new workers all along the intra-occupational hierarchy, it is relevant to discriminate potential workers in more dimensions than age, experience and formal qualifications.

In sum, the results for both background variables are mixed, which is not to say that they are incomprehensible. Rather, their variation indicates the manifold ways through which background affects mobility. The probability of change may differ between two "otherwise identical" workers if one comes from an influential family and other does not or, if only one was socialized in an urban environment. Certain effects are nonetheless systematic. Of these, perhaps the most striking is the result for industrial jobs. Whether it is because they have greater difficulties in completing upward movement towards these jobs, or because they are more easily forced away from them, workers with lower manual origins are clearly disadvantaged.

CHAPTER IV

IV-1. Demographic and structural effects in the probability model.

In a dynamic economy the pattern of demand for productive resources undergoes continual change and, for the system as a whole to be flexible, resources should be able to transfer readily between alternative uses. To this extent, the experience of the men in the Monterrey mobility sample would seem to be highly exceptional. The observed mobility rates are hopelessly small. What is more, they have decreased over a period that by all accounts was one of violent and accelerated growth.

In this section we shall argue that the apparent contradiction between theoretical expectations and empirical findings can be explained by the peculiarities of the sample and our estimation procedures. But we shall also argue in mother direction. Considering the reservoir of surplus labor in the lowest occupations, while there is evidence of a great deal of mobility in the sense of forced or induced job changes, there is no firm indication of an individually actuated occupational filtering process. That is, a process whereby the most able workers are continuously (and increasingly as faster pace) promoted up the hierarchy of jobs. Even after adjusting for the peculiarities of the sample and procedures there remains traces of significant rigidities in the flow of labor. Moreover, we shall later maintain that these barriers result from parallel changes in the structure

and internal organization of production. In our interpretation, there is no necessary suggestion that over time the pattern of demand "adjusts" to changes in supply. Nor is this conclusion, as it stands, at odds with current accounts of Mexico's growth record for the period in question. Many authors have argued that the quest for capital accumulation through import substitution, particularly in its "advanced" phase of intermediary and capital goods, had the effect of subsidizing the real cost of these goods thereby inducing capital for labor substitution in production.(1) This in turn would have continuously raised existing barriers in the absorption of unskilled labor. Consequently, at equal rates of output growth, a smaller volume of labor resources would have been utilized. Accepting (as these authors do) the doctrine of marginal productivity pricing, the minimally admissable productivity level for incoming workers into the better jobs would have increased. This would further discourag the employment of untrained labor. Thus, in this interpretation, production would turn to techniques that use more intensively both physical and human capital.

Later on we shall examine in greater detail - and attempt to criticize - the theoretical and historical basis of this explanation. Presently we are, however, concerned with demonstrating the validity, if not of its conclusions and assumptions, at least of its empirical basis in the Monterrey sample. In doing so we seek to complete our refutation of the naive - but ideologically powerful - view that mobility is fundamentaly a function of individual characteristics. We

(1) See, for example, Villareal (1970) pp.90-99, Witte (1957); Brutton (1972); Reynolds (1970) p.181; Strassman (1968), Chapter 3.

shall show that in the relatively "advanced" and prosperous state of Mexican society circa 1965 individual achievements were less relevant to mobility than in the comparatively languished underdeveloped economy of the early fifties.

For the time being leaving aside the question of whether the observed mobility is indeed "smaller" in volume than what could be expected, some of the reasons behind the decreasing rates are apparent enough. In our sample, we are dealing with superimpositions of cohorts defined by year of entry into the labor force, all but the last of them, aging as we approach 1965. Since experience discourages mobility it is only reasonable that the observed rates should have decreased. And that is not all. For any given sample the whole combination of personal attributes varies; as does, consequently, the probability estimates based on the mean values of those attributes.

It may be said that some of the movements in mean values (such as, for example, in the size composition of firms or even in the educational level of the workers) are themselves a product of the changing economic environment. Nevertheless, the fact would remain that estimated probability values when based on different means are not strictly comparable. In this situation, the alternative open to us (having obtained a probability function for every period) is to estimate the probabilities of change with a fixed set of means. Indeed, we can do more than that. For every pair of periods and a given occupational move we can decompose the probability of change in two parts.

Let $Pi_j \Big|^{xx}_{yy}$ (written for simplicity as P^{xx}_{yy}) denote the probability of moving from Occupation i to j during a given quinquennium, estimated with means (superscript) of a comparison year xx and coefficients (subscript) of a period begining in year yy. Now the difference in probability values between the periods can be written as:

$$P^{yy}_{yy} - P^{xx}_{xx} = (P^{yy}_{yy} - P^{yy}_{xx}) + (P^{yy}_{xx} - P^{xx}_{xx}) \qquad (4.1)$$

The first term in the RHS of the expression measures the gap between probabilities estimated with different sets of coefficients but equal means, those of the final period. Its magnitude reflects interperiod variations in the rewards to an "equal" set of individual attributes as seen from the perspective of the final period. This variation can only be due to intertemporal changes in the pattern of supply and demand interaction and may, therefore, be qualified as structural in nature. Thus, the <u>structural component</u> measures the difference between the probability of movement estimated for a given period and that which the period's "representative" worker would have had <u>if he had initiated the move during the compasisson year</u>.

The second term in the RHS of the expression captures the effect of different mean values applied to a fixed set of coefficients, in this case, those of the base or comparisson period. As defined, this difference is due to intertemporal changes in the occupational distribution of

worker characteristics. Since the are estimated for the base period but witnessed from the perspective of a mover with final period "avarage" qualifications, the differences indicate the relative advantage (weakness) this worker has with respect to earlier movers. We term this the demographic component in the decomposition of interperiod probability differences. In the remainder of this section we shall present the results of this exercise when applied to the probability estimates derived from the Monterrey sample. Table IV-3-1 presents the necessary empirical results. Each part of the Table reports the decomposition of the probability of upward mobility from one of the four occupational groups, as seen from the vantage point of the last (1960-65) period. Because they have an easier and more straightforeward interpretation we begin with the demographic components.

Demographic components: The direction and magnitude of these components is revealing. In all but one case they are negative and, apart from those for Occupation 8-7-6, large. Here as expected lies part of the reason for the decreasing trend in mobility. The results are stronger for moves begining in the lowermost Occupation 10. During 1940-45, the "typical" worker of the period had a 24.82% probability of reaching a better occupation. Hindered by this qualifications, a "typical" worker of 1960-65 would - in that same period - have had a probability of only 10.02%, which explains the negative demographic component of - 14.80 probability points displayed in Table IV-3-1.

Table IV-3-1

Structural and demographic components with respect to the 1960-65 probabilities

	1940-45	1945-50	1950-55	1955-60
Occupation 10				
Initial probability[1]	24.82	30.28	21.79	21.00
Demographic component[2]	-14.80	-9.11	-6.37	-3.68
Structural component[3]	8.10	-3.05	2.70	0.80
Final probability (1960-65)	18.12	18.12	18.12	18.12
Occupation 9				
Initial probability[1]	25.72	25.56	12.21	19.82
Demographic component[2]	-6.94	5.23	-4.89	-5.19
Structural component[3]	-4.86	-16.87	6.60	-0.71
Final probability (1960-65)	13.92	13.92	13.92	13.92
Occupation 8-7-6				
Initial probability[1]	na	na	6.56	5.44
Demographic Component[2]	na	na	-0.06	-0.61
Structural component[3]	na	na	0.37	2.04
Final probability (1960-65)	6.87	6.87	6.87	6.87
Occupation 5-4-3				
Initial probability[1]	17.87	8.49	8.27	8.20
Demographic component[2]	-3.29	-0.76	-2.04	0.14
Structural component[3]	-11.20	-4.35	-2.83	-4.96
Final probability (1960-65)	3.38	3.38	3.38	3.38

[1]Estimated at the means of all independent variables.

[2]Difference between P* the probability evaluated with the coefficients of the period indicated by the column heading and the 1960-65 means, and the probability evaluated with the means and coefficients of the period indicated by the column heading, (i.e.: the initial probability).

[3]Difference between the probability evaluated with the means and coefficients of 1960-65, (i.e.: the final probability), and P* defined above.

Thus, there is some substance to the argument linking a swelling of employment in "marginal" jobs with steadie deteriorating attributes, of workers in these jobs. Predictably, the magnitude of the effect decreases as the mean values approach those of the final period: Calculated with 1940-45 mean values, the demographic component indicates a hypothetical 82% drop in the probability estimates for 1960-65; with 1955-60 values it signals to a much more modest decrease of 15%.

Examining the changes in mean values and the corresponding coefficients for both periods the following picture emerges. The 1960 "representative" worker was more experienced than his 1940 colleague, and had spent a greater portion of his working life in Occupation 10 jobs. Already during 1940-45 such changes would have discouraged mobility, especially the latter. He was less schooled and this would have obstructed movement to white-collar jobs, which then accounted for 22% of the upward changes. Futhermore, as in indicated in Table , there were adverse changes in the composition of occupational supply. The 1960 distribution had lower proportions of workers with advantaged socioeconomic background (a 10% decrease in the number with fathers in non lower-manual occupations), geographic origin (a 15% decrease in the number of urban raised workers), and sector of employment (workers in "dynamic" activities decreased by 10%). Background happened to have been, during the 1940-45 period, an important influence in moves to the industrial occupations, just as origin had been for white-

collar destinations and, sector for the semi-skilled, lower -manual, ones. Together, this combination, when applied to the 1960-65 coefficients, would have cut by half a worker's chances of upward mobility.

The results for Occupation 9 are not as clear. As is indicated in Table IV-3-1, the expected trend is disturbed twice. First by the demographic component for the 1945-50 period, which is positive and large; then, by the 1950-55 result. Although it has the expected direction, this component is smaller than either the 1955-60 or the 1940-45 ones. The difference is nevertheless negligeable, and need not cause any alarm. It is the other result that impresses.

In searching for answers to the 1940-45 riddle, it is rewarding to glance back at the elasticities of Tables III-6-1 and 2. Locating the period's column we note that, surprisingly, the elasticities of both kinds of experience are positive, in moves to the white-collar occupations. Although close to zero, they contrast sharply with the very large and negative elasticities for 1960-65. This change alone would account for the shift in direction; the more so if we recall that the 1960-65 means are substantially large than those of 1945-50. Besides, the period's very large elasticity of schooling only emphasises the result. Under these circunstances the gains exceed any loss that hapless changes in the sample's sectoral and enterprise-

size distributions may have caused.[2]

Continuing our presentation of the "demographic" results, we move on to the middle-level white-collar jobs, (Occupations 5-4-3). The findings for the industrial occupations are few, uninteresting, and may be summarized in one sentence: Given that the probability of movement was uniformely small and that there were hardly any changes in sectoral means, the demographic impacts were, likewise, small. Interstingly enough, the same description would seem to apply to the results we first set to analyze in this paragraph; i.e. those for Occupations 5-4-3. In this case, however, there were changes in mean values (of the continuous variables measuring schooling and experience, in particular) with substantial variation in interperiod probabilities. The estimated probability of upward movement during 1940-45 was 17.87% and only 3.38% for 1960-65. The smallness of the demographic components presented in Table IV-3-1 must, therefore, reflect the overall inelasticity of the independent variable effects. The sudden drop during the 1945-50 period is, once again, due to a reversal in the coefficients: the negative and larger (almost unitary elastic), impact of occupational experience, coupled

(2) At this point a careful reader may object that, by drawing on estimated results, our explanation is mechanical, as given. It begs the question of why the drastic change in coefficients. We are aware of this problem; only we prefer to deal with it later when discussing the structural components of the decomposition. They are the ones that explicitly measure the impact of changes in the coefficients. For now, all we want is call attention to the results of the 1945-50 period. This is yet another indication of its uniqueness.

with a decrease in the responsiveness of schooling. The positive component for 1955-60 is so small (0.14) as to be insignificant.

In sum, notwhistanding occasional variation, the evidence is conclusive in one respect: changes in the mean values of the variables accounted for a substantial portion of the observed decline in mobility rates. This result is in part a consequence of adverse changes in the demographic characteristics of the labor force.(3) Is also reflects a pervarsive pattern of immobility that stretches back at least as far as the beginning of Mexico's so-called "modern economy" in the early 1950's.(4)

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(3) Foremost among the adverse demographic influences is the effect of age on mobility. Our results were already discussed in Chapter III. They are corroborated by a wealth of empirical evidence including a study by Contreras (1974) of a sample of 2.500 males heads of households in Mexico City. Contrasting upward mobility rates between the terminal years in two age groups (one going from 21 to 30 years of age and the other from 31 to 45 years) the author finds that the rate decreases from 28 to 16% as the median age increases from 25 to 39 years. This, despite the fact that the older group spans more years and hence, potentially, more moves. (See: Contreras (1974), Table 8, p.317; mobility rates refer to a 6 tier occupational scale). Unfortunately, the authors of the more recent Mexico City mobility survey did not attempt to control their (published) results by age, nor did they measure mobility within a specific time frame. They do imply, nonetheless, that mobility decreases with age and other adverse demographic characteristics. (See: Muñoz, Oliveira and Stern (1977), esp. Part IV).

(4) Various analyses of the Mexican occupational structure have identified this rigidity. As we already had occasion to indicate, it is clearly documented in the outstanding volume published by the original users of the Monterrey data. Tello (1974) and González C. (1971) report that 92.3% of the Mexican Labor Force in 1964-65 had the same job for the previous 5 years - and they cite as reference data collected by the Dirección General de Muestro, SIC (see Gonzāles C. (1971), Table 9, p.15). See also Reyna, Vila and Albrechtsen (1967).

What we have termed (and is usually referred to as) demographic changes are not only, or even principally, the consequence of "natural" (ie. biological) evolution. Because they are historical demographic changes inescapably reflect broader transformations in the social fabric; indeed, for all that they can be determining, most often not they are determined, and not by natural elements, alone. Despite their intrinsic biological nature, the demographic attributes we have identified are not elements of a natural order which cab be analysed in terms of unchanging principles of compectition and internal unity. On the contrary, they are socially produced results.

The argument involved is abstract but nonetheless simple: through changes in the structure of production (and thus in the material basis for social organization) the accumulation of capital, in a social formation dominated by capital, is what ultimately drives, and sets limits to, any process of socioeconomic transformation.(5) This is, as we shall see,

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(5) Particularly in this instance simple should not be read as simplistic. With one phrase we are making reference to the whole of Marx's analysis of the dual dominance of capital over labor: in the form of ownership of the means of production on the one hand, and the form of real control over the process of production on the other. Recently many authors have tried to explicitate the importante of the concept that,to quote from a cellebrated passage from the Preface, "In the social production which men carry on they enter into definite relations that are indispensable and independent of their will; these relations of production correspond to a definite stage of development of this material powers of production. The totality of the relation of production constitutes the economic structure of society - the real foundation, on which legal and political superstructure arise and to which definite forms of social consciousness correspond.... It is not the consciousness of men that determines their being, but, on the contrary, their social being determines their consciousness". See, for example: Brighton Labor Process Group (1977),Gaudemar (1976),esp. Part II, Braveman (1974), Coriat (1976); in addition to Thompson's (1968) Super historical analysis, esp. Part III, the insight notes of Rosdolsky's (1978) Chapter 13, and Napoleoni's (1976) reading of Marx's"umpublished" chapter of Capital (Marx (1977) pp.948-1084). In Chapter V, when presenting our interpretation of the empirical results, we will have occasion to developt, this argument further.

apparent even in what historically is a very short lapse of 25 years. A period that, in light of previous ones, was singularly characterized by stable and powerful institucional forced dominated by an increasingly effective - and repressive - political coalition. Party, State, and the loosely woven, but firmily tied, euphemistic "Família Revolucionária", were all resolutely committed to the promotion of industrial capitalism in Mexico.(6) And, in this respect alone, they were successful. Productive capacity was strenghned. It not only expanded but became more fully integrated into a structural whole that was rapidly, although not uniformely, modernized.

In less than three decades output more than quintupled. Partly, the expansion was fueled by increases in the share of profits in total product, and of investments in total government spending. But equally important was the renewed flux of foreign capital; with it, the volume of investment reached unprecedent heights, quickly furthering the con

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(6) The following passage from Hansen's splendid political analysis is ilustrative: "Si consideramos los años compreendidos entre 1940 y 1970, todos los indicios sugieren claramente que es mejor considerar al PRI como un aparato por medio del cual la Coalición Revolucionaria controla la política mexicana, más que como un mecanismo destinado a representar y satisfacer las demandas de los grupos de intereses que lo componen... Un gobierno en el que las demandas de la mano de obra organizada y de los campesinos mexicanos hubieran estado efectivamente representadas, no habrá diseñado ni aplicado la estrategia para el desarrollo que ha caracterizado al reciente crecimiento económico de México... Ningún segmento de la sociedad cuyos intereses están representados de un modo efectivo en un sistema politico, reduce voluntariamente sus demandas durante más de una generación, mientras otros recogen los frutos de su sacrificio." (Hansen (1971), p. 142).

centration of financial and productive capital.[7]

Some would see in these trends - particularly in the decisive interference of governmental policies fostering rapid industrial expansion while attempting to placate labor's demands through oportunistic wage and benefits increases — the indication of a shift towards more capital intensive production technique. Consequently, a more intensive use of exilled manpower in the context of a spiralling wage-skill adjustment mechanism. An apparently contradictory widening of rural to urban (expected) wage differences with increasing migration and ever diminishing opportunities for labor mobility out of the unskilled labor pool. A rush towards educational credentials further augmenting the gap that separates private and social returns to investments in human capital.

According to a still popular interpretation, as new distortions were rolded to existing ones, production became increasingly inefficient and hence distributionaly punitive. To be sure these misalocations are no longer imputed to such simplistic causes as perverse (or uninformed) microeconomic decisions. Rather, they are viewed as a reflection of broader outcomes involving the choice of techniques, the product-mix and the resulting distribution of employment and income.

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(7) See Reynolds (1970), Chapter I; Wionczek (1970): Aguilar (1967). Industrial concentration, as measured by the share of the largest firms in total product also increased. Refering to the 1965 to 1970 period, Collás (1979) observed that "... the rates of growth of large firms is larger and less variable than those of small firms" (p.307).

Many "enlightened" policy prescriptions have been defended with the following argument: To begin with, the pattern of income distribution molds the structure of consumption in favour of luxery-goods manufactured by "modern" enterprises; these, in turn, because of their technological requirements and institutional obligations cannot escape from the inelasticities in supply (of qualified manpower) and/or the regulations contraining minimum wages. Thus they make use of more capital intensive techniques.

All this would produce a slow expansion in the volume of employment. Coupled with the dualistic structure of the labor market - imposed by the institutionally and/or technologically determined minimum wage — these trends would exacerbate occupational immobility and hence income inequalities. This of course would only add fuel to the fire...

Theoretically all these propositions are very debatable and we will, at the opportune moment, return to them. Right now we only wish to stress the internal logic of these arguments so as to best contrast them with our empirical evidence. After all, during the period in question the Mexican economic performance - and the record of governmental policies - were not even ones. Growth came in spasmodic waves as the economy was, in successive periods, subjecte to sharp turn-arounds in investiment activity, with widely divergent sectoral consequences. Both long-term trends, leading to shifts in the structure of production, and short term fluctuations, left their mark in the occupational patterns des

cribed by our sample. This trace is what we hope to capture with our exercise of an admittedly limited, but nonetheless indicative, comparative static.

Structural components: Returning to expression (4.1) we recall that the second term in the RHS captures the effect of different mean values applied to a fixed set of coefficients; this we have termed the structural components. We begin our discussion of their performance by reporting the results for upward moves from lower-manual jobs in Occupation 10.

The relevant findings are summarized in the third row of Table IV-3-1. In all comparissons, except those for 1945-50, the "typical" 1960-65 worker experienced in 1960-65 more mobility than he would have had, experienced with the same attributes, in other periods. For example, this "avarage" worker who was in Occupation 10's labor force in 1960, (and who, as the estimate shows, had almost one chance in five of reaching a better job by 1965), would most likely have had only one chance in ten of moving upwards - if the response to his attributes had been that of the 1940-45 period. The difference of 8.1% in probability is due to a structural shift in the response function.

Probable as they are, displacements in the supply schedule cannot account for this result,alone. As is the case with all reduced-form models, our coefficients capture the joint effect of forces of supply and demand.The estimated difference, because it is obtained with an equal set of

worker's characteristics in both periods indicates a shift in demand. A change in the patterns of labor absorption, of employer's assessments about worker' characteristics, or both.

Let us for a moment look more carefully into the direction of structural change between 1940-45 and 1960-65. On this account, the most striking aspect of the particular result is that it favours mobility. In other words, during the early sixties the chances of completing an upward move were greater; and this after a period during which "artificial" movements in factor prices would have, suposeddly, induced capital for labor substitution, encouraged stiffer entry requirements for the better jobs, and thus penalized the mobility prospects of the less skilled.[8]

Perhaps a die-hard defender of the "distorted factor prices cum human capital" doctrine will object to our comparison. Not on account of the degree of "distortions" which, if they exist as such, were clearly greater by 1960. No other trend was as significant during the early forties as the sharp increase in prices with a consequent plunge in wages and living standards, for most Mexicans.[9] To be sure it is our statiscal procedure that must be carefully interpreted. Therefore, before continuing with the presentation of results it may be best to stop and analyse some of the more debatable aspects concerning the method. In our view,

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(8) See, for example, Villareal (1976) p.70, Ranis (1972), p.323.

(9) See Rottenberg (1961) for a discussion of the period's dismal wage performance.

the following objection is the most serious one.

It may be argued (correctly) that the size of any coefficient has been determined from a distribution of workers' characteristics, and not only by their avarages for a particular period. Moreover, workers with identical characteristics are not (except by chance) representative cases of two different samples. If the "avarage" 1960 worker was better educated, and so had greater mobility, what of the equally well educated worker in 1940? To answer this question with a comparison based on the 1940 sample avarage would truly be misleading since, in 1940, the worker was ex-hipotesis above avarage. This is why we have purged the results from their "demographic" (i.e.: different mean values) components. However, the correction is at best approximate. It is not the same to be a member of a class of well educated workers and the only well educated worker in the company of illiterates. (Certainly not in a world were prices are the supposed rulers and smooth factor substitutions the guardians of profit maximization).

The fallacy with the preceeding argument does not only concern the empirical evidence for factor substitution, although we shall later discuss that as well. Rather, it lies in an interpretation that is either incomplete or, worse, ends up pressupposing what it sets out to prove. Historically, one observes that prices, factor intensities and, hence, the model's coefficients, changed with the distribution of labor types. But there is no explicit causality, no evidence that adjustments in demand occurred because of changes in the

composition or in "restrictions" to supply.

As regards the majority of workers, who are wage-earnees an change in relative prices in effectless, until there are repercussions in the patterns of employment (factor use) — and it is not clear why, and how, they should change without considering the stimulus from the product market and the complex web of interindustry relations. Observed results are inexorably simultaneous. And if anything can be said about causation then one must acknowledge that, in an economy where labor-power is a commodity whose use value is conditional upon employment (for the creation of new value), the forcer of demand, i.e: of capital accumulation will and must dominate. Labor-power does not exist as a natural condition, as a naturally given "factor of production". As a commodity it is produced along with the reproduction of labor, of which it is an attribute. However, unlike other commodities, since it is the means for the expansion of value, the usefulness of labor-power is only determined in its relation to capital, that is as a fundamental component in fulfiling capital's objective of valuation through the production of new commodities. Thus labor-power, as a commodity, is not produced except for its consumption by capital. Although labor in general can be transformed into wage-labor, and once transformed loor its value by being unemployed, the dynamics of its production and use are commanded by the needs of capital in its expansion. In fact, given the expansion of production through the continuous introduction of technological change the supply of wage labor is, to a large extent, a endogenous

result - even if, as is not the case here, there were no visable labor suspenses. We shall return, and later expand upon, this point of view.(10) For now let us add that to hold the alternative interpretation, and maintain that demands would shift simply in response to an urge for static cost minimization, following an exogenous "disturbance" in supply prices, is to view the model's coefficients as supply responses. But that is the conclusion which should be demonstrated, no argued from.

The curious thing about the 1940-45/1960-65 comparison is that the avarage characteristics of the labor force in Occupation 10 did not, as it happens, improve. On the contrary, as Table shows they deteriorated. Therefore, if anything, the 1940 environment (in our sample) was one of relative abundance of better qualified unskilled workers.

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(10) Perhaps the difficulty lies in the fact that labor-power, although it is a commodity, is not a commodity like all others. In this context it may be useful to quote at lenght from Levine's recent work: "The conception of labor-power, as nothing more than a particular commodity already given as an element of the commodity circuit, and therefore also of the circuit of capital, has the effect of deprising labor-power of its specificity. To be sure, labor-power has a use-value and in this sense its conception exists implicitly within the most elementary notions of exchange. (...) What is lost in the subsumption of labor-power into the elementary conception of the commodity is the specific determination of labor-power, and therefore its real conception. (...) The real amergence of the conception of labor power... is only made possible on the basis of the conception of capital as self-expanding value, having as its objective the production of commodities and therefore the production of value "(Levine (1978) p.150). This explaine why: "The determination of labor power as the principle of the expansion of commodities and of values hinges upon its conception in relation to, and in opposition to, capital". Therefore, "the method employed in the analysis of labor-power is not... that of choosing, from among a group of existing factors — factors already posited within the general conception of commodity exchange - that one which happens, by chance, to fulfil the need of capital to expand" (Ibid., p. 149).

The pull of the mean would be towards the upper tail of the distribution! Consequently, the coefficients should and do, penalize the lower than average standards of 1960. In this year, and up to 1965 employers who wanted to fill non lower-manual positions by hiring from the pool of unkilled labor had to make do with a deteriorating quality of supply.Still, they did do so, and with enough vigour to compensate, from the worker's point of view, for this flaw.

To what shall we impute this result? And how, then , reconcile the interpretation with the figures for 1945-50 when the evidence does seem to agree with expected outcomes. For in this period we observe the reserve: the comparisson indicates that 1960 workers would have better chances had they been there at the time. As the figures in Table IV-3-1 indicate, even after discounting the very large demographic component, there remains a negative balance against the 1960-65 probability. Clarly, the datum for 1940-45 precludes an interpretation of this result in terms of adverse price and factor proportion movements. After all, it was, with the promulgation of the Ley de Industrias Nuevas y Necesarias, in 1945, that industrial protectionism, with this precise title begun; that commercial protextionism was made effective by the creation, in 1947, of the Comité Nacional para el Control de Importaciones; and that generalized subsidies to private production via provision of public infrastructure and services first begun to have a major impact. Meanwhile, 1950-51 the real value of the minimum wage had decreased to

58,6% of its 1940-41 level.[11] In brief, this was the era of Alemán, who as Vernon has stated:

> ... proceeded upon the principle Avila Camacho himself had seemed more and more disposed to adopt - the principle that what was good for Mexican business was probably good for Mexico. As capital was drained out of Mexico,he permitted some easing of the credit restrictions which the Banco de Mexico had heretofore been applying to the private sector. ...he instituted a considerable increase in the tariff structure, giving a fres dose os protection to Mexico's Industry. At the same time,however,he was careful not to place burden some restrictions on the capital goods or industrial materials which Mexico's industries were importing from abroad.(12)

The results, seen from the perspective of supply-and -demand adjustments along as imaginary static isoquant, are truly baffling. The simple explanation concerning increasing barriees to mobility not only is at odds with the sign of the 1940-45 component. It is difficult to maintain in light of the component's reversal in 1945-50 and its re-switch to a, once again, positive magnitude in 1950-55. (See Table-IV-3-1). The latter implies that mobility out of the lower manual occupations was in fact easier during the last quinquennium than it would have been in 1950-55.

It must be admitted that in the early fifties State subsidies to private capital formation continued,in unabashed

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(11) See. Villareal (1976), pp.64-67, on the question of governmental policies. The wage data are from Gonzalez S. (1972), Table 8, p.85.

(13) Vernon (1963), p. 101.

Table

Avarage unskilled wage, rate, avarage industry rate and legal minimum daily wage: Monterrey (1940-1965)

Year	Avarage unskilled daily rate[1]	Avarage industry daily rate[2]	Minimum daily (urban) wage[3]	Real avarage unskilled rate index (1940=100)[4]	Real daily min.wage (1940=100)[4]
1940	-	4.46	2.50	100	100
1941	-	4.52	2.50	-	96.4
1942	4.75	4.79	2.50	83.2	83.2
1943	6.16	6.13	2.50	82.4	63.5
1944	7.23	6.90	3.60	77.0	77.8
1945	6.65	7.03	3.60	66.0	67.9
1946	7.65	8.30	3.60	60.8	54.4
1947	8.33	8.72	3.60	58.8	48.3
1948	8.81	9.57	3.60	58.6	45.5
1949	9.91	10.42	3.60	62.5	43.2
1950	10.05	11.25	4.50	59.8	50.9
1951	11.33	12.31	4.50	59.8	45.1
1952	11.71	13.14	5.60	54.1	49.1
1953	12.05	14.32	5.60	56.8	50.2
1954	13.89	14.90	8.00	62.4	68.3
1955	13.59	15.75	8.00	52.5	58.8
1956	15.64	17.23	10.50	57.6	52.5
1957	15.64	18.12	10.50	54.6	49.8
1958	17.81	20.12	12.00	56.0	71.6
1959	19.00	21.40	12.00	58.5	70.2
1960	20.57	24.10	14.00	59.4	77.4
1961	25.00	23.47	14.00	72.1	76.7
1962	24.07	26.60	17.00	68.8	92.3
1963	28.83	31.72	17.00	81.6	91.4
1964	-	-	20.75	-	108.7
1965	-	-	20.75	-	105.0

Notes:

[1] DGE: Estatistica de trabajo y salarios industriales, encuesta de la ultima semana de octubre, 1940-1963 (mimeo). Constructed as the arithmetic avarage of the regular hourly rate for leborers (peones) in six industries selected so as to exclude a high incidence of artisan-type establishments.

[2] Same source, refers to the arithmetic avarage of regular hourly rates for the whole industry.

[3] Taken directly from official government publications.

[4] Based on the Mexico City cost-of-living index, calculated by the Banco de México.

Source: Perrakis (1970), Table A-13, pp. A-16 to 19. The author's Chapter IV contains a detailed analysis of the statistical sources.

defiance of the growing economic problems or, perhaps, because of them. Additionaly, real minimum wages increased, if only to regain some but not all, of the losses suffered since 1935. (The third column in Table IV-3- report a 51% increase from 1951 to 1954). This did not,however,alter the historical trend in the direction of a declining ratio of capital-to-labor costs. The relative cost of capital outlays, for all manufacturing, decreased a further 19% between 1951 and 1955, according to Witte's data reproduced in Table IV-3-

Against such forms of still mild "extra-market" support, prevailing in the early 50s, the much more significant and over government action during the later years of the decade and into the 60s stand in sharp contrast. In his influential book, Rene Villareal, qualifies the post-1958 period as the era of "advanced import substitutive industrialization" characterized by increased. State intervention and industrial protectionism.(13) Rigged to the expansion in consumer durables and intermediary goods, the growth of industrial

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(13) Solis, although he disagrees with the date, choosing to mark the break point in 1956, holds the some view; he calls this the phase of substitution of production goods or "inward oriented" development. (Solis (1970) pp.219-220). Moreover, he joins in to avouch the important role of governmental policies. For example, he argues that: "En México el uso de la política comercial por razones de balanza de pagos es una consideración muy secundaria. El argumento dominante es más bien el de la industria incipiente, el cual se hizo cada vez más intenso desde el decenio de los cincuenta en la fase del desarrollo hacia adentro".(Ibid, pp 237-238). This in addition to the explicit policies of industrial support, discussed in pages 223, passim.

Table

Mexico - Indices of Relative Costs - Capital Costs/Labour Costs (1945 = 100)

	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
All manufacturing	100	96	94	88	79	69	72	71	68	66	65
Food and beverage	100	93	88	78	68	58	63	63	63	63	64
Tobacco	100	95	91	83	74	62	68	69	69	70	74
Textiles, clothing, footwear and made-up textiles	100	98	98	93	86	76	79	80	78	77	78
Paper and paper products	100	96	94	87	80	69	77	78	77	78	79
Rubber products, chemicals and chemical products	100	93	88	80	70	59	66	68	69	71	72
Non-metalic mineral products	100	98	98	93	86	76	79	77	73	71	70
Basic metals	100	98	99	94	89	78	73	62	53	45	40

	1956	1957	1958	1959	1960	1961	1962	1963	1964
All manufacturing	63	61	57	52	47	44	42	39	36
Food and beverage	62	60	58	53	48	45	43	41	38
Tobacco	66	60	52	45	38	35	33	31	28
Textiles, clothing, footwear and made-up textiles	76	73	66	61	54	51	48	47	44
Paper and paper products	72	64	55	47	40	38	35	33	31
Rubber products, chemicals and chemical products	69	63	54	48	41	39	36	33	29
Non-metallic mineral products	67	63	57	51	45	43	41	39	36
Basic metals	42	44	44	44	44	40	37	34	31

Source: Witte (1973), p.47.

output was even more heavily based on the adoption of newer and more mechanized techniques. Moreover as the domestic structure of production sought to internalize total demands it paradoxically reinforced its international dependency. Increasingly, a greater share of new investment was undertaken by the globaly expanding multinational corporations transfering their monopolistic hold on large scale - and less labor using - production technologies to the Mexican market. As a region that developed even faster than the country as a whole, Monterrey not only shared in this process - it lead the way.(14)

All this goes to show that proportions argument was, if anything, strenghened by the events of the period. The estimated relative cost of capital plunged, by 1964, to 36% of its 1945 value. Witte herself admitts as much. Quoting from Michael Todaro's work, she suggests that the low rates of employment absorption in Mexico's "modern" sector were due to:

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(14) See: Unikel (1976) Chapter 6. If in 1940 León was the fifth-ranked State in terms of value-added per inhabitant, in 1965 it was the second -ranked State. (See CEPAL (1972) p.242). Simular findings are reported in Aguilar, Lamadrid and Guzman (1972). The nature of State industrial policies reinforced the disparate regional growth of Mexico: although Mexico City was by far the biggest gainer (of the 737 firms that between 1940 and 1964 received incentives under to Ley de Industrias Nuevas y Necesarias, 70% were in the Central Zone of Mexico) Monterrey and its region occupied an honorable third place, behind the morthen boundry States. See: Lavell (1972). Moreover, national and not only foreign enterprises shared the same characteristics. In her study, Good reports that "foreign joint venture firms and the Mexican (Monterrey) firms are not significantly different in performance, in terms of growth and profitatily, or in terms of structure" (Good (1972) p.134). This, due to the very "internationalized" behavior of leading Mexican owned enterprises in Monterrey.

(1) labor augmenting (sic) technological progress, (2) the tendency toward more capital-intensive methods of production as the scale of output rises above some threshold level even in the context of unchanged relative factor prices, (3) high wages which result from strong industrial labor unions, and (4) absence of skilled labor and managerial talent.[15]

For what should have been (according to the theory) a worsening of the situation, we nevertheless find an improvement: expressed by the positive structural components in 1950-55 and 1955-60. None of the results seem to fit the theoretical predictions. The probability of upward movement from the pool of unskilled labor decreased between 1940 and 1965 and for more reasons than demographic shifts, alone. However, it did not do so in a systematic way. In fact, as the structural components (based on the 1960 sample and the 1960-65 coefficients) show, except for the 1945-50 interlude, mobility was highest in the most "protected" of all periods: the early sixties.

This figures in Table IV-3- may help explain this result. There we present the same demographic and structural background only now disaggregated by specific moves. It is

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(15) Witte (1973), p.34. Surely the author must have meant labor saving technological progress.

Table: IV-3-

Occupation 10 — structural and demographic components by occupation of destiny -- 1960-65 period

Occupation 9:	1940-45	1945-50	1950-55	1955-60
Initial probability	12.61	16.59	9.44	9.00
Demographic component	-5.84	-4.71	-2.59	-0.59
Structural component	4.31	-0.80	4.23	2.67
Final probability (1960-65)	11.08	11.08	11.08	11.08
Occupation 8-7-6:				
Initial probability	6.66	9.16	9.77	6.13
Demographic component	-4.96	-5.43	-2.99	-1.70
Structural component	1.55	-0.48	-3.53	-1.18
Final probability (1960-65)	3.25	3.25	3.25	3.25
Occupation 5-1:				
Initial probability	5.55	4.53	9.77	5.87
Demographic component	-3.99	1.04	-2.99	-1.39
Structural component	2.23	-1.78	-2.99	-0.69
Final probability (1960-65)	3.79	3.79	3.79	3.79

at once clear that, aside from the still puzzling result for 1940-45, the positive structural components were all due to comparisons involving mobility to Occupation 9. In moves to the industrial and white-collar occupations the components are systematically negative, at least after 1945. Thus they indicate a progressive narrowing of the mobility paths to the more desirable destinies.

At first this result appears to vindicate the theoretical predictions concerning the effects of increasingly "perverse" factor price movements. Yet before condemning our previous assault on the hypothesis the reader may care to notice that the components are unexplicably larger for 1950-55 when clearly they should have shown a contineously decreasing trend. If on the one hand we must not neglect this empirical finding, we would also err if we dimissed too quickly the very large and positive components for moves ending in Occupation 9. More workers in this occupation were employees than in either the occupation of origin or in white-collar jobs; in addition, according to the 1965 data, barely 16% of then earned less than the minimum-wage. (See Tables). Its tasks (such as auxiliary industrial or service jobs, cleaning and janitoring, etc) are typically the most accessible ones for workers moving from the lower manual stratum. Moreover, the probability of successfully completing a move to Occupation 9 is at least three times as large as either to Occupations 8-7-6 or 5-1.

Before attempting to put forth our own interpretation of the preceding results it may help us to quickly glance at the estimates for other occupations. Any explanation concerning so many trends would necessarily be complex and we thought best to leave it for the next chapeter.Hopefully by then we will have a clearer grasp of the empirical basis.

The second part of Table IV-3-1 on page presents the decompositions for the probabilities of upward movement from Occupation 9, once more based on comparisons with 1960 means and 1960-65 coefficients. Here again, the 1960-65 based components are notably at a disadvantage - except when collated against the 1950-55 mark, Structural differences alone would have chiselled more than 40% of the 1940-50 probability, accounting for a rattling 17 points drop in the final result.(16) This, of course, only accentuates the disparity with the following period's component. It being positive is not only startling. With respect to the "increasing barries to mobility" hypothesis it is also disconcerting; supposing, that is, the hypothesis holds for moves along the "protected" hierarchy of jobs.

These last remarks would apply as well for the corresponding results in the third part of Table IV-3-1 regarding moves from industrial to white-collar jobs. The 1960-65

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(16) Surely this must in part be due to the surprisingly positive demographic component reported in the table. Somehow given the 1945-50 probability function, the characteristics of the 1960 labor force would have helped mobility in the period. See Chapter : Section for an interpretation of this result.

response function was more favourable to mobility than either the 1950-55 or 1955-60 ones. Still, the significance of this trend is not clear. Conceivably it could concern moves to quasi-managerial positions within the industrial hierarchy.[17]

On the other hand, the components for moves up from white-collar jobs are negative throughout the four period comparisons. (See the final portion of Table IV-3-1). This evidence rekindles the argument about increasing "barriers" to mobility, but with two important qualifications. In the first place, the numbers do not conform to a pattern of continuously augmenting difficulties. While the difference with the early forties is the greatest (-11.2 probability points), the low point occurs in 1950-55 and not 1955-60. Moreover, the regularity appears in what is, from the standpoint of conventional theory, the least likely of all occupational groups.

Unless one falls back on some notion of creeping credentialism, there are hardly any reasons to suppose that, during the forties, managerial positions were less "protected" than in the sixties. To be sure it would be possible to construct, within the human capital framework, same a-posteriori justification for credentialism. For example, any

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(17) Occupational group 5-4-3, one of the possible destinations, includes all engineering related technical (ie.: not-professional) positions, in addition to foremen and managers in small enterprise. As we have elsewhere explained, the "white-collar" tag applied to this group is merely suggestive.

evidence concerning inequalities between private and social rates of return to human capital investments may be interpreted as due to compensating credentialism in the labor market.[18] Nonetheless, in the absence of a theoretical argument explaining the link between changing conditions of production and the upgrading of educational credentials the human capital arguments are inconclusive, if not, as M.Blaug for example would mantain, tautological.[19]

---

(18)
Recall for example, the inginious model developed by Fields (1974). Sketchy evidence concerning augmenting disparities between social and private rates of return to educational investments in Mexico is presented by Solis (1970), pp.255-271 (specially Table 6-7, p.269) in revening the work of M.Selowski: "Education and economy growth: some international comparisons". Economic Development Report Nº 83, Harvard University, (1967).

(19)
See Blaug (1976) p.839. As first proposed by Arrow (1972) and later fully developed by Spence (1974), signalling models form a solid (neo classic) theoretical basis for the link between (employers) adopting of an educational "signal" and the demand for signal acquisition. To quote Carnoy: "The central concept of the signalling model in that hiring is an investment under uncertainty. (...) Based on previous market experience with different combinations of signals and indices (traits the worked cannot alter) the employer is assumed to form conditional assessment of any individual's productive capacity. It is these subjective assessments of productivity which determine the wage (and position) effered. Given the offered wage schedule for different levels of a signal, workers will acquire the amount of the signal which maximizes the difference between offered wage and cost of acquisition of the signal. Equilibrium is this model is attained when the employer's expectations about productivity of individuals with given signal levels are confirmed by the actual performance of those individuals". (Carnoy (1978) pp.22-23). Nonetheless, the theory gives no indication of which worker traits are productive, apart from the fact that it gives no justification for its assumption (necessary for equilibrium) that the costs of acquiring a signal are inversely related to the worker's productive ability.Moreover, the model's acknowledged possibility of multiple equilibria opens the door to many other explanations for the phenomena under investigation. We shall soon attempt one ourselves.

The pattern of increasing rigidities in the mobility of workers within white-collar occupations is an interisting and, as we shall attempt to demonstrate, significant result. By itself it does not however "prove" anything. Certainly not the kind of stereotyped views commonly used to analyse Latin American labor markets.

IV-2. Conclusions

The principal conclusions that emerge from this decomposition are that for most of the periods and occupations upward mobility decreases as the cohorts age, as workers became more experienced in their own occupation and less selective in terms of educational achievements, socioeconomic and geographic origins. Deteriorating demographic characteristics hinder mobility. None of these results is at all startling, but the estimates given here disentagle them from one another so that the sizes of the separate effects emerge more clearly than they do in aggregate mobility studies.

Of the results for the structural components only one, involving the white-collar occupations, could be said to produce a reasonably systematic pattern when compared across periods. At the same level of worker's characteristics, upward mobility decreased throughout the interval from 1940 to 1965. Even so, the figures differ substantially from one period to another and not in the predicted direction. The three remaining comparissons (involving the lower-manual, manual and industrial occupations) tend to give results that

change in sign with respect to 1960-65 coefficients and that often disappoint expectations. In part this is because the structural components reflect changing institutional differences and degrees of governmental intervention in the economic process, and institutions and policies do not always present neat patterns. But it remains likely that there are more consistent patterns of structural characteristics in the Monterrey labor market than we have reported so far, and that we have missed them because we have searched for them with misshapen lenses.

In closing this chapter we return to a theme mentioned at the outset of our study - the tendency of some observers of Latin American labor markets to view them as havily influenced by random and chaotic forces which spring up from distorted an uncalled for interferences with the self-adjusting mechanisms, thereby judging them to be ill-behaved or imperfect markets relative to markets in more advanced economies. We do find that the Monterrey labor market is highly complex, and made up of separate but interrelated, disparatly evolving occupational submarkets. However, we cannot concur in the view that accentuates the influence of supposed (but never directly observed) movements in factor prices with compensating adjustments in the hiring practices of enterprises. Luckely for us, neither does the evidence displayed justify such an interpretation. We now turn to our own critical edition of these results.

Table:

Estimated probabilities of movement from occupation 10 : 1940:1965[1]

	1940-45	1945-50	1950-55	1955-60	1960-65
1940 Coefficients					
To: Occ 10	75,18	78,40	83,83	87,27	89,98
Occ 9	12,61	10,82	9,11	7,58	6,77
Occ 8-7-6	6,66	6,32	3,94	2,89	1,70
Occ 5-1	5,55	4,46	3,12	2,26	1,56
1945 Coefficients					
To: Occ 10	70,72	69,72	74,30	76,04	78,83
Occ 9	16,99	16,59	14,85	13,97	11,88
Occ 8-7-6	8,79	9,16	6,42	5,21	3,73
Occ 5-1	3,47	4,53	4,43	4,78	5,57
1950 Coefficients					
To: Occ 10	78,20	71,97	78,21	81,28	84,58
Occ 9	9,45	11,75	9,44	8,03	6,85
Occ 8-7-6	9,77	12,59	9,77	8,59	6,78
Occ 5-1	2,58	3,68	2,58	2,11	1,78
1955 Coefficients					
To: Occ 10	71,18	72,11	77,73	79,00	82,68
Occ 9	8,87	9,01	8,49	9,00	8,41
Occ 8-7-6	10,09	9,97	6,74	6,13	4,43
Occ 5-1	9,86	8,91	7,04	5,87	4,48
1960 Coefficients					
To: Occ 10	74,10	74,88	77,93	79,85	81,88
Occ 9	12,73	13,06	12,46	11,86	11,08
Occ 8-7-6	7,76	7,45	5,44	4,40	3,25
Occ 5-1	5,41	4,60	4,17	3,88	3,79

Note:

[1]Estimated at the means of all independent variables.

Table

Estimated probabilities of moviment from Occupation 9: 1940-1965[1]

	1940-45	1945-50	1950-55	1955-60	1960-65
1940 Coefficients					
To: Occ 10	14.51	10.34	11.14	9.29	4.47
Occ 9	59.77	64.23	63.98	68.07	76.75
Occ 8-7-6	10.68	11.76	11.70	9.50	8.03
Occ 5-1	15.04	13.67	13.18	13.14	10.75
1945 Coefficients					
To: Occ 10	6.60	4.40	4.13	2.63	1.45
Occ 9	66.00	70.04	71.72	71.31	67.76
Occ 8-7-6	16.36	11.76	9.65	6.77	5.00
Occ 5-1	11.05	13.80	14.50	19.29	25.79
1950 Coefficients					
To: Occ 10	8.04	5.84	5.58	3.41	1.84
Occ 9	69.55	78.78	82.20	87.15	90.85
Occ 8-7-6	7.50	6.41	5.52	3.44	2.28
Occ 5-1	14.91	8.98	6.69	5.99	5.04
1955 Coefficients					
To: Occ 10	9.99	8.44	7.80	7.01	5.18
Occ 9	59.62	66.30	68.67	73.17	80.20
Occ 8-7-6	21.15	17.84	16.06	11.40	8.08
Occ 5-1	9.24	7.42	7.47	8.42	6.55
1960 Coefficients					
To: Occ 10	14.05	13.04	12.96	10.35	8.43
Occ 9	59.35	65.06	67.94	73.49	77.65
Occ 8-7-6	17.42	14.11	11.68	8.07	5.93
Occ	9.19	7.79	7.42	8.09	7.99

Note:

[1] Estimated at the means of all independent variables.

Table:

Estimated probabilities of movement from Occupation 8-7-6: 1940-1965[1]

		1940-45	1945-50	1950-55	1955-60	1960-65
1950 Coefficients						
To:	Occ 10	4.17	3.72	3.25	2.98	3.25
	Occ 9	0.19	0.10	0.06	0.04	0.05
	Occ 8-7-6	87.56	89.05	90.13	90.44	90.20
	Occ 5-1	8.76	7.12	6.56	6.55	6.50
1955 Coefficients						
To:	Occ 10	0.49	0.53	0.48	0.45	0.42
	Occ 9	0.13	0.18	0.22	0.27	0.28
	Occ 8-7-6	90.89	92.42	93.44	93.84	94.47
	Occ 5-1	8.49	6.86	5.86	5.44	4.83
1960 Coefficients						
To:	Occ 10	1.01	0.78	0.49	0.35	0.29
	Occ 9	2.92	2.37	2.34	2.26	2.75
	Occ 8-7-6	88.47	90.10	90.50	90.54	90.09
	Occ 5-1	7.60	6.75	6.67	6.86	6.87

Note:

[1]Estimated at the means of all independent variables.

Table:

Estimated probabilities of movement from Occupation 5-4-3:1940-1965[1]

		1940-45	1945-50	1950-55	1955-60	1960-65
1940 Coefficients						
To:	Occ 6 to 10	4.14	3.39	4.16	2.88	2.88
	Occ 3, 4, 5	77.99	80.79	82.57	82.99	82.55
	Occ 1, 2	17.87	15.82	13.27	14.13	14.58
1945 Coefficients						
To:	Occ 6 to 10	1.43	1.81	0.96	0.81	0.72
	Occ 3, 4, 5	88.47	89.69	90.21	91.29	91.55
	Occ 1, 2	10.10	8.49	8.83	7.90	7.73
1950 Coefficients						
To:	Occ 6 to 10	4.74	4.74	4.38	3.90	3.68
	Occ 3, 4, 5	81.53	85.21	87.35	89.26	90.09
	Occ 1, 2	13.73	10.06	8.27	6.84	6.23
1955 Coefficients						
To:	Occ 9, 10	5.32	5.37	5.39	5.00	4.72
	Occ 6, 7, 8	4.10	3.23	2.87	2.39	2.25
	Occ 3, 4, 5	83.02	83.19	83.94	84.41	84.69
	Occ 1, 2	7.57	8.21	7.80	8.20	8.34
1960 Coefficients						
To:	Occ 9, 10	6.54	5.30	4.08	3.34	3.10
	Occ 8, 7, 6	0.71	0.69	0.58	0.39	0.40
	Occ 3, 4, 5	87.79	90.01	91.63	92.70	93.12
	Occ 1, 2	4.97	4.00	3.70	3.57	3.38

Note:

[1]Estimated at the means of all independent variables.

THESIS PROSPECTUS

Occupational Mobility and Labor Market Segmentation (Monterrey, Mexico: 1940 - 1965)

Paulo Vieira da Cunha

Prof. Albert Fishlow (Thesis Advisor)
Prof. Willian Alonso (Chairman)
Prof. Frederick Collignon
Prof. Janice Perlman
Prof. Claire Vickery

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INTRODUCTION

In recent years a number of authors have examined the link between geographic and occupational mobility in rapidly urbanizing-developing countries. Few of these studies have, however, been able to measure the mobility process itself. Other analysts having the requisite data have chosen to concentrate upon the process of social stratification. This preoccupation has led them to aggregate in a single variable job transitions which occur in vastly different calendar years, and which also involve disparate distances of movement.*

The purpose of this study is to explain, with the aid of probabilistic models of mobility, the level and direction of intragenerational occupational mobility in Monterrey (Mexico) for the 25-year period between 1940 and 1965. With this approach the hierarchy of jobs is first divided into a small number of occupational states which are then used to build mobility transition matrices spanning five-year sub-periods of the total time span. The procedure proposed aims to explain the sources of change in these matrices of probabilities. It seeks to associate the observed changes with the operation of a pre-defined statistical model of the process of occupational mobility, to be estimated from individual observations obtained from a sample of workers' life histories.

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* Perhaps the best known example of this approach is the work of Blau and Duncan (1967) on the American occupational structure. This Procedure was repeated, for Monterrey, by Balan, Browning and Jelin.

Specifically, we propose an empirical test of the theory of structural marginality.* This theory hypothesizes the segmentation of the labor market into several distinct sub-markets. It implies that the sustained level of economic growth observed during the past decades has failed to spread into the bottom layer of occupations incorporating the ever-increasing mass of migrants. It thus seeks to explain both the process of occupational stratification, and of income concentration.

Part I of the proposal discusses the underlying theoretical controversies surrounding the issues of urban marginality and identifies the most salient hypotheses to be examined.** Part II, which is the core of the proposal, details the methodology to beemployed, both at the aggregate level of changes in the occupational distribution, and at the individual mobility level. Part III describes the criteria to be used in defining the occupational groupings; considering as well some of the likely problems to be faced. Finally, in the Appendix we describe briefly the data set to be used.

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* The term marginality has been applied in a variety of contexts. For a discussion of its social, cultural, and political dimensions, see J. Perlman (forthcoming) which also presents a decisive empirical nullification of non-structural theories of marginality.

** Part I is based mostly upon my earlier work, (Vieira da Cunha (1974)). Also, on subsequent manuscripts presented to Professor Albert Fishlow's thesis seminar.

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I. The Issues:

Although the rate of growth of the urban labor force has not been , but with rare exceptions, an explicit objective of development policy in Latin America, until recently it was counted as one of the beneficial outcomes of such policies. It was generally believed that the dynamic "modern" environment of industrial economies would facilitate occupational mobility, and open the roads to success for those truly able and willing to dedicate their energies to production.

During the last decade a number of studies have, however, seriously questioned the desirability of the rapid process of metropolitanization. Indeed a number of countries in the region have begun - without apparent success - to actively pursue policies of decentralization and, in Mexico at least, of discouraging rural out-migration. These policies have only partly been influenced by the never too popular goal of regional equity. More directly, these are attempts to attenuate what has been called the "employment problem in Latin America": the failure of past urban oriented development to erradicate, or even ameliorate, massive underemployment of labor; to provide mechanisms for occupational mobility as a means toward an improved distribution of personal incomes.[1] The development experience has been, contradictory: At the same time that the urban-industrial complex gained eminence over the agro-export sector it also inherited from the latter the same curious symbiosis between a dynamic center and a subsis-

tence periphery.

The nature of the problem can be apprehended succinctly from the Mexican experience. During the last twenty years Mexico has expanded its economy at an average annual rate of over 6 percent [redacted]. Meanwhile, the distribution of incomes has worsened, and at least one study has found that in 1970 in the country's major metropolitan area 23.7% of all workers had jobs in occupations with remunerations well below the minimum established level of subsistence. For Monterrey in particular, Puente Leyva found that the poorest 30% of the families received 7.3% of the total family earnings; while the top 10% received 42.6% of the total. (Puente Leyva - 1969, Table 12).

1. The "urban traditional sector":

Even though in the view of some officials and analysts, the very presence of an employment problem is still questionable, there has been no lack of possible theoretical explanations to the manifested insufficiency in labor absorption. Recently, several analysts have turned to detailed studies of the migratory process in hopes of finding the causes of the phenomena in some disequilibrium supply mechanism. Todaro and Harris' model associated the presence of an urban pool of underemployed labor with an equalization process between the expected life-time earnings in urban <u>versus</u> rural employment.

Migration in this view involves a two stage process in which an unskilled rural worker is willing to, at first, accept

temporary employment in the "urban traditional sector" until finding modern sector employment. Occupations in this sector are said to perform the positive social function of enabling workers to bring their productivity level on a par with the distribution of wages in entry jobs into the modern sector. Traditional sector employment is thus composed both of unqualified recent migrants and equally disadvantaged urban dwellers. Depending on their stage in the life cycle, and their initial endowments when joining traditional sector jobs, workers would achieve upward mobility into the modern sector through a combination of new investments in the accumulation of human capital and in the search for better opportunities of employment.[2] In sum, traditional sector employment is understood as an additional, supplementary, investment within the individual's total migratory decision.[1a] In terms of the labor market as a whole, the magnitude of employment in the "urban traditional sector" acts as an equilibrating buffer, at a given level of wage differentials, between the supply of labor at the market and employer's demands for labor services.

The bulk of the literature following this approach has dealt with two aspects of the model; namely, the specifications of the barriers to market adjustment and the economic characteristics of "traditional" employment.[2] Their conclusions are easily derivable from conventional models of labor market competition, save for one crucial assumption: that wage rates in less developed countries adjust too slowly to bring about equilibrium in the labor market. Thus a wage gap emerges bet-

ween the two spheres of the urban market, in addition to the remaining differentials between the latter and the agricultural market. Because migration is induced by existing wage differentials, equilibrium in the markets is restored through quantity rather than price adjustments. Hence the over-supply of workers vis-a-vis the level of demand in the modern sector. As Gary Fields has observed, wage stickiness may occur for either of two sets of reasons,

> One school of thought points to institutional factors which affect the bulk of the labor force, including the widespread effects of minimum wage legislation, the impact of government wage scales throughout the modern sector of the economy, and wage gains negotiated by labor unions. A second and not necessarily competing argument is that non-institutional circumstances - the reduction of hiring and training costs and gains in worker efficiency as wages are raised - could cause a rural urban wage differential and consequent urban unemployment [or more likely, traditional employment] in equilibrium.[2a]

It has, nevertheless, been generally accepted that throughout this process workers do move out of the urban "traditional" sector into the more rewarding and mobile modern sector. Contrary to the discussion on "dual labor markets" in the United States, this type of dualism is predicated on the argument that the absorption process is too slow; not that it is non-existent. Eventually, all workers would be transferred into the modern segment.[3] The argument does not involve the question of whether or not the institutions maintaining wage barriers will erode or are already eroding. Rather, it is simply concerned with its rate of erosion. The existence and endurance of the subsistence sector is seen as the price

society must pay for the permanence of wage barriers.

Measurement, and even discussion, of the often forgotten issue of mobility between the two spheres of urban activity has, however, been scarce. When tackled, it has been confounded by difficulties in defining both sectors in ways other than post-facto earnings distributions; by attempts to infer what is an inherently dynamic process from a static cross-section of findings.

Although conceptually attractive, the model of migration with an adjustment "stage" is not so well suited to the growing evidence brought out by recent studies in various Latin American cities. What these studies seem to show is that the "traditional" sector may well be a dead end, and not a stepping stone.[3] Thus, while migration continues, the number of workers in the "traditional" or "marginal" urban sector increases absolutely; as only a lucky few are able to pull themselves out into modern jobs. Furthermore, the problem does not seem to be one of unemployment or underemployment caused by generalized lack of demand. It is primarily one of low paying jobs and only secondarily one of insufficient work opportunities.[3]

Structural Marginality: These points of contention surface forcefully in the literature of structural marginality.[4] This theoretical body rejects the idea that market imperfections can in any way cause the excess supply of labor at the market. Rather, that is viewed as one of the results of the unequal pattern of regional development; as one region grows at the expense

of others. Rural outmigration is the outcome of two different kinds of possible expulsion mechanisms. There are, on the one hand, the cumulative pressures of diminishing returns upon relatively fixed resources. As population grows, either more productive techniques are developed for using the increasing labor force, or the resulting excess population is forced to emigrate. Given the low level of resources prevailing within the subsistent rural economy, the latter is the usual solution. On the other hand, the direct contact with capitalistic institutions is likely to cause profound transformations within the agrarian structure. Specialization of production and overall increases in efficiency are likely to cause redundancy in the labor market. Certain activities, notably the crafts, became obsolete and uncompetitive. Throughout the local economy the combination of labor-savings innovations with institutional mechanisms destroying the land holding pattern of subsistence agriculture would cause the "liberation" of vast shares of the rural workforce into urban markets.

Although the transformations in the rural productive structure could be linked to an expanding consumer market for manufacturers (and hence urban employment growth) there is no assurance that an equilibrium position between supply and demand will be reached. On the contrary, everything leads in the direction of much sharper supply response. This would be especially true if a local subsistence sector emerges within the urban economy. Thus, Singer's conclusion that:

> Migrations towards the large urban centers may better be seen as products of tertiarization than

> its cause, to the extent that this growth generates conditions for survival in the urban milieu to those that cannot join the capitalist economy. (Singer (1972), 52)

The emergence of an urban subsistence sector plays a central role in theory of marginality. The situation of marginality is seen as originating from the superimposition of different modes of economic organization in a single historical moment. In particular, it is viewed as the result of the emergence of new types of productive systems that are not however typically capitalistic. If during the so called "classical" period of capitalistic growth, the operation of the productive apparatus demanded and created the universalization of all workers into wage earners, Latin America's capitalism has been characterized as "exclusionary:" (Kowarick, Quijano, Oliveira) as developing through the transformation of only a portion of the available manpower into proletarian wage workers. While the onset of industrial capitalism in the region (with the associated changes in the organization and in the technology of production) necessarily "liberated" large shares of the labor power concentrated in the previous types of slave and merchantilistic economies, it failed to later re-absorb all of the available manpower in its own sphere of production. Therefore the excess manpower already concentrated in urban markets reverted to archaic forms of production: crafts and in general all types of informally organized, autonomous, centers of small scale commodity production; in addition to a whole host of "new" forms of subsistence activities typified in the petty service occupations.

In fact, it is argued that the process of capitalist

development in Latin America has created a growing mass of people who are not systematically integrated into the occupational structure. As Hobsbawn has pointed out, this is similar to what occurred in process of industrialization in the pioneering European countries.[5] Yet in Western Europe the economic system was able to incorporate the marginal populations or at least reduce their numerical importance during the process of development. What the structural marginality literature claims is that the same thing is not happening in Latin America. Kowarick, among others, has identified at least three major roots in the differentiation of the present experience from that of early industrializers. Firstly, there has been the impact of the demographic transformation wrought on the region, culminating in historically unprecedented rates of growth of the labor force; and of overall urbanization. Coupled with the inordinate growth in the supply of labor, the present use of indutrial technology has, paradoxically, tended toward labor-saving means of production. This apparent contradiction - of a labor rich country employing labor-saving means of production - is perhaps best explained by yet a third characteristic. Historically, the development of Latin America has taken place as a part of a wider process of capitalistic expansion throughout the world. While it would be erroneous to infer that a situation of dependency necessarily implies that the dominant country "dictates" the development alternatives open to the underdeveloped periphery; it nevertheless implies that these alternatives will be greatly influenced by the type of linkages tying the two countries together. The situation of dependency thus conditions the development process of underdeveloped countries.

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In particular, several authors have associated the post-war industrialization surge with a new type of dependency, based upon foreign direct investment, combined with the internal (to the enterprise) transference of differentiated products and technologies for producing these products. This new form of economic linkage transformed the consumer "basket" available domestically. Aided by measures tending to the concentration of incomes, these enterprises soon surpassed the older industrial sectors in their rise to economic prominence as the new "dynamic" poles of the domestic economy. Moreover, whether responding to domestic measures favoring the creation of monopolistic markets - or themselves acting towards their creation - foreign corporations did concentrate their investments into the least competitive sectors of the domestic economy. Thus while gaining economic dominance the new "dynamic" pole also achieved a qualitative change in the organization of markets.

With larger sizes, more sophisticated imported technologies, and longer planning horizons, these enterprises brought about profound changes in the pattern of labor demands. It is the contention of the theory of marginality that these changes have produced a segmentation in the market. The crux of the argument can be stated simply. In marked contrast to the industrialization process under the institutions of competitive capitalism, the marginal pool of labor loses its role as a potential mechanism for the adjustment of supply with demand in the labor market. Marginal labor must therefore remain in its virtual state vis-a-vis the monopolistic sector, for it neither

contributes directly to its production process, nor makes up a sufficiently qualified unemployed population to perform the traditional roles of the industrial reserve army.

According to Quijano, marginalization is the outcome of two central mechanisms, both originating in the juxtaposition of the institutions peculiar to monopoly capital with those of competitive capital. Firstly, due to technological obsolescence a number of activities lose their economic value with regard to the new products and services being provided by monopolistic enterprises. All these activities, and the individuals affected by them, do not disappear, but became marginalized - unable to transfer their expertise to the new forms of economic organization. Secondly, new migrants arriving to the city, unable to qualify for work within the expanding "dynamic" pole, or to find work within the peripheral industries, must either accept employment with the newly marginalized activities, or revert to new types of subsistence activities. (Quijano (1973), pp. 143-144)[6]

Thus the central thesis of the theory is that far from promoting the integration of the labor force, the rapid pace of recent industrial growth would have enlarged the magnitude of the marginal sector.

The Urban Marginal Sector: The theory of structural marginality argues that: (a) the so-called employment problem in Latin America is due to the lack of manpower absorption in the dynamic (in growth sense) sectors of the economy; and not one of temporary underemployment. (b) The marginal sector is not a residual

buffer of the development effort, but is in itself a product of that process - evolving alongside with, and as a result of, the growth of modern enterprise. More importantly for our purposes, it implies that (c), the urban labor market cannot be seen as a single (though diversified) mechanism enabling all workers to progress through the job hierarchy. Rather, it should be modelled as a collection of increasingly heterogeneous, albeit interdependent, markets; each offering its own range of mobility within but almost no mobility between markets.

This last condition must clearly hold if the concept of marginality is to be more than a mere epithet tagged on to an area's low income populations. But here again, one finds that the issue of, in this case, immobility between the various segments has received little consideration.[7] The presumption is that, as a consequence of the outlined changes in the structure of production, the accumulation process of the new "dynamic" sectors is not directly dependent on the threat of unemployment for the sustenance of low wages. At least not a threat of the magnitude that would be permissable were all workers homogeneous from the point of view of production. Rather, new types of administrative controls and institutional mechanisms are devised for satisfying employers' needs of both, (a) a stable, internally trained work-force, and of (b), a continual mechanism of wage repression. As has been recently argued with reference to North American labor markets, it is possible to view the creation of internal labor markets as a nec-

essary part of a single historical sweep bringing forth the rise of monopoly capital, an increasing sophistication in producer's technology, and the subsequent segmentation in labor markets.[8]

Market segmentation would involve more than the search for optimal production possibilities given the constraints of the required technology. In this view segmentation becomes a necessary part of the accumulation process. The issue of mobility is therefore seen in terms of limiting constraints, and not acquired or even inherited productivity-related endowments of the worker. The educational hierarchy, as well as origins, race sex, etc. are instruments for the preservation of established divisions in the hierarchy of work, and hence, in the claims individuals may have on consumption.

The process of occupational mobility would therefore be more or less bounded within the various segments; namely: (a) The marginal occupations encompassing the autonomous and subsistance workers; (b) the competitive capitalist economy incorporating the less skilled occupations in the older industrial enterprises, still dedicated to the production of consumer goods such as foodstuffs, textiles, etc....; as well as certain spheres of bureaucratic public employment; and (c) the newly dominant monopolistic segment uniting within it the more skilled workers of the presently dynamic industries, as well as the more prestigious tertiary occupations serving these industries. Mobility would be constrained because, on the one hand, employers would base their hiring and promotion decisions

on different sets of worker attributes in each sector of the market. But even before the worker reaches the pool of prospective candidates for mobility, he would be discouraged from contemplating the move - not necessarily through coersion, but rather due to his participation in the mechanism available (in each sector) for the acquisition of the set of characteristics demanded for the jobs in these same sectors. The idea being that the occupational prospects of the worker are conditioned by the environment in which he obtains his attributes, before and after joining the labor force. While the environments may change as a result of the total development effort, it is in their continuing differences that the process of segmentation is maintained and constantly restored.[8]

Mobility out of the marginal occupations, while probable in moments of great expansion in the capitalistic sector, would generally be rare; and increasingly more so. Whereas at the onset of the industrialization effort the destruction of the established crafts and menial occupations was accompanied by the incorporation of existing craftsmen into the newly established enterprises; once the industrial sector is established, mechanized and bureaucratically organized, the type of employment experience acquired in marginal occupations would most probably be of little use in industrial production. The same would be true of service occupations growing as extentions of the industrial nucleus. The nature of the work experience acquired in marginal occupations diverges continually from that demanded in the capitalistic sector. Thus, even in their mo-

ments of expansion, firms should prefer to sub-contract for the services of marginalized labor rather than accept these workers as permanent employees. The theory of structural marginality would therefore predict that workers once in the "urban traditional sector" would not normally have a high probability of movement into the "modern sector" - even if they were to acquire characteristics that in the past enabled some workers to leave these occupations.

Hypotheses to be investigated

Since the 1940's the Mexican economy has enjoyed a relative steady period of growth. Given this experience, did the probability of occupational mobility out from the so called "urban traditional sector" decrease in recent decades; or has it, on the contrary, increased along with the unprecedented expansion of industrial output? On the supposition that we shall be able to compare equivalent stages in this generally expansionary trend, and not periods at different moments in the business cycle, the two theories would predict different outcomes to this exercise. If migration, and ceteris paribus the size of the "traditional pool," varies directly with the rate of expansion of the modern sector, the probabilities of movement should not have decreased, and if anything, increased.

Alternatively, if the situation of marginality has been intensified by the recent growth experience, we expect that the probability of movement has decreased.

There are in addition some corolaries to this hypothesis

Assuming that the jobs which shall be classified into an occupational group have not changed during the period of analysis, the application of human capital theory to the individual process of mobility would lead us to the following, supplementary, hypothesis: The contribution to the mobility effort given by the various individual characteristics making-up the worker's human capital has not changed over time. This would imply that, as the level of education of the work force improves, the number of workers having to accept employment in the least productive jobs would diminish. In general, in the absence of long run market disequilibrium, changes in the supply of workers to the market should be accompanied by changes in the occupational distribution of the labor force. On the other hand, the theory of marginality would predict that this link falls into a wide region indeterminacy. It would predict that the set of demanded attributes for employment has changed over time, causing the specific contribution of a given level of each attribute to fluctuate so as to maintain the segmentation in the market.

We are aware that this prediction would, in part, result also from models of disequilibria in the patterns of educational investment chosen by workers and demanded by employers (c.p. G. Fields (1974)). Nevertheless, these models would yield equal predictions only if they also assume that employers adjust workers to jobs - which is an adjustment process consistent with the theory of marginality. In order to ascertain the impact of these adjustments (should they indeed yield the correct predictions) we shall attempt to decompose the con-

tributions made to the total probability of occupational change; as well as examine the historical experience for qualitative supporting evidence.

II. METHODOLOGY

The issue of marginality and of segmentation is, as we have seen, one of immobility in the occupational hierarchy. The problem is therefore concerned with the distribution of workers among occupations; with changes in this distribution over time, as both existing workers go through their life-cycles and new workers enter the labor force. Given this structuring, it is possible to cast the analysis of marginality into the probabilistic model of Markov Chains.

In this section, we present a methodology for simulteneously testing the predictions of: (a) the hypothesis of transitional underemployment based on the neoclassical supply-induced model of individual mobility; and, (b) the hypothesis of marginalization based on the model of occupational stratification in segmented markets. We focus on the individual process of occupational mobility. In doing so, we necessarily apply the Markov framework at the individual level, sacrificing the possible alternate assumption that it is the population level process that can be modelled by a suitably defined Markov Chain. That is to say, we assume a-priori that the observed matrix of transition probabilities is not homogeneous for all the individuals involved.

Part 1 briefly described the usual Markov model, and shows how it can be built around joint conditional probabilities subpartioning

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the total probability of a worker being in any given origin state. Part 2 examines a procedure for disaggregating the observed population level transition matrix into the Markov matrices of individual mobility; on the assumption that the observed cell probabilities are weighted avarages on the N individual probabilities, and that every one of these results from a linear and additive model of mobility. It then shows how this disaggregation can be used for estimating change over time, and hence for testing our hypotheses. The arguments used are taken from Spilerman (1972), McFarland (1970), and Theil (1972). Part 3 is a theoretical attempt to justify the use of a single model of mobility for estimating the probabilities implied by the alternate views of this process. Part 4 details more fully the econometric model to be used in estimating the probabilities of movement.

1. The Markov Model: Consider a large population of jobs, which are partitioned into a few categories, defined as to wage, work environment, training, etc., and thus treated as states in a mobility process. Such states will be useful for the analysis of the labor market as long as individuals who belong to one are imperfect substitutes for individuals who belong to others; and as long as the process of mobility out of that state is common to all workers in that state.*

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* The grouping of jobs into occupational states will be explored more fully in Part III of this proposal.

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Given this classification, let the functional distribution of the work force be described as the frequency of employment in each of the states $S(s = 1,2,\ldots,r)$. Consider now two stages in our history, t^n and t^{n+1}. If we designate the distribution at t^n as the vector W^n, $(W^n = s_1, s_2, \ldots, s_r)$ and that at t^{n+1} as a vector W^{n+1}, the issue of occupational mobility arises in trying to account for the transformation of W^n into W^{n+1}. (Duncan (1966), 51-53). Suppose a vacancy is created in occupational state s_1 by the retirement of a worker. Suppose further that the chance is p_{11} that the next occupant arrives to this job from another s_1 job; in addition, that p_{21} percent of the time such a vacancy is filled by a move from an s_2 job; p_{31} percent of the time by a move from an s_3 position to an s_1 job, and so on for all possible r^2 moves. Considering the square matrix $P(n)$, called the one-step population transition-matrix formed by the probabilities of change, we can postulate that the mobility process follows a Markov Chain if we assume that the individual probabilities of making a particular transition is determined solely by the present state the worker is in, independent of his past history. 1/ For Markov processes, knowing the outcome of the last experiment we can neglect any other information we have about the past in predicting the future. As we shall see, this assumption is not as harmful as it first appears, but only if we can make sure that the Markov process we are dealing with is specific to an individual and not to an arbitrary avarage of individuals. 2/ That is, we suppose that for any worker:

$$P(S^{n+1} = s_j \,/\, S^n = s_i,\ S^{n-1}, \ldots, S^0 = s_0) = P(S^{n+1} = s_j \,/\, S^n = s_i)$$

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where we designate the last expression as $p_{ij}(n)$ for all state sequences $i_0, i_1, \ldots, i_{n-1}, i$ and j, and all $n \geq 0$. Such a stochastic process is known as a Markov Chain. (Kemeny and Snell (1960) Chapter II). If this is the case, then the number of workers in occupational state s_j by t^{n+1} is:

$$W^{n+1}(P(S^{n+1} = s_j)) = \sum_k W^n(P(S^n = s_k))\, P_{kj}(n)$$

Noting that $W^n = (p_1(n), p_2(n), \ldots, p_r(n))$ where $p_j(n) = P(S^n = s_j)$ the above can be written in matrix form as,

$$W^{n+1} = W^n\, P(n),$$

for all $n > 1$. Thus $P(n)$ is a known transformation which takes W^n to W^{n+1}.

Suppose however that the probability of entering the j-th state depends not only on the present state but also on investments the worker makes in additional training, while at s_i. 3/ That is,

$$P(S^{n+1} = s_j \,/\, S^n = s_i, X_x)$$

where X_x denotes that the worker acquired x units of training. But, it is also likely to suppose that the amount of training an individual acquires while in a state is itself conditional on being in that state. 4/ Then by multiplying the conditional probability

$$P(X_x \,/\, S^n = s_i)$$

by the preceeding expression, and summing over all x we obtain the conditional probability of $S^{n+1} = s_j$ given only that $S^n = s_i$

$$\sum_x P(S^{n+1} = s_j \,/\, S^n = s_i, X_x)\, P(X_x \,/\, S^n = s_i) = P(S^{n+1} = s_j \,/\, S^n = s_i)$$

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Hence, the Markov Chain model is applicable inspite of our earlier interjection of the trainability requirement. As Theil points out, basically what is needed in this case is an appropriate interpretation of the probability $p_{ij}(n)$. It is conditional on the previous occupational state and not conditional on the degree of training of the worker. In this example, the influence of training would be to distinguish between workers that are already at state s_i but who have different amounts of training. It does not distinguish between the amount of training required to move into state s_j versus that required to move to any other state. 5/

Nor is training the only sub-partitioning possible. On the contrary, we can employ as many sub-partionings as we deem necessary for analyzing the process of occupational mobility within the context of a probabilistic framework conditional on the worker's present occupation. This is important for our analysis because more than being interested in projecting an unknown phenomenon into the future, we are interested in analyzing the casual structure of the phenomenon. We could therefore turn to a comparisson of the magnitudes of the p_{ij}'s for ascertaining the presence of marginality in our data.

But if marginality is a matter of immobility, mobility is a matter of scale. We propose to use as a scale comparisson of different historical periods. Given a sequence of equally spaced transition matrices $P(0), P(1), \ldots, P(n), \ldots$ we define the marginality of an occupational state in terms of the joint conditional probability of moving out from that state during the period defined by the transition matrices. That is, in terms of the decomposition 6/

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$$P(S^{n+1} = s_j / S^n = s_i) = \sum_x P(S^{n+1} = s_j / S^n = s_i, X^1_x, \ldots, X^V_x)\, P(X^1_x, \ldots, X^V_x / S^n = s_i)$$

where $X^1, \ldots, X^V$ is a series of attribute variables particular to the workers making the ij-th transition.

The importance of conditioning the p_{ij}'s on the attributes vector X can best be aprehended in an example. Suppose we were to find that the probability of making the ij-th move was low to begin with and has steadily declined. Could we then conclude that those workers presently in state s_i are marginalized from the competitive economy? Not always, consider two possibilities. Firstly, let say that presently more than half of the workers in s_i are illiterates, whereas some years ago the majority of workers in this occupation were educated. 2/ Because we expect that more educated workers are more mobile it would follow that the avarage rate of mobility out of s_i should have decreased! This would explain the lower transition probability from s_i to s_j.

The important point to observe is that this change in the quality composition of workers in s_i may have resulted from a decrease in the desirability of the jobs in state s_i --- a not unexpected event in the process of economic development. Thus it would be misleading to infer from the tendency for p_{ij} to fall that entrance into occupation s_i hinders further mobility. A more appropriate interpretation would be to associate the decline in the ij-th probability with the fact that the residual of workers still in s_i have such personal attributes as to render them immobile in the present economy.

Secondly, lets suppose we observed that the proportion of educated workers in the origin state increased, while the probability of the ij-th transition has decreased. We would then conclude that

workers unfortunate enough to be in s_1 are indeed marginalized. Moreover, if we were decomposing the probability of movement in terms of other variables in addition to education, yet observe that only education showed significant variations within the period, we can further relate the condition of marginality with a fall in the "rate of return" of education with respect to the ij-th move.

In general we propose a simple measure of the condition of marginality. 8/

> If the probability of outward movement, jointly conditioned on the present state of the worker and on the attributes of the <u>initial</u> distribution of workers, has significantly decreased over time, then the workers in this occupational state can be said to be marginalized from the competitive economy.

2. <u>Disaggregation of the Population P(n) Matrix:</u> While we have shown that even with a modification of the conditional probabilities of change the process of occupational mobility could be cast in a Markov framewok, it is not generally true that the probabilistic process described by the population P(n) matrix is that of a Markov Chain. The difficulties in using Markov processes for social analysis arise not from the limits of the process itself, but rather, from the assumptions imbedded in the probability framework in which it is applied. Two of these difficul ties have received great attention, (Hodge (1966), Duncan (1966), McFarland(1970),:

(a) The presence of population heterogeneity in any given matrix. If the workers in a given state differ in their nobility rates, or in the transition matrices governing their movements, then any aggregate (or avarage) observation of period-by-period changes ---

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such as exhibited in the population transition matrix P(n) --- will gloss over conflicting tendencies, render the process unanalyzable in terms of the limiting matrix P^* usually associated with any Markov Chain process, and thus usually yielding incorrect predictions of period-by-period changes.

The dual of this problem can be stated as,

(b) If the individual level matrices are estimated longitudinaly, only part of their differences will result from changes in the supply of work skills the individual may have. Another part will be due to structural change in the composition of the demands for skills, which is precisely what would predominate if the hypothesis of marginality were correct. This would imply that two workers with equal attributes, making the same move but at different times, will have different chances of successfully completing the move. Thus the problem of heterogeneity would always be present in any population wide occupational transition matrix. Moreover, as we will show, even if the individual transition matrices were stationary, the population level process (obtained by aggregating and then averaging the moves of all individuals making the same move) would not be Markov, that is converge to a Markovian I" limiting matrix.

The usual procedure employed to attack (a) is by deconposing the original population into more homogenous sub-populations with varying rates of change.[8a] A now common usage, first applied in Blumen, Kogan and McCarthy (1955), is to differentiate between movers and stayers; although the subdividing process can be extended to cover other differences as well (Rogers (1966), Spilerman (1972a)).

Nevertheless, this imposes severe restrictions on the sizes of the sub-samples subsequently available for study. Spilerman (1972) therefore proposes an alternate procedure whereby each individual makes a single transition in a time period but follows a transition matrix Q unique to him, and which specifies his probabilities of transfering to the various destination states. To obtain these matrices, involving a number of variables measuring the heterogeneous characteristics in the origin population at each state, he proposes the use of a linear regression on a binary dependent variable.

Let P(n) denote the observed one-step transition matrix for a population at t^n. Each cell in P(n) represents the proportion of individuals in occupational state s_i who moved to s_j by t^{n+1}. Since P(n) is a population transition matrix it results from movements of individuals who differ from one another in making a particular transition. If however we can model the individual probability of change, then we can also aggregate their common probability, keeping account of their differing deviations from the common mechanism of change. Although for an individual with a given set of attributes there can be but two outcomes for every mobility trial (he either makes it or not), for a sample of individuals with varying attributes there is an expected probability, p_{ij} of undertaking that movement. This rationale is the basis for the following method of disaggregation, developed by Spilerman (1972).

For each origin state s_i, at t^n, we define an indicator variable y_{ij} where:

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$$y_{ij} = 1, \text{ if the person moves to } s_j \text{ by } t^{n+1}$$
$$= 0, \text{ otherwise}$$

Corresponding to each origin state, r such variables can be defined, only one of which will have a positive entry for any given worker originating in that state. This entry will correspond to his destination state s_j.

Considering all individuals who were at s_i at t^n, we can estimate the following model of occupational mobility*:

$$\bar{y}_{ij} = a_{ij} + \sum_{v}^{v} b_{ijv} X_v + e_{ij}$$

for $j = 1,2,\ldots,r$ and where the X's are the individual characteristics causing heterogeneity in the population.

Consider an indivudual m who was in state s_i at t^n, with an attribute profile X(m). For him, $\bar{y}_{ij}m$ is an estimate of his probability of makin.. the ij-th transition. 9/ Since the choice of mobility is binary, $\bar{y}_{ij}m$ can also be interpreted as the expected number of transitions by m, during the t^n to t^{n+1} interval. 10/ Thus the sum of all the $\bar{y}_{ij}m$'s for the N individuals in s_i during t^n, is equal to the number of persons who moved from s_i to s_j in this interval. That is:

$$\sum_{m}^{Ni} \bar{y}_{ij}m = N_{ij}$$

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* The rationale and full development of this model is considered in in the next section.

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but

$$\frac{N_{ij}}{N_i} = p_{ij}$$

therefore

$$\bar{y}_{ij} = p_{ij}$$

and we can estimate the following population transition matrix:

$$\bar{Y}(n) = \begin{bmatrix} \bar{y}_{11} = a_{11} + \sum b_{11}{}^{v} X_v & \cdots & \bar{y}_{1r} = a_{1r} + \sum b_{1r}{}^{v} X_v \\ \vdots & & \vdots \\ \bar{y}_{r1} = a_{r1} + \sum b_{r1}{}^{v} X_v & \cdots & \bar{y}_{rr} = a_{rr} + \sum b_{rr}{}^{v} X_v \end{bmatrix}$$

when the regressions in each row are evaluated on the means of each independent variable (at the end of t^n) we obtain,

$$\bar{Y}(n) = P(n)$$

As formulated the mobility model is linear in probabilities. For estimation we would futhermore need to assume that the independent variables be normally, independently distributed with common variance. These assumptions would suffice to yield the $\bar{y}_{ij}$ estimates. As Theil (1970) mentions this approach has, however, the disadvantage that, "it cannot guarantee that the probabilities implied by the model constrained to the interval 0 to 1". He therefore suggests the following transformation of the dependent variable

$$\bar{y}_{ij} = \log \frac{\bar{y}_{ij}}{1 - \bar{y}_{ij}}$$

that is, the <u>logit</u> of the probability of change from s_i to s_j.

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If we assume that the observed transition probabilities are the result of independent random drawings from a binomial population, then it has been shown that the logit of y_{ij} can be estimated. 11/

So far we have only considered the one-step transition fro: t^n to t^{n+1}. If we were to look at the higher order transitions, the difficulties outlined in (b) would arise. Considering more than one period, it is not unreasonable to suppose that in addition to shifts in the number of workers in the origin states, and in the attributes these workers have, there have also been changes in the mobility process itself. In comparing the $t^{n,n+1}$ P(n) population matrix, with the $t^{n+1,n+2}$ P(n+i) matrix, we are unsure of what has really changed. Has it been the attributes in the population? Or, the mobility process itself?

It is clear that if it has been the mobility process itself that has changed, then the sequence P(n), P(n+i) does not conform to a Markov Chain. Nevertheless, at the population level, even without changes in the process the sequence of transition matrices will not conform to the usual limiting properties of Markov Chain models. To see how just a simple demographic shift can affect the interpretation of the results we shall develop an argument first exposed by McFarland.

As in (a) consider an individual model of mobility. Every worker, in his carrer, follows a series of individual transition matrices, Q(0),Q(1),Q(2),...,Q(n),... . 12/ At the end of every period we can aggregate all the individual Q matrices into a population P(n) transition matrix. Instead of considering all the individuals in state s_i at, lets say, t^0, we proceed by defining a matrix $R_m(0)$.

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$R_m(0)$ is constructed so that it is a diagonal matrix with only one entry on individual's m origin state.[13]

Summing over all individual $R_m(0)$ matrices with a common entry in the ii-th element, we obtain

$$R^0 = \sum_m R_m(0)$$

which is also a diagonal matrix.

Using R^0 we can state the Markov property as [14]

$$P(0) = \left[R^0\right]^{-1} \sum_m R_m(0)\, Q_m(0)$$

the two-step matrix would be,

$$P^2(0) = \left[R^0\right]^{-1} \sum_m R_m(0) \left[Q_m(0)\right]^2$$

and the n-th step matrix,

$$P^n(0) = \left[R^0\right]^{-1} \sum R_m(0) \left[Q_m(0)\right]^n$$

With this notation our problem can be clearly stated. Consider the the comparisson between two successive transition matrices $P(0)$ and $P(1)$ which in a stationary Markov Chain model would equal $\left[P(0)\right]^2$. From the above it is clear that

$$P^2(0) \neq \left[P(0)\right]^2$$

$P^2(0)$ is a <u>weighted avarage</u> of several $\left[Q_m(0)\right]^2$ matrices. But, $P(0)^2$ is the second power of the weighted avarages of the Q_m's matrices. It is important to note that even if the individual Q_m matrices were stationary, <u>the long run (limiting) population transition matrix P^* would not conform to a Markov Chain process</u> (McFarland (1972) 470-471).

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Q_m^* the limiting matrix at the individual level would however conform to a Markov Chain model. We could therefore emply the aggregating procedure just described for projecting the W^0 distribution into the series $W^1, W^2, \ldots, W^n, \ldots$. This could be done by first employing the estimated sequence $\bar{Y}(0), \bar{Y}(1), \ldots, \bar{Y}(n), \ldots$ to build the various individual sequences (which may then be non-stationary) $Q_m(0), Q_m(1), \ldots, Q_m(n), \ldots$, and then aggregating and projecting these as shown in the preceeding paragraphs. 14a/

We shall nevertheless procede by a simpler route. To detect the types of changes we can decompose the differences between two consecutive population level estirated $\bar{Y}(n)$ matrices. In total we face two types of changes:

(a) Changes in the contribution of the explanatory variables to the probability of movement from s_i to s_j, during $t^{n,n+1}$. These changes would result from changes in the process of mobility itself --- responding to long run tendencies in the demand for labor.

(b) Changes in the numbers and demographic composition of the work force, also during $t^{n,n+1}$. These changes would result from the various individual supply decisions of workers and their families.

We can apply a model of comparative statics to decompose these simultaneous movements. Consider a single cell estimated value $\bar{y}_{ij}$ for two consecutive distributions,

$$\bar{y}^0_{ij} = a^0_{ij} + \sum_v b^0_{ijv} \; X^0_v$$

$$\bar{y}^1_{ij} = a^1_{ij} + \sum_v b^1_{ijv} \; X^1_v$$

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We want to decompose the differences $\bar{y}^1_{ij} - \bar{y}^0_{ij}$ into two parts:[15]

a). $\bar{y}^1_{ij} - y^*_{ij}$ the proportion attributable to the fact that in each period the given variables might have had a different influence on mobility --- an indication of the "marginalization" of the ij-th move.

b). $y^*_{ij} - \bar{y}^0_{ij}$ the proportion atrributable to demographic differences in the mean values of specified characteristics of the population. These differences arise from changes in the composition of the work force at origin state s_i between origin and destination years.

We define,

$$y^*_{ij} = a^0_{ij} + \sum_{v} b^0_{ij}v \, X^1_v$$

It is the probability of moving from state s_i to state s_j which individuals in s_i at t^{n+1} would have <u>if they moved according to the characteristics of individuals, also at state s_i, but at t^n</u>.

It is estimated by substituting the (mean) values of the explanatory variables for $\bar{y}^1_{ij}$ into the $\bar{y}^0_{ij}$ regression, and computing the resulting probability, or logit of probabilities.

A statistical comparisson of the sequence $\bar{y}^0_{ij}, \bar{y}^1_{ij}, \ldots, \bar{y}^n_{ij}, \ldots$ together with its decomposition as to the source of changes, should give us the elements for implementing the proposed test on occupational marginality.

3. <u>Recursive Model of Individual Mobility</u>: In this section we wish to specify the individual process of intragenerational mobility. We hope to derive a statistical model suitable for implementing the decomposition presented in the previous sections, and thus suitable also for

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implementing the proposed test of occupational marginality. It is not our intent to test the validity of this model, nor could we if we so wished, for the data available reflects the operation of a single market mechanism. Lacking a comparative set of institutions, or any adequate control group, all discussions of causality are necessarily conjecture. As we shall attempt to demonstrate, the same reduced form equation equation can be derived from two (at least two) quite contrasting sets of assumptions. Since the alternate models yield different predictions to the temporal stability of the process of mobility, it should still be possible to historically "validate" the contrasting theories. We shall therefore rely upon intertemporal comparisons to ascertain causality of change, and shall not attempt the estimation of the total recursive system at every period of change.

It is inherent to the operation of capitalistic labor markets --- in which workers must sell their labor power for the receipt of wages --- that the characteristics influencing occupational mobility be derived from the criteria employers use in hiring, promotion, and pay. An adequate understanding of the process of mobility thus requires an understanding of what are the criteria employed in hiring, of how these are transliterated into measurable, or at least discernable sets of workers' characteristics, and of how these vary across occupations. It also requires an understanding of the mechanisms available for the acquisition of the demanded attributes --- and of how these vary for different groups in the labor force; influencing and even determining future careers.

It is this latter set of influences which are of particular

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interest to our work. No doubt there is a continual interplay between the design of new entry requirements and the mechanisms producing the desired attributes. Nevertheless, because the design of criteria establishing the attributes demanded must always precede the hiring of labor we can consider that these are, at a given moment, fixed. The chances of mobility at that moment would therefore depend only upon the distribution of demanded characteristics in the labor power concentrated at the market.

Just what these attributes are is a matter of considerable debate. The narrowest view, associated with the theory of human capital, reduces all characteristics to a single homogeneous measure of relative productivity between workers competing for the same job. Since this measure is a priori strictly unobservable, employers will attempt to measure it by the accumulated stock of human capital in every worker. More simply, by his level of education, training and experience.[16/] From the perspective of human capital accumulation, workers first acquire the necessary education, training and experience demanded by desired occupation. Having done so, they will expect to achieve both their immediate occupational goal, and successively their ultimate occupational destination.

It can easily be shown that, in the context of the human capital model, the contributions to the stock of capital accruing from on-the-job training and experience are themselves dependent upon the initial stock; that is, the initial level of education of the workers. This would suggest that the career path of any worker is already determined once he joins the labor force. That the only difference subsequent training and experience could make would be to influence the relative position

of the worker within the occupational group he is in. But this is not necessarily, or even generally, true. Because some forms of human capital are more useful to the firm than others --- particularly some types of training and experience only obtainable from the firm or industry itself --- education is not a perfect substitute for training or experience. These last two attributes are demanded in and for themselves, and not as mere compensation for unsatisfactory levels of schooling. In a mobility process education can therefore also be seen as a complement to training and experience. ~~Even~~ A well educated worker lacking ~~certain types of~~ job-specific training could not ~~compete for~~ hope to achieve certain occupational destinations.

The theory of human capital postulates nevertheless that there is always a range of substitutability between the various types of human capital. This would be specially true of occupations at the bottom end of the distribution of labor types.[12] For example, the theory would lead us to expect that for the job of truck-driver a primary education degree complemented with a driver training course would be a good, but not always superior, substitute for an equivalent number of years of work experience. Substitutability insures fluidity in the market, both for employers and workers. Thus any worker who has strong aspirations for mobility could travel along at least a part of his desired road, even if he was unfortunate enough not to be able to do so before he joined the labor force.

In sum, human capital theory is predicated on the belief that there is substantial mobility between neighboring occupational groups. It seeks to explain this, as well as all mobility in a competitive economy,

in terms of traits workers individually acquire. That is, in terms of their level of schooling, training and experience at the time of the move. The theory would predict that at any given moment of change the level required of each of these demanded characteristics fluctuates within a given range; but that the total level required of each individual is always the same for the performance of identical tasks. For each worker, the fluctuation in levels between the various components of human capital should add-up to the constant requisite of human capital demanded for the performance of identical tasks.[18]

For any worker at time t^n his probability of being in occupation s_i is given by

(1) $P(Occ\ {}^{n}_{i}) = g(H^{[0,n[})$

where $i = 1,2,\ldots,r$ and H is an aggregate of all forms of human capital measured in some inter-personally comparable numeraire. Note that the superscript of H refers to the period just up to but not including the moment of transition. That is, the interval is closed at the left but open at the right. On the other hand, the probability is measured at the point indicated by the superscript. For simplicity, from now on the interval $[0,n[$ will be represented by n.

Assuming that the function g is linear and additive in probabilities we can write

(2a) $P(Occ\ {}^{n}_{i}) = a_0 + a_1 Educ^n + a_2 Train + a_3 Exp^n$

where all measures are in stock of Education, Training and Experience respectively; and where all superscripts refer to the (point) time of change.

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We wish to contrast this view with the one suggested by the process of labor market segmentation cluminating in marginalized occupations. In a recent series of studies Bowles and others have suggested that employers, in making hiring and promotion decisions, have other objectives in addition to that of mantaining the technical efficiency of the productive process. Employers are concerned with two other objectives: The maintenenence of the hierarchichal structure of command, and the legitimation of the authority structure within the enterprize. Following Bowles we can associate these objectives with four additional characteristics to be demanded of workers, apart from their potential efficacy in production:

> There are personality traits (such as motivation, perseverence, docility, dominance, flexibility, or tack) which enable the individual to operate effectively in a work role. ... There are ... modes of self presentation, such as manner of speech and dress, patterns of peer identification and perceived 'social distance' from individuals and groups of different social position ... /there are/ ascriptive characteristics such as race, sex and age. Finally ... /there is/ ... the role of credentials, such as level and prestige of education, which, like modes of self presentation and the ascriptive traits, are a resource used by employers to add to the overall legitimacy of the social organization of production. (Bowles (1973) 347, emphasis added).

In this model, employers will seek to identify the differences among workers in all five characteristics thought-of as important for the total productive effort. The search for measurements of these characteristics lead employers to discrininate workers by their socio economic backgrounds --- for it is the individual's socioeconomic origins which later influence the acquisition of the demanded traits.

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Mobility will therefore depend not only upon the worker's "search" for the correct attributes, but also upon the socioeconomic characteristics which he partly inherited and partly continued to develop willingly or not. Modifying the functional form presented in (2a) we can postulate the following model of mobility (assuming again a linear and additive decomposition of the total probability):

$$(2b) \quad P(Occ_1^n) = b_0 + b_1 Educ^n + b_2 Exp^n + b_3 Train^n + b_4 X^0$$

where X^0 is a vector of variables measuring the worker's socioeconomic origins.

Although in this formulation, as well as in the human capital model, education, training and experience play a central role in the mobility process, the interpretation of their influence is vastly different in each of the models. Accordingly, in order to better undertand their differences, it is necessary to understand the mechanisms which lie behind the acquisition, by the workers, of the demanded characteristics. To this problem we now turn our attention

Assume for simplicity that hiring and promotions are discrete over time. Assume as well that we operate in a competitive, utility maximizing environment. In this case, the rewards presently associated with the distribution of characteristics such as education, occupation, etc are seen, in the competitive paradigm, as determining (in a probabilistic sense adjusting for expectations) the demand for these characteristics. Various mechanisms for fulfilling this demand can be considered. In the human capital model, however, these mechanisms are dependent only upon the worker; on his previously accumulated human capital,

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and on his personal evaluation of the rentability of a new change in attributes given his expected working life. The mechanism can best be described as a production function for human capital in which the arguments are, the worker's own accumulated stock, the fraction of total productive time chosen for investment purposes, and other market resources involved in acquiring new training.

Given two workers of equal initial stocks and facing the same market for future mobility, with the same direct costs of production, and equal access to borrowing for production, the only element distinguishing how much human capital will be produced by one with respect to the other is their personal evaluations of the trade-off between current and future income. Thus, if after some years in the labor force two workers who have equal initial endowments occupy widely different positions in the occupational hierarchy it must be because one of the workers chose to invest a larger proportion of his earnings in additional human capital than did the other.[19/]

Training is in principle equally accessible to all workers; although, as we have indicated, some types of training may require specific complements of formal education. It is a characteristic of the human capital approach to market imperfections, to be concerned with inequalities in opportunities only for financing formal education. If these inequalities did not exist, then the differing amounts which workers chose to invest in themselves would reflect only their own peculiar tastes. Following this view it would not be unreasonable to suppose that workers already within an occupational group will suffer equally from the existing imperfections of the market. Put

in another way, one is most likely to find that the greater disparities in opportunities for re-investment fall across occupations rather than within occupations. Assuming then that workers within an occupation will face similar economic constraints in borrowing for the acquisition of new capital and in renting their expected future capital, all those who fail to move out of this occupation will do so because they chose not to undertake the necessary investments. Therefore, as the argument goes, the truly exogeneous influence is choice. Lacking data on individual choices, or more precisely, the fraction of time that workers chose to forego production for investment, we could use as a proxy for this variable each individual's own socio-economic background, controlled for some measure of his expected lifetime. With this interpretation (and abstracting from direct costs of training) the production process for individuals in occupation i, for a given time interval could be adequately described by:[20]

$$(3) \qquad Qi(t^n, t^{n+1}) = F_i\left[H(t^n),\ X^0,\ A(t^n)\right]$$

where the Qi's are the additions to the individual's own stock of human capital (H), produced in the period; X^0 is a vector of socioeconomic characteristics, and A is the age of the worker at the beginning of the period. By decomposing human capital stock into its three components we can re-write the above as:

$$(4) \qquad Qi(t^n, t^{n+1}) = F_i\left[h\left[(Educ(t^n),\ Train(t^n),\ Exp(t^n)\right];X^0,\ A(t^n)\right]$$

Assuming that all individuals enter the school system at approximately the same age, and remain thereafter permanently in the work force,

experience would be a linear function of age.[21] If we extend the assumption of linearity to the whole production equation, and assume further that the various compenents of human capital are additive, we have:

$$(5) \qquad Qi(t^n, t^{n+1}) = c_0 + c_1 Educ^n + c_2 Train^n + c_3 Exp^n + c_4 X^0$$

where $c_3 = c + \overset{*}{c}_3$, and $\overset{*}{c}_3$ is the coefficient linking experience and human capital production. [Although the production function in (5) has been considered linear for explanatory purposes, it does not necessarily need to be so.[22]]

Given this production function, rational economic behavior by individuals would dictate that each will continue to produce new units of capital for as long as the discounted future benefits of that extra unit just exceed, or equal, the extra costs of production. On the presumption that all individuals do so, the observable amount of new desired investment at the end of every period must just equal the amount produced during the period. That is, equation (5) can be interpreted as a net investment function for individuals in occupation i.

We can now integrate the two parts of the mobility process: the mobility equation based upon the worker's human capital at the moment of change (Equation (2a)), and the subsequent changes in his stock of human capital (Equation (5)) which would probably lead him into a new position in the occupational hierarchy, into new investments, and so on recursively for the rest of his career.

To complete the system we only need the identity:

$$(6) \qquad H^{n+1} = H^{(0,n)} + Q_1^{(n,n+1)}$$

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Or, making use of our previous assumptions,

$$(6a) \quad h(Educ^{n+1}, Train^{n+1}, Exp^{n+1}) = h(Educ^{n}, Train^{n}, Exp^{n}) + Q_i^{n,n+1}$$

from the stock relation for the new period t^{n+1} given by (6), and the probability of change equation given by (1), we have:

$$(7) \quad P(Occ_j^{n+1} / Occ_i^{n}) = G \ (H^{0,n+1})$$

where the probability of reaching state s_j by t^{n+1} is seen to be conditional on the origin state s_i. Repeating, for equations (2a) and (6a):

$$\boxed{(7a) \ P(Occ_j^{n+1} / Occ_i^{n}) = \bar{a}_0 + \bar{a}_1 Educ^{n+1} + \bar{a}_2 Train^{n+1} + \bar{a}_3 Exp^{n+1} + \bar{a}_4 \chi^0}$$

Our objective now is to show that equation (7a) can also be generated by an alternative explanatory model of the mechanisms available for occupational mobility. Unfortunately, since all that we can observe are the results of these mechanisms, we cannot claim that one model is "truer" than the other. Moreover, since we are proposing to estimate only the reduced form we shall forego the potential opportunity of testing some aspects of the human capital controversy, aspect that have all to well been debated in Bowles (1972). The following description is included only to show how it is possible to interpret the results of the proposed test on occupational marginality along some chain of causation other than that of the human capital model.

If the process of market segmentation is to be understood in terms of the historical superimposition of disparate forms of accumulation in a single economic system (as was described in Part I), then the imperfections which might exist in the distribution of opportunities

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must be seen as an outcome of this process. That is, inequality of educational opportunities results not from a breakdown in the market mechansim, but from the very operation of this mechanism across generations. The level and quality of education which individuals receive before entering the labor force is heavily and even decisively influenced by the socio-economic strata to which they belong. Armed with this education and the continual additional help of their social position, sons of workers who already occupy high positions in the hierarchy of occupations will have a much better chance of landing in prestigious occupations. That does not imply that the new generation will directly inherit the job of their parents. The constraints imposed by the inter-dependent effects of education and social origins apply primarily to the easiness of access which workers of different social origins have with respect to a given ladder of jobs. It is the opportunity to be on this ladder of jobs, as well as performing successfully in these jobs, that jointly determines the occupational destination of the new generation.

The realization that the sphere of work, as that of schooling, is conditioned above all not by the productiveness or ability with which the worker accomplishes his assigned tasks, but by the task itself, is a fundamental point of difference between the two theories. It implies that access to training opportunities is limited by the occupation the worker is in. More importantly, it implies that employers in evaluating characteristics of the worker will react primarily to the occupation (job) last occupied by the worker. Hiring and promotion decisions are not based upon the characteristics

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of the worker independently of the positions he previously held. Rather they are based upon the previous occupation the worker held, modified perhaps by the variance of individual characteristics in the pool of potential new workers. In the extreme, such procedures would result in the creation of strict internal labor markets, where mobility is conditioned by the hierarchical distribution of workers within the enterprize.

It is now important to distinguish between education, training, and experience as more than additive components into a single, homoeneous measure of human capital. The experience acquired within any job cannot be separated from the performance on that job. It is a decision the control of which lies unilaterally with the employer, in the design of jobs and sequence of jobs within a mobility cluster. Once employers accept a worker for a given job they know or at least expect that this worker will acquire a minimal level of familiarity with the job -- and that the time and production costs associated with this learning process will vary not so much with the ability of the worker as with the difficulty and specificity of the task to be performed. It is even likely that the learning process be so routinized that it is materially impossible for some workers to perform in any sense "better" than others. 23/

This form of training, more than a unique decision in the case of each worker, is a generalized procedure associated with certain jobs. The skills acquired are not specific to the worker but to the job itself. Clearly, not all jobs need have the same amount (or range) of specific-training; nor would it be profitable for the

enterprize to attempt to do so. Firms can shift to workers at least a part of the costs implied in the loss of output due to training. Nevertheless, they will be more willing to do so in positions where the efficient performance on the job is almost wholly independent of the worker's own evaluation of the importance the enterprise attaches to his performing well in the job. This is tantamount to saying that enterprises will avoid shifting the total costs of training to those employees occupying jobs in which the successful accomplishment of the designed task necessarily rests on the worker's collaboration with, and command over, other workers. In occupations having a high concentration of independently performed menial jobs, workers will most likely absorb the full cost of their training. This will be particularly true if those positions are not entry "ports" into a sequence of established promotions. In this case the enterprise, apart from maintaining supervisory control for the purpose of preserving the workers' minimal required level of output, will probably be uninterested in the actual performance standards of the individual. Because these workers by definition already lack most of the attributes which would influence employers to offer them higher wages, the range of potential costs that could be shifted toward them is small; and hence the amount of learning experience offered in these jobs is small.

Having almost no over-cost of employment in addition to their wages, workers occupying the most menial, or "external" tasks, in the enterprize are easily substitutable. With small to insignificant costs of potential turnover employers can, in these jobs, benefit from the large offer of unskilled workers in the market. Not only

could employers use the threat of substitution to decrease wage expectations among the more skilled workers, but they can also guarantee that at least for this group of unskilled workers, wages be kept to a truly minimal level. The full impact of a "bad job" is not, however, captured in the conditions of work and pay, alone. Depending upon which jobs the worker has occupied in the past (that is, his experience) the more or less preferable it will be for an employer to hire him for a new position. We maintain that this type of learning experience which is not a function of workers' choices --- that is, associated with jobs, not workers --- is of great importance in determining the probabilities of occupational mobility among workers.

The experience acquired on the job also influences the attitudes of workers toward their careers, as has been variously described with reference to the so-called secondary market in the United States. [24] Workers who find themselves in jobs with small opportunities for upward mobility will have little incentive to pursue further education or training. The actual environment of such jobs may, in fact, prevent workers from spending their spare time in the acquisition of education.

In contrast to this group of jobs, in work environments built around a rapidly succeeding sequence of jobs, workers will find the necessary incentives and facilities for acquiring extra education, or training. Indeed, the mobility process itself may be regulated through the acquisition of educational credentials, in addition to job performance. Workers may actually be co-opted into supplementary education, through offers of paid tuition, time-off from work with pay and personal encouragement of supervisors. Thus, contrary to

the learning acquired through job experience, education and training --- albeit also conditioned on the worker's job environment --- are a matter of personal choice. Nonetheless, because they are conditioned on the job held by the worker, they are less likely to be "chosen" as means to mobility by those who apparently would most benefit; namely, laborers at the very bottom of the occupational hierarchy.

We can retrace the steps taken for deriving equation (7a) so as to conform to this new view of the mobility process. A worker who is in occupation s_i would change at least some of his attributes (education, training and experience) before he leaves that occupation. The additional experience acquired in s_i would depend only on s_i. That is:

$$(8) \qquad \Delta Exp(^{n,n+1}_{i}) = h_i\ (Occ^{n,n+1}_{i})$$

the changes in education and training would, as mentioned, depend also on the already acquired (and inherited) characteristics of the worker,

$$(9) \qquad \Delta Educ(^{n,n+1}_{i}) = z_i\ (Educ^{n,n+1},\ Exp^{n,n+1},\ Train^{n,n+1},\ X^0)$$

$$(10) \qquad \Delta Train(^{n,n+1}_{i}) = u_i\ (Educ^{n,n+1},\ Exp^{n,n+1},\ Train^{n,n+1},\ X^0)$$

The set of stock identities would became:

$$(11) \qquad \begin{aligned} Exp^{0,n+1} &= Exp^{0,n} + \Delta Exp(^{n,n+1}_{i}) = \sum_{t=0}^{n} Exp^{t,t+1} \\ Educ^{0,n+1} &= Educ^{0,n} + \Delta Educ(^{n,n+1}_{i}) = Educ^{0} + \sum_{t=1}^{n} Educ^{t,t+1} \\ Train^{0,n+1} &= Train^{0,n} + \Delta Train\ (^{n,n+1}_{i}) = \sum_{t=0}^{n} Train^{t,t+1} \end{aligned}$$

and, assuming again that all functions are linear and additive in probabilities,

$$(12)\ P(Occ^{n+1}_{j} / Occ^{n}_{i}) = a_0 + a_1 Educ^{n+1} + a_2 Train^{n+1} + a_3 Exp^{n+1} + a_4 X^0$$

which is the reduced form of the recursive process of occupational mobility, and the equation to be estimated for each ij-th cell. The final section of this part examines briefly the procedures proposed for the estimation of equation(s) (12).

4. Econometric Estimation: The Monterrey sample contains the necessary information for estimating equation (12), as well as the advantages of large sample sizes.* All of the data are for male workers who were in Monterrey in 1965. Because the the number of workers who were active both during 1965, and in periods prior to 1940, is small relative to the total number of workers in the Sample, we shall not attempt to estimate occupational distributions anterior to 1940. From that date onwards we intend to build transition matrices based on 5-year intervals, up to and including 1965. In total, five transition matrices are to be estimated and decomposed.

There are three reasons for this particular breakdown. Firstly, the interval is sufficiently large to permit almost any type of supply adjustments to secular changes in demand. Secondly, on a preliminary comparisson of the economic indicators for industrial output, every one of the six terminal years implied by the matrices seem to have fallen between major changes in the cycle.[24/] In particular, the largest post-war recession in the area did not take place until 1967, two years after

*A brief description of the Monterrey Sample, and a more detailed statement of the variables and measurent procedures to be used, is included in the Appendix to this proposal.

the end of our empirical study. Thirdly, the dates correspond with four of the presently available industrial censuses for the period.

The general model to be estimated, for each cell in each transition matrix, is of the form (see Theil (1967), pages 714)

$$L_{ij} = \log \frac{p_{ij}}{1 - p_{ij}} = \alpha + \sum_{v}^{V} \beta_v x_{v_i} \quad .$$

where, x_{v_i} is the value taken by the attribute x_v for the i-th individual in the origin cell, and p_{ij} is the probability that an individual in s_i at the begining of the priod moves to s_j by the end of the period; given that the explanatory variables take the values, $x_{1_i}, x_{2_i}, \ldots, x_{V_i}$. Note that there is no error term. This is due, as Theil points out, to the fact that this equation does not state whether or not the individual worker moves from s_i to s_j; it only specifies the <u>probability</u> that the worker has of moving to state s_j. We however lack data on the p_{ij}'s and must estimate them from the frequencies of positive movement from s_i to s_j, exhibited by the sub-sample of workers at s_i at any given period. That is,

$$l_{ij} = \log \frac{\bar{y}_{ij}}{1 - \bar{y}_{ij}} = \alpha + \sum_{v}^{V} \beta_v x_{v_i} + \left(\log \frac{\bar{y}_{ij}}{1-\bar{y}_{ij}} - \log \frac{p_{ij}}{1-p_{ij}}\right)$$

$\bar{y}_{ij}$ is the relative frequency of positive response, computed (as indicated in Section II-2) as $\left(\frac{n_{ij}}{n_i}\right)$ where n_{ij} is the number of cases in which the event of mobility from s_i to s_j did take place. The error term appears because the $\left(\frac{n_{ij}}{n_i}\right)$ estimate of the probability p_{ij} is not really constant but varies with different values of x. Moreover, as an estimation of $\bar{y}_{ij}$, it is subject to random variation.

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Theil has shown that the above model can be estimated by a weighted least-squares regression. It can also be estimated by maximum likelihood procedures. The estimates will have optimum properties under the following conditions; (Theil (1971) Chapter 5)

(1) the error terms $l_{ij}-L_{ij}$ all have zero means
(2) they have the same variance, and
(3) they are pairwise uncorrelated

For these conditions to hold we must assume that the relative frequencies are obtained from independent random drawings from a binomial population in each cell, in each period of analysis. As long as the samples are large, indications are that this assumption will hold (see Theil (1972) pages 175-176).*

Using natural logs, the estimated form of the preceding relation will be:

$$\bar{y}_{ij} = \frac{\exp\left\{a + \sum_{v}^{V} b_v \bar{X}_v\right\}}{1 + \exp\left\{a + \sum_{v}^{V} b_v \bar{X}_v\right\}}$$

The independent variables $v = 1,2,\ldots,V$ to be used are,

A. Socioeconomic origin variables:

1. An index of socioeconomic background combining father's education and occupation, and mother's education; all measured when the respondent was 15 years old. This corresponds to the index used in Blau and Duncan (1967).
2. An index of size of community of origin, already employed in the research conducted by Balan, Browning and Jelin (1973).
3. A binomial migratory status / native, variable.

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* The author [illegible] a [illegible] test to the null hypothesis that an observed relative frequency is indeed obtained from a series of n random drawings with a probability p_{ij}.

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B. Education:

4. Highest level of education completed at the time of the change; measured as indicated in the Appendix.

C. Training:

5. For blue-collar workers, the level of specialization in the occupation, at the time of the change.

6. For white-collar workers, the type of technical training completed, be it secretarial, commercial, etc.

D. Experience:

7. Number of years the worker has been in the labor force, measured as indicated in the Appendix. (The choice not to differentiate between post and pre-migratory work implies that we view the mobility process as including the migratory decision.)

8. Number of years the worker has been in the same occupation.

9. For moves not originating in the autonomous or subsistence states, an index of the number of persons under the worker's supervision.

In addition to these, and so as to adequate the model to the hypothesis of increasing sectoral divergence as a result of the unequal development process (cf. Part I) we shall include two additional variables*:

10. An index of firm size, in the worker's current occupation.

11. A binomial dynamic-traditional sector of activity variable; defined by the estimated avarage growth rates of output for the various activities reported by workers in their present state.

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* The importance of including these additional variables is discussed further in Part III - Section 2 of this proposal.

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III. OCCUPATIONAL CLASSIFICATION

The Monterrey sample contains a very detailed, two-digit breakdown of the jobs reported by workers in their life histories. Additionally, it contains accurate earnings data for the 1965 cross-section of jobs, which would permit us to construct a hierarchical distribution of earnings by jobs. To operate at this level of disaggregation would, nonetheless, be empirically unfeasible and theoretically misleading. After all, it is our premise that certain groups of jobs share common characteristics of work influencing not only wages, the mechanisms of wage determination, and of on the job training; but conditioning as well the types of authority and organizational structure for the work process; hence, the regulation of job tenure and mobility. Moreover, as Gordon, et al., have argued, "These objective conditions of work themselves tend to affect workers' attitudes and consciousness; /therefore/ these subjective conditions, to the extent that they are conditioned by objective working conditions, also comprise labor market characteristics." (Gordon, et al, (1973), p. 31)

In designing an aggregation procedure, we must meet two conditions. (a) To Partion the distribution of jobs so that set of occupations can be clearly ranked from most desirable to least desirable occupations. Although some authors have stressed the importance of "status", or power, as criteria for ranking occupations, for our purposes it is the earnings-generating capacity of jobs that should influence their position in the hierarchy. Quite clearly, there other dimensions

of the hierarchy tend to be highly correlated to earnings. The same could be said of other characteristics related to the work environment. As long as the other elements influencing the organization of work vary consistently with differences in the earnings-generating capacity among occupational groups — as they most likely do — their effect would be to reinforce the hierarchical structure. We plan, therefore, to use the detailed earnings data to aggregate jobs into occupations. Given the richness of detail in the sample we need not, however, be restricted to that measure, alone. Indeed, as will be indicated, we have more precise ways of defining at least one of our more interesting groups: the marginalized sector.

(b) Having found a classificatory scheme, the second part of the aggregation problem concerns its temporal stability. We know that Monterrey's occupational structure - in the sense of relative numbers working in several occupations - has undergone pronounced changes during these last decades. Can we then assume stability in the hierarchy derived for 1965? If we choose to answer this puzzle on basis of precedents established by other analysts, we would conclude that the assumption of stability is warranted. For this country, Hodge, Siegel and Rossi ( ) concluded, from an empirical test of this assumption that, "there have been no substantial changes in occupational prestige in the United States since 1925." Whether the same applies to the changes experienced in Monterrey is questionable. Nevertheless, as Blau and Duncan have stated, "Like previous investigators we have assumed, faute de mieux,

that the scale of occupational status remained fixed over the half-century spanned by our current and retrospective data." Blau and Duncan (1967), 121.) We shall attempt to explore some of the implications of this assumption on the latter part of this section, after settling some of the issues raised earlier in (a).

The marginalized sector: As mentioned, we shall not rely on reported earnings for classifying all, or even, single handedly, any of the occupational groups. Rather, we shall attempt to put together the considerable information available on the Monterrey job market for delineating the major groups; employing the suggested criteria only for checking the consistency of the available descriptive material when applied to the job titles reported in the 1965 sample.

One of the defining characteristics of the marginalized sector is its organization around autonomous or family-employed workers. We can therefore use this additional information to aggregate jobs into what should be the lowest ranked occupational group. In particular, the proposed criteria for aggregation is: Jobs concentrating workers who are self employed (or family help) with neither vehicle or establishment of large size; working in either outdoors environments, in door-to-door activities, or with direct contact to customers in an establishment type excluding offices, plants, or schools.

The hierarchy of occupations. In scaling the remaining jobs in

the sample we face the following constraint: Since mobility in-and-out of these groups can be motivated by two alternative models, the grouping should be consistent with both the human capital view of worker motivated mobility, and the segmentation argument based on job-induced impediments to mobility. Does this requirement lead us into a contradiction?

If all workers rationally accumulate human capital and then choose to rent their stock to the highest bidder, occupations should be ranked in accordance only to their level of earnings.[2] Mobility between occupational groups would, in this case, represent different coordinates in an individual's age-earnings profile. Diagramatically, one possible arrangement is shown in Figure 1.

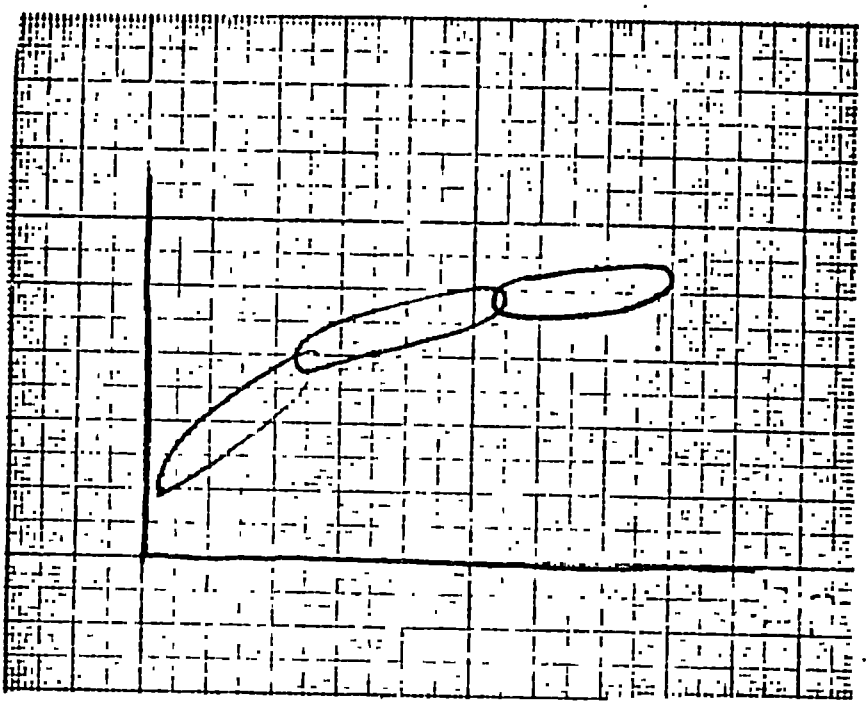
The supposition is that when a worker has a certain stock of human capital he has to change occupations in order to capture the full returns on his investment. For example, a skilled worker would move into a position as a foreman; a foreman would become a manager, etc. From the point of view of the worker this would not, however, imply a discontinuity. As Eckaus has observed, the assumption in these models is that, "many different 'types' of educated labor are used in production since each period of formal education, or each period of on-the-job training, is believed to create a different 'type' of worker whose unique features are rewarded with a different income." (Eckaus (1973) 64, 65)

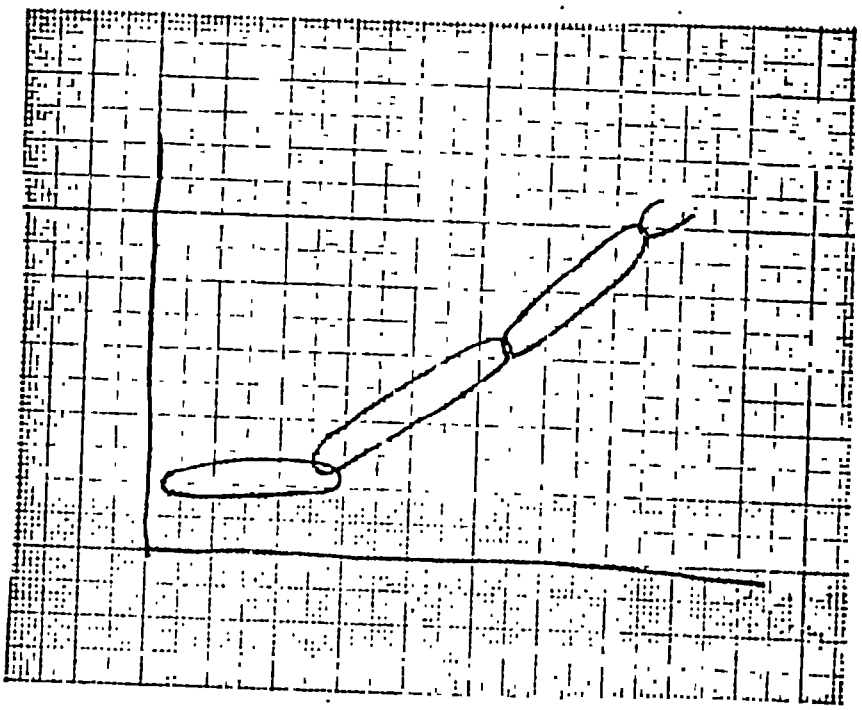
If on the other hand it is the distribution of jobs which conditions earnings, <u>and</u> the characteristics workers may

acquire for subsequent mobility, occupations should be classified in accordance to the total job environment: This includes both earnings and the mechanisms enabling workers to increase their future earnings. The segmentationist argument would point out that two jobs having equal earnings are not necessarily "equal" from the point of view of mobility - one may hinder subsequent increases in earnings (either within the job or by moving between jobs) while the other may be an entry position in an already institutionalized mobility ladder. Therefore, it is the distribution of earnings by worker' ages that needs to be observed before one could conclude the issue. Diagrammatically, a possible arrangement would be as shown in Figure 2.

It is however possible to exaggerate the differences in outcomes predicted from these contrasting views. Although their theoretical foundations are vastly different, both may predict similar results (inferring, of course, very different causal structures behind the results.) It would be equally inconsistent, from the human capital point of view, to rank occupations only by their mean earnings. That is, ~~in 1965,~~ without considering the distribution of earnings by age.

To illustrate this last argument, we recall that in the human capital model, the re-investment process motivating mobility depends both upon the marginal cost schedule for producing new units of human capital, and on the marginal rate of return expected from this investment.[3] Marginal revenue is higher the lower the discount rate at which resources are





borrowed for production, and the longer the expected length of working life. (If depreciation of the stock is considered, the lower the rate of depreciation, the more profitable the investment.) Given imperfections in the supply of human capital, interest rates are likely to vary among workers; and, as we have argued, most likely systematically across occupational groups. On the other hand, marginal costs are lower the greater the learning ability of the worker. As such, Mincer himself points out that, "Longer schooling is likely to be followed by greater post school investment, and generally, the serial correlation of installments of investments is likely to be positive." (MIncer (1974) 16). Consequently, workers who enter occupations requiring initially high levels of human capital will have, all other things being the same, a greater tendency to re-invest — increasing continuously the earnings-differentials between occupations. From this perspective, a simple comparison of mean earnings between occupations, would be a sufficient condition for creating an unambiguous hierarchy of occupations. Indeed, such a measure is often used in implementing mobility studies.

The idea of constantly increasing differentials, while central to the human capital model, would nevertheless empirically apply only if the distribution of ages in both occupations were identically the same. Accepting the fact that the age composition within occupations is apt to change over time, the expected 1965 earnings calculated for any one group of jobs is a poor indicator of the desirability of that occupation.[4] In

the human capital model, re-investment is seen in the context of the individual's life cycle. This implies that in its framework - as well as in the segmentationist view of the labor market - what should be compared is, for each occupation, the total variation of earnings by age, and not only mean earnings.

Thus far we have abstracted from job induced trainability differences between occupations. These can also be included in a single hierarchy, suitable for implementing the mobility processes of each theoretical framework. Differences in training, and non-worker initiated learning opportunities on the job, are, as we have seen, of major importance in classifying occupations according to a segmentationist view of the labor market. They are just as important in the concept of occupation usually employed in the human capital literature. The importance of job related training is implicit in the distinction made between general and specific training. In occupations encompassing jobs with large nondiscretionary amounts of specific training (eg., foremen, managers, etc.), the total amount of human capital "produced" per period will be higher than it would have been had the worker chosen to invest in it alone. As was initially pointed out by Becker, with specific training the supposed equality between earnings and human capital would apply only over the entire career of the worker in the firm (Becker (1964) Chapter). As long as the distribution of specific training fluctuates across occupations and differentially with the years, it is necessary to measure earnings not only independently of the age distribution of

workers; but also independently from the variance of firm specific training. This latter variable being measured by its usual proxy: the distribution of worker experience on the firm.

In sum, we conclude that both frameworks would accept a common procedure for hierarchizing the distribution of jobs into an implementable occupational classification. This procedure would be based on the earnings distribution within the job, across workers of different ages and different periods of on-the-firm experience. Jobs having relatively similar distributions , and levels of income, could then be classified into a homogeneous occupational group.

The "Prestige" Occupations. Jobs at the top of the hierarchy will be lumped together on basis of the descriptive titles contained in the Monterrey sample. These include; professional jobs, and managers and owners of large enterprises. No statistical test would be certain to yield reliable estimates for this group since the concerned sub-sample is too small when further subdivided into the multiplicity of reported jobs.

The Lumping of States into Occupations. In aggregating jobs into occupations we must meet the conditions for lumpeability of the Markov chain process (Kemeny and Snell (1960) Chapter 6, Section 3.) Recall that our probabilistic model is based on an r state Markov process with individual transition matrices Q. Suppose that we group some of these states into a new partition of sets of states, $A = (A_1, A_2 \ldots, A_t)$, aggregating jobs into the occupational groups discussed earlier. In doing this we are forming a new probabilistic process as

follows. The outcome of the jth experiment in the new process is the set A_k that contains the outcome of the j-th step in the original Q(rxr) chain. We define the probabilities of movement as follows, At t^0, given the initial density of jobs W^0, we assign,

$$P_{W^0}(S^0 \in A_i)$$

At t^1, we assign,

$$P_{W^0}(S^1 \in A_j / S^0 \in A_i)$$

And in general the <u>lumped</u> process becomes,

$$P_{W^0}(S^n \in A_t / S^{n-1} \in A_s, \ldots, S^1 \in A_j, S^0 \in A_i)$$

If the lumped process is Markov, the above would equal:

$$P\ (S^n \in A_t / S^{n-1} \in A_s)$$

irrespective of the initial W^0 density. Jointly conditioning on the attributes vector $T_1^1, \ldots, T_1^k$, this last expression can be written as,

$$\sum_{\mathcal{L}} P(S^n \in A_t / S^{n-1} \in A_s, T_1^1, \ldots, T_1^k)\ P(T_1^1, \ldots, T_1^k / S^{n-1} \in A_s)$$

For these two last expressions (which are equivalent) to hold a necessary and sufficient condition is that, with respect to the partition $A = (A_1, \ldots, A_t)$ for every pair of states A_i and A_j, $_kA_j$ have the same identical value for every s_k in A_i. (Kemeny and Snell (1960) Theorem 6.3.2.) Or, to use Theil's words, when the "probability of transition from any category A, to the set A_j /is/ the same for all categories of A_i, and this /is/ true for all pairs of sets A_i and A_j." (Theil (1972), 304)

The condition necessary for lumpability would appear to imply that, even at the individual level, the assumption of

the Markov chain process are violated. That is, that our proposed decomposition of the individual probabilities of movement would fail to represent the true heuristic process involved, if it did not consider all pst occupations of the worker in addition to his present obe.

Recall however that our q_{ij}'s are jointly conditioned on other attributes of the worker. Moreover, we have argued that this conditioning is the outcome of either one of two processes of mobility, as outlined in Section II, Part 3. In deriving these models we concluded that the contribution given by each one of the explanatory variables was conditional on the job the worker held at the moment of change. The additional assumption we now need for lumpeability is that, instead of being conditional only in one type of job, the contribution of these variables (and hence the probability of movement) is conditional on a <u>group</u> of homogeneous jobs, termed an occupational group. More than justifiable this assumption is necessary if our analysis purports to trace the eventual process of occupational seggregation. For example, the above implies that for two workers holding different jobs in a same occupational group, but having the same level of education, the contribution of that education to their probability of movement will be the same. Had they been in different occupations, the same level of education could have differing impacts on their individual chances to a new position. Note, finally, that if the market is truly open to re-investments by all workers at all jobs, then <u>a-fortériori</u> any grouping of jobs that does not consistently violates the hierarchy of earnings will be lumpable

as long as the internal differences in the human capital levels of the workers undergoing mobility are matched by internal differences in earnings within their occupational destinations.

The Problem of Stability and Interpretation:

Necessarily this study assumes that the underlying phenomena influencing mobility were present both at the beginning and end of the period, although not in equal intensities. Specifically, the occupational classification must have remained constant although the distribution of the population between cells - the occupational distribution - varied. Since we are exluding unemployment from our analysis, we must also view the economy as in a constant state of excess demand for labor; albeit clearly not for all types of labor. In actual fact this is not a very restrictive assumption. After all, Monterrey has received a continuous stream of permanent migrants that somehow survive within one of its labor markets. Because unemployment compensation (for extended periods) is unavailable, survival must be associated with some kind of "useful" employment. The issue therefore is not one of unemployment, but of quality of employment; and we hope that our occupational classification will be sensitive to this.

It is equally reasonable to assume that the changes wrought in the structure of production, although responding to external pressures, developed alongside with the expansion of Monterrey's economy. If they responded endogenously at least vestiges of the present structure must be traceable to the early 40s, when our analysis begins. The third issue, that of the stability of the classifications, is however more difficult to tackle.

A major hypothesis of our proposed work is that the

occupational paths of workers have become more divergent over time. If this is indeed the case, then quite obviously at least the occupations placed at the career destinations of these increasingly divergent paths must have changed over time. For example, consider the case of an apprentice to a shoemaker back in the early 40's. With increasing demand for specialized leather workers in the expanding shoe manufacturing sector, the apprentice could decide whether it would be best for him to choose the factory over the shop. Since we know that it was factory employment which increased it is very likely that the apprentice chose the industrial job. This choice was also consistent with the rapid expansion of manufactured shoes, and gradual decline in domestic production; which would be in accordance with our model of occupational changes. Suppose now that we take a similar apprentice in 1960. If his entry job was in this type of "traditional" employment, one could hypothesize that the probability of him being able to move to manufacturing would be very small. In other words, from being a stepping stone to industrial employment, the apprenticeship has become a barrier. If this condition is known to the worker <u>before</u> he enters into this type of activity (that is, he chooses it because he knows he does not have a chance in the market for "good" unskilled positions) then he also knows that failure in his apprenticeship would condemn him to the most casual and unrewarding types of employment in the periphery of the "modern" sector. Viewed from this perspective, the desirability of entering the small scale shoe repair busi-

ness has increased relative to that of twenty years ago. Thus at the same time that the desirability of entering the shoe repairing business has declined relative to "modern" employment, it has appreciated relative to other job opportunities in the autonomous sector.

Let's see the same movement from the perspective of the "modern" sector. Presently, a move from an apprenticeship towards an entry level position in manufacturing would, if at all possible, be priviledged over a move towards shoe repairman. Twenty years ago, however, this choice could have been ambiguous. The ambiguity would come from the degree of proprietorship the apprentice already had over the profession he was entering. If he was inheriting the shop, given possible alternatives at the time, it could have been a wise move to choose to remain in the same sector of activity. Later on he could even expand the repair activities to sales of manufactured shoes, and so to say,"cash in" from the very destruction of his trade. Viewed from the perspective of someone who could inherit a small shop, the move from apprenticeship to factory employment would, some years back, have been an undesirable move.

How does this anecdote relate to the problem at hand? Most likely the apprentice and the craftsman would be in one occupational group, while the unskilled worker in another. Hence, the occupational changes between the autonomous sector and the unskilled - employee position would, some years back, give a wrong indication of the true desirability of the move.

Since in general we associate between movements with upward mobility, and within movements with "stratification," we could be drawing erroneous inferences about the process of change in the occupational structure.

The error stems from misspecifying the desirability of the same changes in two different periods in time. This can be remedied, somewhat, by the introduction of control variables further describing the differences between workers in the origin job. One can control, for instance, for position in the occupation thus differentiating between genuine horizontal moves, from vertical moves hidden within the variance in the occupation itself. One can also control for differences with respect to firm size and sector of economic activity; varying the latter in accordance to the historical performance of each sector of employment at each period considered. This can be achieved either by employing already published indicators of sectoral shifts,[6] but also through consultation of the available industrial censuses. In summary, if the job change involves simultaneously changes in firm size and sector of activity, then at least part of the difficulty (or easiness) of entry will be associated with changes in these variables. Their inclusion in the probabilistic model of occupational mobility should, therefore, correct possible errors due to mis-specification of the underlying process of change.

By employing the aggregation procedures just described, as well as by controlling for inter-sectoral and inter-firm size differences in the probabilities of making the ij-th tran-

sition, we will be minimizing possible errors due to misspecification of the true desirability of change. Moreover, under either one of the two possible processes of mobility, the assumption of lumpeability of the Markov Chain is warranted. Given this occupational classification we can implement the decomposition outlined in Section II.

Resuming we have tried to show that,

1. The process of occupational mobility can be modelled, at the individual level, as a probability process through a regular, non-stationary, Markov Chain.

2. That these individual probabilities of change can be seen as the result of a probabilistic model of occupational mobility, jointly conditional on the worker's present state, and on his vector of attributes measured at that state.

3. That by aggregating the individual matrices at any given poin in time we can estimate the parameters of this probabilistic pro cess. Thusly, that, for an given matrix we can compare the fluctuation in parameter values between different types of occupational change, drawing inferences about possible mechanisms of market segmentation, if applicable.

4. Moreover that through comparisons over time we can evaluate: (a) The magnitudes and direction of the changes in the probabili ty of movement between any two cells, (b) the decomposition of these changes so as to detect whether they result from differenc in the average composition of worker characteristics at the moment of change (ie. supply adjustment); or, alternatively from shifts in the parameters regulating the contribution of these

characteristics to the process of mobility; and, by combining these two estimates, evaluate (c) whether or not this quantitative empirical test nullifies either of the predicted hypotheses.

APPENDIX: THE MONTERREY SAMPLE AND ITS VARIABLES

The sample collected in the Monterrey Mobility Study reflects well the characteristics of the working population in the city*. The universe sampled was the resident male population, 21-60 years of age, in 1965. So as to secure an adequate representation of older men and men from upper socioeconomic strata, the sample was designed to overrepresent these groups. In the end, the sample consisted of 1,803 randomly selected individuals, drawn in a predetermined proportion from each of four age and income strata. Comparis ons of census and survey data yielded quite similar results for age, sector of employment and educational attainment. The questionnaire applied opened with a series of questions about the respondent's current job. Next followed the schedule of life-history data which we plan to use for the empirical implementation of this proposal. The life history matrix contains five separate aspects of the individual's history: migration, education, family, health and work history. The latter includes; name of the occupation,

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* A technical description of the sample can be found in Balan, Browning and Jelin (1973), Appendices A and B. Other uses of the data are listed in Appendix C of the same work.

description of duties, position and dependent personnel, as well as the following characteristics of the enterprize: type of industry and number of of persons employed. In addition there are estimates of income.

Given the detail with which the educational variables are reported, it is possible to test for the contribution of each additional level of education to the mobility process. This is of great interest because it would enable us to identify specific changes in the contribution of education to the total probability of any occupational move. Specifically, we propose the following matrix of binary variables:

If,	$EDUC_1$	$EDUC_2$	$EDUC_3$	$EDUC_4$	$EDUC_5$	$EDUC_6$
None						
Some Schooling	1	0	0	0	0	0
Complete Primary	1	1	0	0	0	0
Incomplete Secondary	1	1	1	0	0	0
Complete Secondary	1	1	1	1	0	0
Incomplete College	1	1	1	1	1	0
Complete College or Better	1	1	1	1	1	1

As Calabi, et al, have noted, "This method uses more degrees of freedom but it improves the model ... The test of significance /in this formulation/ determines whether the cumulative coefficient for a given educational level, e.g. $EDUC_4$ is statistically greater or smaller than the cumulative coefficient of the previous educational level $EDUC_3$." This procedure should also help in the case of non-linearities in probabilities. Daniel Rogers, who also worked with this method, observed that, "In ordinary methods using dummies, <u>each</u> of the coefficients could be significantly different from zero in a case in which there were actually only two significantly different divisions in the group." (See, also, Theil (1971), 155-156).

An analogous procedure could be used for entering the individual's experience in the logit regressions. The oldest worker in the sample has 60 years, and the youngest 20. Assuming that no worker begun his career before age 10, this suggests a breakdown into 5 experience groupings. In this case, however, rather than measuring the marginal contribution of each 10-year addition to experience, we think that it would be more appropriate to employ an either/or classification. This would permit us to interpret each dummy cell as a "synthetic cohort" of workers aggregated in terms of years of exposure to the labor market. (See: N. Ryder: "The Cohort as a Concept in the Study of Social Change", American Sociological Review December, 1965; Balan, Browning and Jelin (1973), 26-31). That is:

	EXP_1	EXP_2	EXP_3	EXP_4	EXP_5
If experience is 0-9 years	1	0	0	0	0
10-19 years	0	1	0	0	0
20-29 years	0	0	1	0	0
30-39 years	0	0	0	1	0
40 or more	0	0	0	0	1

This procedure necessarily assumes that it is more interesting to study groups of workers in terms of their common experiences through the ups-and-downs of the labor market, than in terms of their common experience in aging in the life-cycle. That is, each cell will group within it a dispersion of ages; e.g., EXP_2 could contain a range of ages from about 45 years (for a university graduate entering the labor force in 1945 with 25 years of age) to 20 years (for an uneducated worker entering the labor force in 1955 with 10 years of age). Clearly, in considering within-occupations differences we expect that this variation will be smaller.

FOOTNOTES: PART I

1. This view is explicitly or implicitly present in almost all documents dealing with employment in Latin America. Some of the more influential work in this area has been done by the United Nation's Economic Commission for Latin America (ECLA); for example: "Structural Changes in Employment within the Context of Latin America's Economic Development," Economic Bulletin for Latin America, October 1965, Raul Prebish: Change and Development, Latin America's Greatest Task (washington: Interamerican Development Bank, 1970.) For a rebuttal , see Ramos (1970)

1a The analysis of migration as a form of investment in human capital is developed more fully in, L. Sjaastad: "The Costs and Returns of Human Migration," Journal of Political Economy (Supplement, October 1962)

2. This approach has characterized the various ILO missions. See, for example, Towards Full Employment for Colombia, and Employment, Incomes and Equality: A Programme for Kenya. More detailed studies of traditional employment can be found in, T. Merrick: "Employment and Earnings in the Informal Sector in Brazil" (to appear in Journal of Developing Areas) for Belo Horizonte (Brazil); R. Nelson, T. Schultz and R. Slighton: Structural Change in a Developing Economy (Princeton: Princeton University Press, 1971) for Colombia, especially Chapter 5, "Urban Income Distribution in a Dual Economy;" R. Webb "Income and Employment in the Urban Traditional Sector in Peru" (Bogota: I Reunion Latinoamericana Sobre Politicas de Migracion, 1973.) From a mere reading of the titles it is apparent the terminological confusion surrounding this issue.

2a Fields (1974). Fields cites some of the better known examples in the literature. Rather extensive bibliographical coverage is reported, as well, in Morawetz (1974).

3. This view is argued forcefully by PREALC (Programa Regional del Empleo Para America Latina y el Caribe), a division of ILO's World Employment Programme. See, ILO: Employment Policy and the Second Development Decade: A United Nations Family Approach (Geneva, 1973). An excellent statement of this position for Latin America is found in PREALC, (1974).

4. The "theory of marginality" has come to mean many different things under a same name. We are here referring to that current which sees the condition of marginality as a structural characteristic of underdevelopment. This theoretical approach has been developed mainly by: Quijano (1966), (1973); Nun (1969); Castells (1973); Sunkel (1970); Murmis (1969); Tavares (1973); Kowarick (1973), (1974).

For Mexico in particular see, R. Stavenhagen: "Marginality, Participation and Agrarian Structure" (IILS, Bulletin, June 1970). For a comparison of the various approaches see; Perlaman (forthcoming).

5. Hobsbawn (1969)

6. According to the various authors marginalization does not, however, imply that the various sub-sectors are "independent" from one another. On the contrary. Because workers in the dynamic node of the economy consume, in large measure, products and services from the marginalized sector, the latter is seen to contribute to the accumulation process of nodal firms by reducing the reproduction costs of their labor force. Accepting this argument as a general property of capitalism several authors have disagreed with the conceptual relevancy of distinguishing a "marginal" sector from the usual concept of reserve labor. See, Singer (1973), Oliveira (1973), Cardoso (1974).

7. See, for example, Gordon (1972), pages 66-81, and the literature cited therein.

8. Carnoy and Marenbach ("The Return to Schooling in the U.S.", unpublished MSS) observe, with reference to education, that: "In capitalist and post-capitalist industrializing societies the expansion of schooling would occur sequentially... as each level of schooling becomes universalized by the State, the rate of return to that level will fall. In effect, the lower social classes who get a particular level of schooling later than children from higher classes will receive a lower rate of return to investment in schooling than their predecessors."

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FOOTNOTES: PART II

1. By definition $\sum p_{ij} = 1$. For our problem we can also assume that the matrix $P(n)$ is regular without loss of applicability.

2. Suppose we are given a complete occupational history of the worker. Then what the Markov property states is that,

$$P(S^0 = s_0, S^1 = s_1, \ldots, S^n = s_j) = p_{(s_0)} \quad p_{(s_1)} / p_{(s_{i-1})} \; (s_i / s_{i-1})$$

where the probability outcomes $p_{(s_0)}, p_{(s_1)}, \ldots, p_{(s_n)}$ can be the result of <u>any</u> probability density function. Without assuming that the transition matrix P is stationary (ie, that $P(S^n = s_j \,/\, S^{n-1} = s_i)$ is independent of t^n) the Markov Chain is a more description of the process. The assumption only becames binding when additional restrictions are imposed for the purpose of predicting future moves, or aggregating various individuals in a single move.

3. This paraphrases Theil (1972), pages 247-248.

4. We shall develop further these arguments in detailing the individual model of mobility. See Part II, Section 3.

5. In this regards the model would be wrong only if the probability of moving into a new job is dependent not only on the attributes the worker has in His presnt job, and the fact that he is in his present job, but also on other jobs he had before his present one. The idea of independence in a Markov model is best understood in the following observation by Goodman (1962, page 61) "This model does not assume that responses in a given /period/ are independent of responses in the /period/ before the immediately preceeding, but one of the consequences of the model is that if knowledge about responses in the two preceeding periods is available, then it is the information about the immediately preceeding period that is relevant".

6. If the X variables are mutually independent then the above can be written as: $P(S^{n+1} = s_j / S^n = s_i, X^1_x, \ldots, X^V_x)\; P(X^1_x / S^n = s_i) \ldots P(X^V_x / S^n = s_i)$

7. For simplicitly we are assuming constant variances in both years.

8. We have purposefully avoided the measure of mobility traditionally employed in intergenerational analysis, such as the mean first passage time of the limiting matrix. For intragenerational analysis there would be no theoretical justification to the supposition that in a perfectly mobile society the probability

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of entering a particular job is independent of the previous job. A comparisson of the changes in the mean passage time between successive limiting matrices would be useful, but for the reasons to be shown not applicable in a straight-forward manner. Modifications of this criterion to suit the peculiarities of the process herein decribed would result, I think, in the same sort of decomposition as we shall propose. For traditional Markov measures see Prais (1959), Kemeny and Snell (1960) and Theil (1972).

8a. This does not mean that a number of authors have not erroneously assumed that, even in the presence of population heterogeneity, the process of mobility can be modelled as a simple time-stationary Markov Chain.

9. In the case of moves between the same states (which are distiguished from non-moves) the indicator variable would be:

$$y_{ij} = 0 \quad \text{if the person moves to any } j \neq i.$$
$$\quad\;\; = 1 \quad \text{otherwise}$$

10. For a discrete random variable X, $E(X) = XP(X)$. If $X=1$ with probability y_{ij} and 0 with probability $1-y_{ij}$, then $E(X) = y_{ij}$.

11. See Theil (1970). Also, D. McFadden (1922) "Conditional Logit Analysis of Qualitative Choice Behavior" Berkeley: IURD-Working Paper.

12. The $Q_m(0), Q_m(1), \ldots Q_m(n), \ldots$ matrices could be estimated by evaluating the series of estimated $\bar{Y}(t)$ matrices on the attributes of each individual worker.

13. In general the matrices $R_m(n)$ will be of the form,

$$\begin{bmatrix} 0 & & & 0 \\ & 0 & & \\ & & \ddots & \\ 0 & & & 1 \end{bmatrix}$$

and the matrices R^n, of

$$\begin{bmatrix} \mu_{11} & & & 0 \\ & \mu_{22} & & \\ & & \ddots & \\ 0 & & & \mu_{rr} \end{bmatrix}$$

14. This transformation will be defined only if there are workers in every occupational group at t^n. Otherwise the matrix R^n would be singular and R-inverse would not exist. We can assume however, in this case, that the individual Q_m matrices are regular.

14a, next page)

15. This follows a method outlined in: R. Flanegan: (1974), "Labor Force Experience, Job Turnover and Racial Wage Differentials" Unpublished NSS.

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14a. Note, however, that only if the Q_m matrices are assumed to be stationary could we then calculate, for each period, the long run population-level P^* matrix. Say, for example, we consider the initial period t^0. Then:

$$\bar{P}^* = \left[R^0\right]^{-1} \sum_m R_m(0) \left[Q_m^*\right]$$

The matrix $\bar{P}^*$ will differ from a true Markov limiting matrix P^*. As McFarland has noted: "The long run population level transition matrix, $\bar{P}^*$, unlike the long run individual level transition matrices Q_m^*, does not necessarily have identical rows, since the premultiplication of Q_m^* by $R_m(0)$ incorporates only a single row of Q_m^* --- the row corresponding to the person's m's initial state --- into the matrix $\bar{P}^*$. Hence the proportion of persons originating in a given initial state who are in a given state after stability is reached may differ for different initial states"(McFarland (1970) page 470, my notation).

16. Alternatively, employers may choose not to screen workers but to later weed-out the least productive ones. As long as those that are weeded out consistently have lower human capital stocks than those who remain, the impact of this hiring procedure on the identification of the sought-after characteristics will be the same as that of entrance screening. See Stigler (1962). The seminal work in this whole area is Becker (1964). My own interpretation of this theory has been heavily influenced by Mincer (1974); also by Chiswick (1974) who applies the framework to several cases including Mexico.

17. The measurement of elasticities of substitution is frought with problems. Usual estimates are between different types of educated labor, measuring as Fishlow points out, "the extent to which lower wages are offered to compensate for lesser qualification" (Fishlow(1973)page 10). Measured thusly, a number of empirical estimates have found that substitutability between different grades of labor increases inversely with the degree of education of the groups being compared. In addition to Fishlow (op.cit.) see also, S. Bowles (1970): "Aggregation of Labor Inputs in the Economics of Growth: Planning Experiments with a Two Level CES Function", Journal of Political Economy.

18. The above implies that high levels of education (given constant levels of experience and training) and training (given constant levels of experience and education) should always contribute positively to the probability of upward movement. But not so with experience, which is a function of age. Some employers may sense that human capital deteriorates with time and thus would require overcompensating amounts of education and training for high experience levels.

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19. This approach requires a number of heroic assumptions for formal deduction, or empirical inplementation. Ben-Porath for example assumes, "... an individual, who expects with complete certainty to live for T years, and is faced with a given interest rate r, at which he can borrow and lend indefinitely, and a rental per unit of time of the services of a unit of human capital w, both of which he expects to remain constant through life" (Ben-Porath (1970) page 130). Most models also assume that time is to be allocated only between the labor market and production of human capital, although theoreticaly this can be relaxed as indicated in G. Becker: "A Theory of the Allocation of Time", Economic Journal (September, 1965). Moreover, in this production function approach the theory necessarily incorporates the assumptions contained in production functions. For an excellent critique of this approach, in the context of neoclassical economics, see the comments by L. Thurow to Ben-Porath's paper (op.cit) pages 151-154, and L. Thurow: Investment in Human Capital. Belmond: Wadsworth Publishing Co. (1970). Chapter 8.

20. See Mincer (1974), pages 28-31; Ben-Porath (1967), (1970).

21. Note that we are not assuming that this relationship is linear throughout the worker's life time. On the contrary, in this specification, experience is any piece-wise linear function of age --- linearly constant only within a given occupation during the interval $t^{n,n+1}$.

22. As will became clear in equation (6), in here we are only interested in identifying post-facto the new stock of human capital produced.

23. See Doeringer and Piore (1970); and for a contrasting chain of reasoning, Gintis (1971).

24. The available information has been resumed in: Banco De Mexico: El Credito al Consumo en Monterrey N.L., Vols. I and II. Mexico D.F.: Banco De Mexico (1973).

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FOOTNOTES: PART III

1. This material is provided by the surveys conducted by the Centro de Investigaciones Economicas (universidad de Nuevo Laredo) in 1964, and 1965: Ocupacion y Salarios en Monterrey Metropolitano; and by the material found in Puente Leyva (1969)

2. Non wage related compensatory differentials could justifiably be included as a part of the unexplained within occupation differentials. On this, see: S. Rottenberg: "On Choice of Labor Markets," Industrial and Labor Relations Review (January, 1956)

3. This follows the argument presented in Mincer (1974), Chapter I.

4. A perverse example of this would happen in the following situation: Let us say that only portions A (in occupation and C (in occupation II) are observed. In this case, even though both E_1 and E_2 are "means" of the same occupational group, should there be (at other times) young workers in occupation I, but in another job than that captured by the earnings range of B, most likely they will be classified a in occupation II, together with jobs C. Without regard to age, jobs A and C would form one occupation and B another, but clearly the probability of making an AB transition is higher than that of making a CB one.

5. Training and occupation are inexorably linked in human capital models based on the joint production of human capital and output as the result of a single production process. See, for example: S. Rosen: "Learning and Experie in the Labor Market," Journal of Human Resources (Summer, 1972)

6. CIE, Universidad de Nuevo Leon: Estructura Economica del Noroeste de Mexico (Monterrey, 1962)

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APPENDIX II

The Occupational Classification

Introduction:

The are two objectives in this appendix: to present the occupational classification applied in the analysis of occupacional mobility in Monterrey; to discuss the theory and methods used in obtaining the results. As outlined in Chapter I we based our estimation of the occupational hierarchy on the distribution of reported earnings for the last (1965) cross-section of the Monterrey Sample. For theoretical reasons we rejected an approach based simply on the comparison of group means as a criterion for aggregation. Instead we adopted a methodology based on a job-by-job estimation of both age and firm experience profiles on earnings.

In the next pages we present the results of these experiements. It would escape the scope of this report to attempt to reconstruct the theoretical results outlined in the proposal. Nevertheless, a brief discussion concerning the adequacy of the obtained hierarchy is presented in the last section of the paper. The first section covers the results obtained from the estimation of job-specific age and firm-experience profiles on weekly earnings. The results of this first trial are then used to form four broad occupational categories that are, each in turn, more rigorously examined in the following section. The third section presents the final classification along with some further econometric testing of its robustness with respect to other possible aggregations.

1 - The Age Earnings Profiles of Jobs in the Monterrey Sample:

The 1965 cross-section of the Monterrey Sample contains information on the weekly earnings of individual workers in over ninety different job categories. This initial breakdown was too detailed to permit any statistical examination of the within-job distribution of earnings by age and by firm experience. Given the limitations on sample size, and the closeness of the reported categories, even before proceeding to a more rigorous statistical experiment, this complete two-digit code was re-aggregated into 39 different job categories.

It should be pointed out that this re-classification was far easier, and in our view less ambiguous, than it might at first appear to be. Some categories in the two-digit job code had no representatives in the sample.(1) Others, were obvious subdivisions of a broader group that, for our purposes, should have been considered as the unit of observation. This was the case, for example, with the various types of professionals, all of whom were ultimately grouped in a single job category.(2) The various types of low status, though qualified, white collar workers were

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(1) Such was the case with veterinarians, religious workers, and a few other esoteric cases.

(2) Another group of jobs similarly united was that of specialized technicians.

similarly grouped in a single class.[3] The same was done to unqualified white collar work.[4] We eliminated the intraurban-interurban differences between truck and bus drivers; we grouped painters with brick layers, with glass glazers and ceramic craftsmen. After some additional checking, and following the occupational grouping employed by the previous users of the sample, we joined in a single group public administrators of "directive" status with "jefes" and "oficiales" of the armed forces. We also grouped the various trades of printing workers into a single category and, in general, brought together all workers of allied trades into a single group.

Having obtained the final 39 categories, we still had to define the earnings and firm experience variables. To do so we would have to standardize all wages, salaries and compensations on a per-week equivalent in earnings. Fortunately, we found that this work had already been done for us by the collectors of the sample. The staff of the Monterrey Mobility Study had also taken the trouble to code the year every worker joined the firm in which he was employed in 1965.[5] We therefore proceeded with the tasks of classification employing these pre-defined variables.

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(3) These included stenographers, typists, operators of office machines, trained receptionists and telephone operators.

(4) Untrained receptionists, telephone operators.

(5) Unfortunately, this variable is coded in groups of two years, exception being made for 1965 and 1945 or before. We nevertheless feel that this aggregation is adequate. The most damaging cases would be ones involving the open ended interval for all years before and including 1945. However, since there are no workers in the sample aged more than 60 in 1965, even this should not cause serious error.

Age Earnings Profiles: An age-earnings profile should reflect (at least) two attributes of those workers sharing a same job. Firstly, the profiles should indicate their earnings capacity at entry into the job.[6] They should also describe the variations of earnings with age during the worker's active life. Considering the first characteristic, clearly the higher the entry wage the better the job. Similarly the steeper the slope, the greater the advancement, and the more desirable the position. In principle, therefore, there should be no ambiguity in hierarcherizing the various results.

In practice, however, several things may happen. Given our objectives, three likely situations are particularly distressing. To begin with, in the case of job-specific profiles, we may observe that they intersect one another. This would be unlikely in the case of educational profiles since, at any given moment, the average earnings of individuals with greater schooling should always lie above that for less educated workers of equal age.[7] Nevertheless, in the case of jobs, a situation may arise where due to advantageous training possibilities a worker may choose to "sacrifice" present income for a steeper path of earnings in

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(6) Since we are not controlling for the range of ages in the job, wherever age is an important determinant of earnings, the value of the estimated intercept will differ from that at entry age.

(7) The same argument would apply to occupations as a category. See, for example, Wilkinson (1966).

the future. But if this is so, then the job with greater volume of earnings over the relevant age would be preferable.(8)

A related aspect of this question concerns the shape of the earnings profiles for some of the jobs. In the case of educational levels, the average of individuals in a same category should show some positive relationship between earnings and age. After all, at least some of the workers in a group are apt to have high paying jobs. But in the case of job profiles this is no longer true. Some jobs may involve tasks where the effect of age is random, if not negative. Indeed, this is often taken to be one of the identifying characteristics of secondary labor markets. For such cases, barring a strong negative effect of age, the mean level of earnings can be used as a satisfactory classification characteristic.

A second, and in some ways, more serious problem, has to do with the specific use we shall make of the profiles - for in our scheme, these estimates are instrumental rather than analytic. We are interested in the aggregation of jobs having similar profiles so as to construct an occupational hierarchy. To do this we require, however, a criterion for determining similarity among 39 different alternatives! To solve this problem we propose a two-stage approach: First, we estimate the profiles individually.

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(8) In actuality, none of these situations arose in the sample, a fact which may reflect the complementarity of high wages with large opportunities for training in the good jobs of the economy.

Afterwards, we judiciously select what appear to be similar ones, and only then proceed to test for the statistical significance of the aggregation.[9] Although less elegant and exacting than a test of identity between two distributions, this procedure is much less cumbersome in that, for any given comparison, it greatly reduces the number of relevant cases. Furthermore, given the decreasing power of any test that is applied to a tree-like sequence of successive binary combinations, we believe that this two-stage procedure is more, and not less, cautious.

The final situation we shall consider deals not with the interpretation of the profiles but with their reliability. It should of course be recognized that we are not really estimating age-earnings profiles, but rather imputing them from a cross-section of observations. Although this procedure has been widely used in the past it does not follow that the method is without its drawbacks. In our case the most serious reservation about this form of estimation concerns the relevant range of ages for which earnings are to be estimated. In an urban environment an individual rarely spends a life time in a single job; save perhaps, those at the very top of the job hierarchy. Nevertheless, individuals at all ages may by some accident join any one of the various job categories. This means that in estimating from a cross-section we may be distorting the natural length of the cohort measured in terms of the most

(9) These experiments are described in the following sections.

probably range of ages for that job. Moreover, for those jobs that are in a mobility ladder it may be that individuals of different generations receive differential treatment. Eckaus has argued this effect for education. According to him, each generation, or vintage, is qualitatively "superior" to the former. Thus, by inferring longitudinal results from cross-sectional data we may be assigning the same weight (a price) to two very different commodities.(10)

There is no easy way out of this situation. Nonetheless, the strength of the indictment is weakened by our selection of objectives. As long as these problems do not afflict only a particular job, among a group of similar jobs potentially forming an occupational category, the resulting biases will not impair our aggregation results. Clearly, however, we shall need discretion in evaluating the results.(11)

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(10) Eckaus (1973), pp. 66-71. Of course, "superior" may not necessarily mean enriched. On the contrary, as Braveman (1974) points out, more developed labor can increasingly be used in simpler more routinized tasks. The problem of aggregating across generation is, nonetheless, the same whether one naively equates progress with generalized improvements, or not.

(11) Another problem that arises from the use of cross-sectional data concerns the form of the earnings function. Strictly speaking, with the use of the cross-section, we should allow for a decrease in earnings at advanced ages. Human capital theorists insist that this form of capital also depreciates; hence, among workers performing identical tasks some may begin to exhibit a downturn in earnings even if previously they had systematic gains with respect to age. For simplicity, and because we believe it is true, we shall assume that, if such a depreciation really exists, its magnitude is small enough as to affect negatively only the rate of increase in earnings, but not the absolute level of earnings.

Empirical Results: In the foregoing paragraphs our major aim has been to indicate some of the shortcomings that are likely to arise in the estimation procedure. We now turn to the actual quantitative results. Means and standard deviations for the variables in the analysis, for each job type are displayed in Table AI-1. To estimate the effect of age on earnings we employed the following specification of an earnings function:(12)

$$y_i = a_0 + a_1 A_i + a_2 A_i^2 \qquad (1\text{-a})$$

where: y_i - weekly earnings, in 1965 pesos, for worker

A_i = age of the worker in 1965

In recent estimates of the earnings function this simple quadratic relationship has been replaced by more complex curves, such as the Gompertz Curve employed by Mincer. The theoretical reasons for complicating the estimation procedure have to do with different assumptions about the post schooling investment behavior of individuals.(13) Since, however, theoretically all that the human capital argument postulates is that the rate of increase in earnings should decrease as age advances, we shall forego the niceties of rigorous mathematical derivation and continue to employ, "for mathematical simplicity and statistical tracta-

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(12) Note that the coefficients a_0, a_1, and a_2 are in fact vectors for occupations 1 through 39. For simplicity of notation we shall always assume this to be the case.

(13) In particular, the use of the Gompertz Curve arises from a desire to explicate some form of serial correlation in the quantities of post schooling investment undertaken per period. These results would, themselves, be radically altered if a different type of distributed-lags structure were used.

Table: A -1

Occupational classification - means and standard deviations of income, age and experience for the 1965 job distribution[3]

		Weekly income[1]	Years of age	Experience[2] General	Firm.	Occup.	Number of workers
1	Domestic servants	160.47 (24.08)	44.47 (11.44)	32.13 (11.89)	7.27 (6.55)	8.07 (5.95)	15
2	Barbers, waiters, etc.	385.35 (288.61)	40.41 (10.05)	27.68 (9.92)	8.35 (7.22)	8.82 (6.25)	34
3	Soldiers, security, etc.	173.84 (31.55)	37.42 9.16	25.47 (9.77)	8.37 (6.32)	3.74 (5.95)	19
4	Professionals and alike	1 165.76 (335.51)	36.21 (9.60)	17.04 (9.76)	7.49 (6.56)	9.38 (7.12)	79
5	Technicions, pilots	775.90 (375.33)	37.35 (11.27)	21.19 (12.46)	5.81 (5.98)	5.71 (5.34)	31
6	Teachers, librarians, etc.	517.27 (387.67)	37.42 (13.75)	22.70 (14.45)	7.18 (6.75)	10.00 (7.11)	33
7	Public burocrats	442.54 (441.76)	37.86 (8.09)	23.86 (7.95)	12.64 (4.38)	6.09 (4.27)	22
8	Managers (large)	1 282.29 (251.11)	45.72 (8.39)	30.31 (9.73)	11.45 (7.02)	9.41 (6.91)	51
9	Managers (small)	1 267.22 (270.88)	45.95 (7.03)	28.39 (7.09)	9.67 (6.41)	9.22 (6.80)	18
10	Shop attendants	320.85 (200.86)	43.70 (11.11)	31.80 (11.95)	8.20 (6.57)	7.80 (6.66)	46
11	Salesmen	699.35 (431.77)	42.15 (12.11)	28.85 (13.11)	10.10 (6.27)	9.65 (6.81)	20
12	Street vendors	181.98 (69.10)	45.22 (10.74)	33.45 (10.87)	7.83 (6.01)	8.17 (6.26)	58
13	Sales agents	800.35 (404.43)	41.54 (10.54)	26.43 (11.26)	7.81 (6.70)	9.67 (6.66)	63
14	Accounting personnel	349.53 (239.10)	33.93 (10.88)	19.37 (11.82)	7.37 (5.61)	7.28 (5.60)	43
15	Office personnel	339.59 (232.75)	35.70 (12.68)	21.00 (13.25)	7.93 (6.81)	6.52 (6.51)	27
16	Work inspectors, etc.	280.61 (82.36)	39.00 (10.91)	26.07 (11.50)	10.44 (6.99)	7.44 (6.37)	43
17	Office heads	769.47 (409.94)	39.08 (12.32)	23.86 (13.09)	8.92 (6.98)	7.97 (7.22)	36
18	Foremen	539.33 (258.50)	44.70 (10.23)	32.26 (11.65)	12.70 (7.42)	9.30 (7.19)	27
19	Agricultural workers	178.54 (60.52)	48.00 (11.19)	35.38 (12.39)	13.46 (7.17)	13.46 (7.96)	13

		Weekly income[1]	Years of age	Experience[2] General	Firm.	Occup.	Number of workers
20	Taxi drivers, etc.	244.83 (85.53)	43.04 (11.87)	30.46 (12.49)	7.46 (6.81)	8.08 (6.57)	24
21	Bus drivers	310.89 (184.03)	39.88 (10.71)	26.60 (11.28)	10.28 (6.95)	10.58 (6.93)	65
22	Textile workers	254.71 (126.57)	37.17 (8.75)	24.67 (9.30)	10.79 (8.01)	10.41 (8.22)	24
23	Wood and furniture workers	237.83 (93.63)	40.50 (10.48)	28.13 (10.78)	8.17 (6.77)	10.60 (6.11)	30
24	Glass and ceramic workers	231.61 (63.57)	40.43 (10.41)	28.48 (10.95)	8.09 (7.16)	10.15 (6.26)	46
25	Metal workers	298.36 (166.06)	40.14 (11.99)	27.51 (12.08)	9.46 (7.03)	8.02 (6.62)	59
26	Electricity workers	312.37 (254.82)	32.87 (10.16)	18.12 (11.89)	4.56 (3.95)	4.69 (3.86)	16
27	Mechanics	341.04 (142.76)	37.00 (11.08)	23.68 (11.83)	10.00 (7.07)	9.84 (6.14)	69
28	Chemical workers	261.58 (119.47)	35.92 (10.97)	23.12 (11.04)	10.42 (6.36)	10.12 (6.23)	24
29	Fixed machines operators	324.85 (165.10)	44.20 (10.76)	30.20 (11.00)	11.40 (6.99)	9.75 (6.34)	20
30	Press and printing workers	336.04 (178.96)	41.00 (11.70)	28.11 (11.73)	12.04 (6.81)	11.81 (6.42)	26
31	Food processing workers	226.07 (52.24)	37.29 (9.75)	25.43 (9.99)	11.71 (6.82)	12.64 (6.58)	14
32	Packers w/ machines	218.85 (58.51)	36.81 (12.01)	23.77 (12.68)	10.35 (7.13)	8.38 (6.55)	26
33	Construction helpers	160.54 (30.58)	41.93 (12.73)	29.76 (13.14)	3.91 (5.00)	7.81 (6.73)	68
34	Steevadores, etc.	179.12 (32.56)	37.60 (10.95)	25.44 (11.77)	8.30 (6.05)	7.12 (5.85)	50
35	Aux. metal workers	201.23 (62.39)	35.63 (10.57)	23.37 (10.76)	7.31 (6.66)	6.82 (7.03)	51
36	Other aux. workers	169.12 (40.29)	35.21 (12.45)	23.16 (13.11)	8.30 (6.72)	8.81 (6.93)	43
37	Aux. service workers	189.33 (61.46)	34.26 (11.39)	21.78 (12.05)	6.44 (6.34)	6.52 (6.61)	27
38	Cleaning workers	206.04 (67.54)	43.08 (11.23)	30.88 (10.94)	7.76 (6.34)	7.40 (5.85)	25
39	Janitors and alike	194.39 (60.77)	47.85 (8.43)	35.96 (9.57)	6.43 (5.18)	5.30 (4.14)	40

Notes:

[1]In current (1965) pesos. The conversion rate was 12.50 pesos per U.S. dollar; the minimum legal wage for the Monterrey Metropolitan Area was 145 pesos a week.

[2]Total labor force experience, including pre-migratory work.

[3]Figures in parenthesis are standard deviations.

bility", the quadratic form.[14] As we shall see, even that concession over the simple linear form proved to be irrelevant. We shall additionally use an alternative specification of (1a), traditionally employed in deriving an earnings function in terms of rates of return for previous investments, that is:[15]

$$\ell n\ y_i = \hat{a}_0 + \hat{a}_1 A_i + \hat{a}_2 A_i^2 \qquad \text{(1-b)}$$

The results of equation (1a) for the 39 job classifications are presented in the leftmost part of Table AI-2 (The results of equations (1b) were in all essential aspects not different from those of (1a). For this reason we proceeded in the analysis employing only the simple earnings specification and not its logarithmic transformation).

As we expected not all of the jobs showed a significant relationship between earnings and age. In fact, less than a third of the categories had tolerably significant coefficients for the age variable. Even fewer showed indications of a non-linear age-earnings function. Moreover, among these the great majority had coefficients numerically so small as to render them incapable of overturning a classification based only upon the linear coefficient.

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(14) Mincer could not be more candid on this point. He states: "The proper form of the experience function depends on the form of the life-cycle investment function. The economic theory of optimizing behavior implies that investment in human capital declines over the life cycle, at least beyond an early stage. Apart from this, economic theory provides no guidance to the specific form of the investment function". Mincer (1974), p. 85.

(15) See G. Becker and B. Chiswick: "The Economics of Education: Education and the Distribution of Earnings", p. 364. The use of the log transformation makes a lot more sense when schooling and post schooling investments are included in the same functions.

Table: A-2

Occupational classification - age and firm experience earnings profiles for the 1965 job distribution[1,2]

Job code[3]	age-earnings profiles					firm experience[4]-earnings profiles					Number of workers
	c	age	(age)^2	R^2	F	c	firm	(firm)^2	R^2	F	
1	49.9804	5.174 (4.480)	-5.697 (5.478)	.1457	1.023	164.82	-3.59 (4.14)	.24 (.22)	.1185	.806	15
2	-570.4990	42.528 (38.10)	-.4406 (.4797)	.0988	1.699	316.42	-14.94 (27.26)	1.61 (1.27)	.2557	5.325[a]	34
3	287.796	-7.58 (6.97)	.113 (.093)	.1491	1.402	146.47	5.74 (4.53)	-.19 (.24)	.2166	2.212	19
4	-1 538.48	129.27[a] (24.83)	-1.41[a] (.32)	.4560	31.857[a]	946.15	48.28[b] (22.37)	-1.44 (1.06)	.1563	7.041[a]	79
5	-2 508.76	171.62[a] (46.32)	-2.06[a] (.60)	.4141	9.897[a]	639.70	32.56 (37.55)	-.77 (2.04)	.0960	1.487	31
6	-1 267.57	96.04[b] (41.08)	-1.14[b] (.51)	.1687	3.044[c]	219.08	71.65[b] (35.71)	-2.26[c] (1.75)	.2671	5.384[a]	33
7	-689.59	38.81 (89.93)	-.22 (1.16)	.1566	1.764	1 400.73	-167.33 (94.13)	6.50 (3.70)	.1430	1.585	22
8	-304.93	64.53[c] (36.39)	-.63[d] (.40)	.1197	3.263[b]	1 031.05	33.55[c] (18.69)	-.74 (.83)	.2471	7.878[a]	51
9	-3 909.44	220.99[b] (105.59)	-2.31[b] (1.19)	.3603	4.225[b]	1 221.13	-1.94 (39.95)	.49 (1.83)	.0438	.344	18
10	-321.91	30.93 (22.69)	-.35 (.26)	.0429	.965	298.15	-7.19 (17.66)	.79 (.85)	.0901	2.130[c]	46
11	-1 902.75	129.24 (77.88)	-1.48 (.95)	.1744	1.795	289.28	75.05 (66.00)	-2.50 (2.99)	.3651	1.308	20
12	391.99	-8.69[d] (6.96)	.08 (.08)	.0682	2.014	183.62	2.50 (5.59)	-.22 (.29)	.0289	.820	58
13	-1 186.08	92.10[b] (32.93)	-1.00[b] (.40)	.1547	5.489[b]	780.35	.34 (29.52)	.16 (1.45)	.0037	.112	63
14	-508.11	48.93[d] (30.40)	-.63[d] (.41)	.0641	1.370	305.72	-.70 (24.73)	.58 (1.12)	.0790	1.716	43
15	-598.28	51.12[b] (24.86)	-.62[b] (.31)	.1517	2.146	158.30	43.61[b] (25.20)	-1.53 (1.24)	.2077	3.145[b]	27
16	325.03	-5.04 (9.35)	.09 (.12)	.1190	2.574	255.00	2.32 (7.83)	.01 (.35)	.0456	.955	43
17	-346.70	47.45 (42.66)	-.44 (.52)	.1367	2.613	756.60	-14.70 (42.88)	1.13 (2.02)	.0313	.533	36
18	-796.83	71.01[c] (38.25)	-.88[b] (.44)	.1584	2.259	441.87	15.80 (34.92)	-.48 (1.52)	.0246	.303	27
19	88.12	2.98 (14.47)	-.02 (.17)	.0463	.243	182.79	-2.69 (11.08)	.14 (.48)	.0109	.055	13
20	-204.35	22.47[b] (11.79)	-.26[b] (.14)	.1662	2.090	183.65	18.25 (10.38)	-.74 (.53)	.1847	2.379	24
21	-499.31	42.23[b] (18.04)	-.51[b] (.22)	.0827	2.796[c]	260.74	-3.54 (14.89)	.52 (.65)	.1017	3.512[b]	65
22	-287.70	28.36 (23.99)	-.35 (.32)	.0734	.832	163.39	37.98[b] (13.52)	-1.79[b] .61	.2879	4.246[b]	24

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Job code[3]	age-earnings profiles					firm experience[4]-earnings profiles					Number of workers
	c	age	$(age)^2$	R^2	F	c	firm	$(firm)^2$	R^2	F	
23	175.21	2.16 (14.74)	-.01 (.17)	.0121	.165	169.58	12.83[d] (8.81)	-.33 (.42)	.2219	3.850[b]	30
24	288.89	-3.44 (7.17)	.05 (.09)	.0091	.196	214.25	-3.58 (4.64)	.40[c] (.22)	.3003	9.228[a]	46
25	186.61	4.46 (13.75)	-.04 (.17)	.0105	.298	195.51	26.31[c] (13.99)	-1.06[d] (.65)	.0765	2.318[c]	59
26	462.11	-12.91 (52.07)	.23 (.72)	.0312	.209	265.33	6.37 (75.89)	.51 (5.78)	.0402	.273	16
27	102.71	9.44 (11.57)	-.07 (.14)	.0776	2.776	232.92	20.62[b] (9.25)	-.66 (.45)	.1674	6.637[a]	69
28	-334.74	32.07 (19.22)	-.39 (.25)	.1403	1.714	257.35	-2.05 (20.41)	.17 (.85)	.0134	.143	24
29	247.44	-3.64 (25.79)	.11 (.30)	.1667	1.700	429.68	-18.60 (33.94)	.61 (1.40)	.0406	.360	20
30	1 121.57	-44.16[c] (25.17)	.57[c] (.30)	.1774	2.481	289.66	-4.79 (25.83)	.55 (1.09)	.1017	1.302	26
31	135.00	3.56 (13.12)	-.03 (.16)	.0738	.438	204.70	5.77 (10.52)	-.26 (.44)	.0316	.180	14
32	81.10	6.79 (6.84)	-.07 (.09)	.0711	.880	190.80	4.18 (6.57)	-.10 (.30)	.0700	.867	26
33	205.59	-2.58 (2.52)	-.03 (.04)	.0188	.623	166.31	-6.57[b] (2.43)	.50[b] (.14)	.2352	9.995[a]	68
34	124.22	3.25 (3.36)	-.04 (.04)	.0245	.591	166.20	4.59 (2.81)	-.24 (.13)	.0642	1.612	50
35	35.49	9.99 (6.75)	-.14 (.09)	.0531	1.345	136.90	21.09[a] (5.03)	-.93[b] (.24)	.2749	9.100[a]	51
36	174.64	.49 (3.71)	-.02 (.05)	.0616	1.312	167.82	1.03 (3.71)	-.06 (.19)	.0042	.084	43
37	118.19	2.38 (8.93)	-.01 (.12)	.1105	1.491	159.31	6.32 (6.52)	-.13 (.33)	.1562	2.221	27
38	202.66	3.11 (10.68)	-.07 (.13)	.1083	2.226	203.92	-2.28 (18.33)	.20 (.42)	.0313	.356	25
39	2.75	10.04 (8.76)	-.12 (.09)	.0677	1.562	170.72	6.55 (5.74)	-.27 (.34)	.0471	1.063	46

Notes:

[1]Standard errors in parenthesis.

[2]Letters in the superscript de note rejection of the null hypothesis, (Ho: $\beta x = 0$), at the following significance levels: (a) = 1% or more; (b) = 5%; (c) = 10%; (d) = 20%.

[3]See Table: , for definition.

[4]Number of years of work experience in the same enterprise.

The jobs exhibiting the usual pattern of age-earnings profiles all fall in the upper tail of the distribution of work. These included professionals, managers, sales personnel, specialized technicians, teachers, and skilled office employees. These results are consistent both with the human capital and the segmentationist approaches to the distribution of earnings. The findings show that, in one way or another, all but the more privileged workers are, as a group, barred from the mechanisms of training and promotion.

It is important to stress the group aspect of the results. Because the normal procedure of career advancement is through inter-job mobility, in a single job category one is likely to find both those workers who are getting ready to move and those that failed to. It was this phenomenon that led us to postulate, in the first place, a parabolic age-earnings profile within a single job category. Workers could experience a rapid pick-up in earnings during their first years at the job and then, either move on, or see their incomes nearly stabilize. However, because of the possibility of quality differences among generations of workers, there may be a distinct pattern for every subgroup - but not one for the group as a whole.

There may be, in fact, two (or more) distributions in a single job category: one upward sloping for the up-and-coming young workers; and another, slightly overlapping the former, but downward sloping. This distribution would apply to those workers who were already rejected in their attempts at mobility.

This occurrence would also explain why only at the upper echelon jobs the estimated impact of age proved to be significant. In these jobs career advancement is consistent with a within job increase in earnings - and not necessarily with job mobility. This also proved to be true of those job categories more akin to what one normally understands by an occupation. Specifically, it was true of the jobs of truck and bus driver, taxi driver, foreman, as well as workers and craftsmen in the printing business.

There may, however, be some statistical reason for the nature of the results. This concerns the high degree of multicolinearity in the data between the variables age and age itself raised to the second power.(16) Although clearly the relationship between the two should be curvilinear, it may be that because of the limited range in values, a nearly linear association also exists. It is well known that the presence of multicolinearity, while not biasing the least squares estimation, increases their variances, making the resulting estimates highly unreliable.(17) Since the usual t-test criteria for the hypothesis that any coefficient is equal to zero is merely the ratio between the estimated coefficient and its standard error, it follows that with multicolinearity we are more likely to accept a false hypothesis.

It is customary to assume that multicolinearity is a characteristic of the sample and not the population.

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(16) In the average job category; $\mu_{Age, Age^2} = .90$.

(17) This fact is proved in any standard text. See for example Theil (1971), Chapter 3, Section 8.

Hoping for the best, we heeded this advice and proceeded to re-calculate our estimates drawing on a sample of work experiences, and not ages, of workers. After all, it has even been agreed that experience-earnings profiles are in some sense a superior form of analysis, in that they explicate the trade-off between greater schooling, foregone earnings and on the job training. Our results were, however, very disappointing. Multicollinearity did not decrease (how could it increase!) and, given the smaller variations for the independent variables, the overall results were poorer.

A standard procedure for hypothesis testing in the presence of multicollinearity is to test for the combined effects of either the sum or the difference between the collinear variables, depending upon whether their joint variation was negative or positive. This in effect allows for the "discounting" of the covariance effects, reducing the standard deviations of the joint variable. Of these possibilities, we are only interested in their combined effect. Hence, to test for a significant difference between the two coefficients (the only permissible alternative in the case of positive correlation) would be of little use to us.

We had, therefore, to rely on the more usual F-test of the hypothesis that none of the explanatory variables has an influence on the mean of y_i.

In this case we test,

$$H_o: \quad a_1 = a_2 = 0$$

against the alternative that H_o is not true; that is, that at least one of the regression slopes is different from

zero. As is well known this test is based on the ratio between the regression sum of squares (SSR) and the residual sum of squares (SSE) corrected by the appropriate degrees of freedom. Because this ratio is not affected by the presence of multicollinearity in the data it should give us an acceptable indication of the general proposition that earnings are linearly dependent on age and age itself squared.

With this criterion, as the results in Table AI-2 indicate, we are to accept the null hypothesis in the overwhelming majority of cases. For the most part, except for the small group of jobs at the top of the hierarchy, age does not seem to exert a systematic effect on earnings. This indicates that for all jobs, exception being made of the cases just alluded to, a simple comparison of mean earnings should suffice for a preliminary grouping of occupations.

Firm Experience-Earnings Profiles: In selecting the methodology for classifying occupations we had concluded that, in addition to examining age profiles, we should also analyze the pattern of earnings variation with length of firm experience. The theoretical reasons for this choice can be found both on the human capital and the more institutional views on specific training and the formation of internal labor markets. With specific training the individual pattern of earnings would be steeper than otherwise. This reflects the fact that the amount of new capital accumulated in a given period consists not only of the individual's own investments, but added to these, the discretionary

investments made by the enterprise.[18] Then, the presence of a large and significant association between firm experience and earnings should serve as an indicator of the incidence of internal labor markets among the jobs in the Monterrey Sample. This information could further be used as an additional criterion with which to appraise differences between apparently similar age-earnings profiles.

The model adopted for empirical estimation was identical to the one employed for age profiles - save, of course, for the replacement of the right-hand variables. The choice of a non-linear specification was, similarly, based on the same arguments used for age earnings variations over the life-cycle. These results are presented on the right-most side of Table AI-2. Once again we are plagued by the lack of orthogonality among the independent variables. We shall, therefore, confine our comments to the total F-test of the regression, and the sign of the coefficients.

On the whole these estimates add little to our knowledge of the occupational structure in Monterrey. As expected, many of the high echelon jobs exhibit the hypothesized relationship. These include professionals, managers, teachers and the like, as well as qualified office employees. However, in all cases the slope of the estimated firm-experience profile lies below that corresponding to the earnings

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(18) In a dual labor market the firm's investments decision could not be looked upon as discretionary, but rather, as necessary for the maintenance of the internal market. They could also be regarded as demands imposed by the adoption of a certain technology.

profiles. This would imply that the relative increase in earnings attributable to an extra year on the firm is less than that accruing from the simple aging process. Considering that the "best" regressions (according to the F-test) involving firm-experience show a much poorer R^2 than those based on age, the results are indicative of a major problem in the specification of these regressions.

In contrast to age, firm experience is not an unambiguous measure-its interpretation varies depending on the quality of the experience. If a worker spends a long time in a firm, but most of it in a low level job, his economic prospects are much dimmer than his fellow worker who has just come in but who is moving up in the hierarchy of jobs. This indeed seems to be what is happening in the case of jobs showing a significantly negative impact of firm experience on earnings.(19)

The only interesting results seem to be those among the industrial jobs showing a significant relationship between firm experience and earnings, but not so, for age and earnings. However, even for these few cases the results do not seem trustworthy. What they would indicate is that internal labor markets exist among textile, woodwork, non-machine-related metals, and mechanical workers. Moreover, that among these the most important one (quantitatively) would be the one for textile craftsmen and workers. But this

(19) As Table AI-2 shows, this is the case with the jobs of waiters, salesmen, chaufeurs, construction helpers and workers in the glass and glazing business. Since these jobs are also likely to be performed by self-employed individuals, the statistical results could be biased towards the least successful of the workers in these jobs.

is doubtfull unless, of course, we change our definition (admittedly not very precise) of what is an internal labor market. The enterprises making up the textile industry are among the least modernized in the manufacturing sector - with a predominance of small, family-oriented firms.(20) unfortunately, these exercises did not provide us with the additional information needed to supplement the earlier results.(21)

A Working Classification: On the basis of the foregoing results we adopted a classificatory procedure based on an aprioristic division of categories, instead of continuing to work with the whole sample of jobs. That is to say, we will first propose very broad groups of jobs (based on the information obtained so far) and only then attempt to obtain occupational classifications within these groups. By subdividing the sample into more homogeneous groups we may adopt a procedure which directly assesses the importance of earnings variations between job categories. This is the usual analysis of variance approach. In our case, pre-grouping is important for isolating a common performance of earnings with age for all jobs in the group; while allowing for inter-job differences in levels of earnings. A group should

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(20) In Mexico, the synthetic textile products are included in the chemical industries. The information on the textile industry is based on evidence for the state of Mexico. See: Idrhrem, La Pequeña Industria en el Estado de Mexico. Toluca, 1973. These results draw attention to the difficulty of specifying industry-wide relationships in a structurally heterogeneous productive system.

(21) We also went through the laborious task of fitting job experience-earnings profiles for the 39 categories; as well as of attempting to estimate labor force experience-earnings profiles controlling for the degree of firm experience. Neither of these results seemed commendable.

therefore be defined so that all jobs in it display a similar pattern of age-earnings fluctuations; although they do not need to share an equal level of earnings.[22]

The findings shown in Table AI-2 indicate at least one distinct grouping. This cluster would include all of the professional, managerial and technical jobs. These are activities for which a positive and significant relationship between age and earnings exists. Specifically, the group includes: professionals, managers, technicians, salesmen in large enterprises, sales agents and department heads in bureaucratic firms. The mean weekly earnings provided by these jobs range from $1,267.22 (1965 figures) for managers to $700.00 for salesmen. We also included among this group jobs that might lead into, or are competitive in attraction with, these categories. Jobs such as those of specialized teachers and department heads in public administration. Altogether, these jobs accounted for 357 workers, or 24% of the sample.[23]

On the other hand, for the remaining jobs we referred to the information contained in Table AI-1, and the corresponding zero order correlations (not reported) to provide us with guidelines for aggregation. There was little

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(22) It is true hat we could theoretically proceed with a model allowing for variations in both the intercept (level) and the slope (age-earnings relationship) of the earnings profile. However, with 39 categories this would imply a repression with 78 independent variables on 1451 cases! And the results would not be simpler to interpret.

(23) This translation of titles is, we are aware, not satisfactory. In total, these jobs correspond to numbers 4, 5, 6, 7, 8, 9, 11, 13, and 17 in the tables.

difficulty in assembling the group of jobs at the lower end of the distribution. These are jobs for which weekly earnings rarely exceed $200.00, showing no positive association of earnings with age; and characteristically performed by self-employed or informally contracted workers. In the sample, the following categories were included in this group: domestic servants, petty traders, agricultural workers, helpers in construction, material handlers, unqualified manufacturing workers, cleaning workers, and janitors.(24) They account for 374 workers, or roughly one-fourth of the sample.

The third group was defined by combining all industrial jobs. We are particularly interested in intra-manufacturing differences and therefore eager to analyze these jobs separately from others in the sample.(25) The activities include textile and wood craftsmen and workers, brick layers, glazers, and similar construction trades, metal handlers, electricians and workers in electrical industries, mechanics, chemical workers, operators of fixed machines, workers in the printing trades and in foodstuffs.(26) There were 336 workers in these categories.

The final group was defined by exclusion. It is mostly integrated by white collar jobs, and by the quasi-

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(24) This group is very similar to the "marginal" category found for Mexico City by Muñoz, Oliveira and Stern (1977), Chapter 6, pp. 75-90. The jobs correspond to numbers 1, 12, 19, 33, 34, 35, 36, 38, and 39.

(25) As we shall see, this did not stop us from attempting classifications cutting across the blue collar-white collar distinction.

(26) These jobs correspond to numbers 22 through 31 in the tables.

manual activities in the services. It includes such jobs as specialized waiters, career soldiers, owner-operators of small grocery stores, employees in the accounting staff and in general office chores, inspectors of merchandise, foremen, as well as taxi-drivers, bus and truck drivers, operators of mechanical packing equipment and auxiliary service employees. These tasks occupied 384 of the workers in the sample, or a little bit more than one-fourth of the total.

Having defined these broad groups combining at least one, but in all likelihood more than one, occupation, we shall now proceed to test for the presence of heterogeneity in each of the groups. To do so we shall use the models of "experimental design", more commonly known as analysis of covariance models.

2 - The Analysis of Covariance Model

The preceding results were based on estimated age-earnings profiles for every occupational sub-sample in the Monterrey data. We sought to find similarities in the estimated coefficients for age and firm experience, across different jobs. Such similarities would indicate that although different in tasks performed, some jobs could belong to a same generic grouping, exhibiting the same pattern of income advancement with age.

In this section a procedure is described with which to formally test the possible aggregations induced from the earlier results. As in (1) suppose income is line-

arly related to age, but that for the less skilled occupations there is a downward shift in this age-earning function.

Our hypothesis is,[27]

$$y_i = b_o + b_2 A_i \quad \text{(for the less skilled)} \tag{2a}$$

$$y_i = b_1 + b_2 A_i \quad \text{(for the skilled)} \tag{2b}$$

where:

$$b_1 > b_o.$$

These profiles are like those estimated in the preceding sections. Since we are already assuming that the relation between age and income is the same for both groups, we can, with an additional assumption, estimate (2a) and (2b) from a single equation. All we need to believe is that the measurement errors for both occupational groups have constant equal variance, and that their values are pairwise uncorrelated.[28] In this case the estimating function becomes:

$$y_i = c_1 + c_2 0_i + c_3 A_i \tag{3}$$

where the 0_i's are dummy variables such that:

$$0_i \begin{cases} 1 & \text{if the worker's occupation is skilled} \\ 0 & \text{if the occupation is not skilled} \end{cases}$$

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(27) On the basis of the results from Section 1, and the nature of the groupings on which the analysis will be performed, we have declined the use of age as a <u>within</u> group variable.

(28) That is, we are assuming that $E(uu^1) = \sigma^2 I_n$ for both groups combined, and not only for each group independently. All the other assumptions of the linear model must also, clearly, hold. For a proof of this simple proposition see, T. Rothenberg, "Notes on the Linear Model", unpublished manuscript, Department of Economics, University of California, Berkeley, 1973.

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Comparing (3) with (2a) and (2b) we note that:

$c_1 = b_o$ and $c_2 = b_1 - b_o$

Thus, to test whether the less skilled and the skilled workers have the same level of income, we can proceed:

$H_o: \; c_2 = 0$

This test can be implemented through a simple t-test on equation (3).

Equation (3) can be generalized to aggregate more than two occupations.

The general model is of the form:

$$y_i = d_1 + d_2 0_2 + d_3 0_3 + \ldots + d_n 0_n + d_{n+1} A_i \qquad (4)$$

where $d_2, d_3 \ldots d_n$ are dummy variables defined as above. Given (4), we can test an additional hypothesis involving the equality between levels of income between three occupations. That is,

$$H_o: \begin{array}{l} d_2 = 0 \\ d_3 = 0 \end{array}$$

In this case, however, the t-test cannot be applied because there are two restrictions. We shall therefore make use of the following F statistic (see Rothenberg op.cit.):

$$T = \frac{Q^* - Q}{Q} \cdot \frac{n-k}{g}$$

where:

Q is the sum of squares of the residuals estimated from equation (4).

Q* is the sum of squares of the residuals of a constrained least squares regression of y on 0's and A. The linear constraints imposed in this case are that d_2 and $d_3 = 0$. Thus, g, the number of independent linear constraints added to the regression, is in our case 2.

k is the number of variables in the original regression

n is the number of observations.

The ratio T measures the percent increase in residual variance due to imposing the null hypothesis. If H_o is true, T should be near zero, if H_o is false, T should be large. It can be proven that, if H_o is true, T has an F-distribution with k and n-k degrees of freedom. Thus, the decision rule is:

Reject H_o if $T > k(*)$ where

k(*) is the value of k such that * percent of the area under an F distribution with (g, n-k) degrees of freedom lies to the right of k.[29]

Results of Occupational Groupings: The model and test just outlined were first applied to the broad occupational groupings derived in Section 1. It will be recalled that four broad groupings were then analyzed:

1. Jobs generally showing a positive, and significant relationship between age and earnings, as well as incomes in excess of $450.00 pesos (1965) a month.

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(29) Note that the test procedure outlined is good for any set of linearly independent constraints, and is not limited to the exemplified case with only two restrictions.

2. Jobs that failed to show a significant response of earnings with age, but that had mean earnings in the range from $250.00 to 350.00 pesos a month.

3. All industrial jobs. These, it will be recalled, were ones that also failed to exhibit a significant coefficient of age with respect to earnings, that had mean weekly earnings in the $300.00 to 350 pesos range, but that were restricted to industrial activities.

4. The last group combines all jobs with low-earnings, including those that showed a negative correlation between age and earnings.

An analysis of covariance, involving each job category, was applied to every one of the four groups. This enabled us to re-group the original 39 categories into ten distinct and internally consistent subgroups. What follows is a description of the process through which these ten subgroups were derived.

The first results, employing the four-part classification are shown in Table A -3. On the whole, the results of these regressions were satisfactory; and a great deal more illuminating than our earlier attempts with age-earnings profiles. All of the regressions indicate that at least some of the jobs included in any of the groupings differ significantly from others in the same category. This implies that, in order to approximate a reasonable classification of occupations, we are therefore forced to consider a further breakdown of the four broad groupings.

Table: A -3

Occupational classification: analysis of covariance on age-earnings profiles for the 1965 job distribution[1]

upper-level white-collar jobs[2]					middle-level white-collar and service jobs[2]				industrial jobs[2]				lower-manual jobs[2]			
755.25[a]	757.91[a]	745.48[a]	793.42[a]	C	291.87[a]	286.19[a]	258.93[a]	C	256.31[a]	253.38[a]	256.34[a]	246.21[a]	C	185.11[a]	184.86[a]	191.[illegible]
(93.46)	(92.90)	(93.18)	(70.10)		(41.00)	(40.82)	(34.89)		(31.14)	(31.03)	(31.02)	(29.09)		(17.07)	(16.79)	(9.[illegible]
11.49[a]	1 .44[a]	11.71[a]	10.52[a]	Age	1.70[b]	1.87[a]	1.98[a]	Age	2.29[a]	2.37[a]	2.29[a]	2.29[a]	Age	-0.55[a]	-0.55[a]	-0.[illegible]
(1.76)	(1.74)	(1.75)	(1.58)		(0.86)	(0.86)	(0.84)		(0.71)	(0.71)	(0.71)	(0.69)		(0.24)	(0.23)	(0.[illegible]
control	control	control		14	control	control		27	control	control	control		35	35.87[a]		
														(15.26)		
0.87	0.31	2.94	control	02	24.80	23.72		26	-19.22	-18.89	-19.22	control	33	44.80[a]	37.69[a]	28.[illegible]
(62.96)	(62.78)	(62.98)	{1}		(42.96)	(43.05)			(38.63)	(38.62)	(38.51)	{6}		(16.81)	(14.07)	(5.[illegible]
-16.16	-16.16	-16.16		10	-45.28	-46.92	control	29	-32.68	-33.25	-32.67		39	35.80[a]		{9
(93.60)	(93.37)	(93.67)			(40.28)	(40.35)	{4}		(35.62)	(35.61)	(32.51)			(15.32)		
-408.74[a]		-406.91[a]		15	-12.96	-13.25		30	-14.31	-14.66	-14.30		01	control	control	
(79.03)		(79.06)			(45.81)	(45.69)			(31.67)	(31.66)	(31.58)					
-440.57[a]	-434.31[a]	-439.59[a]	-433.53[a]	21	-48.75	-49.74		22	-91.22[a]		-91.22[a]		12	21.94	21.93	
(69.69)	(56.94)	(64.73)	(40.64)		(36.84)	(36.92)			(32.41)		(32.31)			(16.91)	(17.82)	
-444.58[a]		-443.09[a]	{2}	03	-181.62[a]			25	-49.87[a]	-65.58[a]	-49.86[a]	-55.26[a]	19	20.03	20.01	cont-
(75.73)		(75.77)			(52.71)				(24.72)	(21.41)	(24.64)	(17.90)		(19.52)	(19.48)	[illegible]
-668.17[a]	-660.66[a]			16	-77.50[c]			28	-76.98[a]		-76.98[a]	{7}	33	-1.80	-1.79	
(77.54)	(77.33)				(40.26)				(32.91)		(32.81)			(14.62)	(14.59)	
-747.95[a]	-748.41[a]	-666.08[a]	-682.55[a]	20	-121.44[a]	-127.89[a]	-104.70[a]	23	-114.21[a]	-114.52[a]			34	14.85	14.89	
(88.17)	(87.93)	(62.47)	(43.08)		(47.32)	(32.57)	(19.42)		(29.82)	(29.81)				(15.24)	(15.20)	
-580.26[a]	-586.46[a]		{3}	32	-137.90[a]		{5}	24	-119.38[a]	-119.67[a]	-117.02[a]	-106.81[a]	36	3.25	3.30	
(87.23)	(87.01)				(45.64)				(26.06)	(26.05)	(21.97)	(18.55)		(15.55)	(15.51)	
				37	-161.00[a]			31	-115.32[a]	-115.42[a]		{8}				
0.4532	0.4529	0.4494	0.4557		(45.06)				(31.56)	(39.54)			R^2	0.0968	0.0953	0.0[illegible]
357	357	357	357										N	374	374	37[illegible]
	0.12	1.24	3.07[c]	R^2	0.1892	0.1768	0.1420	R^2	0.1207	0.1159	0.1206	0.1132	T^3		0.30	1.37
				N	357	357	357	N	336	336	336	336				
				T^3		1.48	1.83	T^3		0.90	0.01	0.40				

[1]

[illegible] figures are OLSQ estimates of the coefficients of the model $Y_{ij} = \mu + \sum_{j=1}^{J-1} \alpha_j + \beta X_{ij} + e_{ij}$. Numbers in parenthesis are standard errors [illegible] estimates. Superscripts denote the significance level of rejection of the null hypothesis, ($H_o = \beta X_{ij} = 0$, or, $\alpha_j = \alpha = 0$); a = 1% or [illegible], b = 5%, c = 10%.

[2] Table [illegible], for corresponding job titles.

[3] [illegible] the test stastistic for the null hypothesis of equality of the full set of regression coefficients between the complete and restrict[illegible] [illegible]uped) models. If Q is the SSR of the complete model, Q^*, the SSR of the restricted model, n is the number of observations, k is the [illegible]er of parameters in the full model, and q the number of additional restrictions, then: $T = [(Q^* - Q)/Q]\,[(n-k)/q]$, which is distribu[illegible] [illegible]n F - distribution, with q, n-k d.f.. See, Rothenberg (s/d), Hood and Graybill (1963), pp. 135-140.

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In the case of group 1 (upper-level white collar jobs) the omitted job category was that of financial managers. Accepting the hypothesis that the coefficient of age is the same for all jobs in that group, the values of the estimated intercept coefficients, and their respective t-values, fail to reject the hypothesis that:

$$H_o^{1a}: \quad d(0_{08}) = d(0_{09}) = d(0_{09})$$

That is, that the industrial and commercial managers, as well as professionals, form a homogeneous subgroup with the left out job category. Moreover, a comparison of estimated intercepts for the remaining jobs in this group suggests two further subdivisions: one re-grouping technicians, sales agents and office supervisors, and the other uniting teachers with governmental bureaucrats and salesmen.

Nevertheless, from a mere examination of these results we cannot be confident that these additional subdivisions are warranted. All that can be said is that managers and professionals do not differ significantly in their levels of income, whereas they do differ significantly from all other jobs in group 1. To test for the validity of the other re-grouping hypothesis we are required to impose the following restrictions in estimating the model:

$$H_o^{1b}: \quad d(0_{05}) = d(0_{13}) = d(0_{17})$$

and:

$$H_o^{1c}: \quad d(0_{11}) = d(0_{06}) = d(0_{07})$$

The previously outlined T-test can be applied to verify these propositions.

The necessary computations are presented in the last row, second and third columns of Table AI-3. In both cases we find that the calculated test statistic is much smaller than the critical F value at the 5% confidence level. Even though it would be erroneous to consider all the occupations as members of a single group, given our test criteria, it would be acceptable to consider them as falling in either one of the three homogeneous subgroups enumerated above.

In the case of the second of the original four groups (middle-level white-collar and service jobs), the occupations apparently sharing the same level of earnings as that of the left out variable are: office workers, waiter, hairdressers, et al., grocery store operators, and chauffeurs. For all of these the estimated intercepts are not significantly different from that estimated for accountants. Formerly, the hypothesis is:

$$H_o^{2a}: \ d(0_{14}) = d(0_{15}) = d(0_{02}) = d(0_{10}) = d(0_{21}).$$

On the other hand, soldiers, auxilliary service employees, packers with mechanical equipment, taxi drivers and perhaps, inspectors, all form what seems to be a distinctively different subgroup - one with a lower level of earnings. That is:

$$H_o^{2b}: \ d(0_{03}) = d(0_{37}) = d(0_{32}) = d(0_{20})$$

The results in the 6th colum, last row of Table AI-3 ratify this hypothesis. Once again the magnitude of the T-statistic is less than the critical F-value with the appropriate degrees of freedom.

These two subgroupings fail, nevertheless, to include all of the jobs originally thought of as belonging to the second group. The foremen in the sample cannot be accommodated into either group. They command average earnings that are much higher than those of any other job in the group. One possibility is that foremen should be included with the more prestigious positions in the first group; at least in its least desirable subgroup. The outcome of further tests, not reported here, upholds this proposition.

Columns 8 and 9 of Table AI-3 present the conclusions of similar experiments for the jobs in group 3. Among industrial workers those working as mechanics, electricians, operators of machines, and of printing equipment, form a privileged group, with significantly higher earnings than other industrial workers. The results of the table confirm the aggregation:

$$H_o^{3a}: \quad d(0_{26}) = d(0_{27}) = d(0_{29}) = d(0_{30})$$

Moreover, we found that the remaining industrial positions form two additional subgroups. One uniting the trades of metal operators, chemical workers, as well as textile workers. The second combining craftsmen and workers in wood, in specialized construction trades (bricklayers, glass fibers, etc.) and including also workers in the food production industry. The tests of Table AI-3 uphold the null hypotheses that:

$$H_o^{3b}: \quad d(0_{22}) = d(0_{28}) = d(0_{25})$$

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$$H_o^{3c}: \quad d(0_{23}) = d(0_{24}) = d(0_{31})$$

Finally, we shall briefly account for the fourth and last group of jobs. Here again, in spite of the lack of cohesion between all jobs in the original group, two distinct and internally homogeneous subgroups were identified. From the results shown in Table AI-3, it is clear that the following six categories could be regarded as a single unit: domestic workers, self-employed street sellers, agricultural laborers, construction laborers, materials handlers, and auxilliary industrial workers. These jobs make up the lowest rung in the occupational hierarchy.

As a final experiment, on the basis of the values of the estimated age-earnings intercepts for the remaining occupations in the fourth group, the following hypothesis was tested:

$$H_o^{4b}: \quad d(0_{35}) = d(0_{38}) = d(0_{39})$$

The estimated figures shown in the table fail to nullify this hypothesis. They are consistent with a re-grouping of these categories into a distinct, and internally homogeneneous, unit of analysis, one that combines the jobs of auxilliary metal workers, cleaning workers and watchmen into a single subgroup. In sum, the results of the last two paragraphs permit us to re-group the jobs belonging to the fourth group into two distinct units of analysis, completing the re-classification of the original four groups into ten internally homogeneous occupational units.

In the last columns for each of the four groups in Table AI-3 we present final estimates of the age-occu-

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pation earnings equations. These results both confirm and summarize the classification scheme previously derived.

Further Results of Aggregation

It is important to note that the re-grouping of occupations derived in the preceding section is a possible one, but not necessarily the only one. Although the results indicate significant divergences among the subgroups in every one of the four initial categories, they do not preclude the possibility that two or more subgroups from different categories be joined to form new, albeit still dissimilar, groupings.

In order to verify the robustness of the present ten-part division, several aggregation exercises were performed. These were essentially of the same nature as before, but with one important difference. It will be recalled that the linear model so far employed allowed only for parallel shifts in the whole age-earnings profile among occupations. In other words, buttressed by the results of Section 1, we have not felt it necessary to allow for simultaneious variation in both the intercept and the coefficient, but rather only in the former. Nevertheless, in comparing between groups it would be more desirable to generalize the model so as to allow differences not only between intercepts but also between coefficients. We shall, therefore, employ the following model:

$$y = e_1 0_1 + f_1 A_1 + e_2 0_2 + f_2 A_2 + \dots + e_n 0_n + f_n A_n \qquad (5)$$

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Naturally we did not feel it necessary to compare all - or even most - of the possible cross-classifications. Combinations involving extremes in the distributions are quite clearly erroneous. Moreover, even among the null hypotheses that may fail to be rejected, some are less appropriate than others in terms of our ultimate purpose. Taking this into consideration, the following re-aggregation experiments were tried:[30]

H_o: e(subgroup 4) = e(subgroup 6)
f(subgroup 4) = f(subgroup 6)

H_o: e(subgroup 5) = e(subgroup 9)
f(subgroup 5) = f(subgroup 9)

H_o: e(subgroup 7) = e(subgroup 8)
f(subgroup 7) = f(subgroup 8)

The tests for these hypotheses indicated the rejection only of the 5 and 9 grouping.[31] Although the occupations in subgroup 9 have a significantly higher initial level of earnings than those in subgroup 5, the latter show a significantly positive response of earnings with age; whereas the former, a significantly negative one.

The results would seem to indicate that the elite industrial jobs are, in terms of age/earnings profiles, not

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(30) Actually, a few more than these were performed. Nevertheless, they were clearly far-fetched and all with exception failed. These included among others (a) combination of subgroup 4 with subgroup 7 and (b) combination of subgroup 10 with subgroup 8.

(31) The estimated result is: $y = 150.33^a + 2.08^a$ Age $+ 91.05^a$(Group 9) $- 3.08^a$ (Age - Group 9); $R^2 = 0.107$.

significantly different than those performed by skilled white collar employees, or by the very small autonomous businessmen.[32] Similarly, they indicate that the remaining two subgroups of industrial workers are not really all that different from one another.[33]

We would have wished that these experiments had turned out otherwise: in a clear refutation of these hypotheses. From our knowledge of the occupational station in Monterrey the previously detected distinctions appear important, both in the dimension of separating white collar from blue collar workers, and in separating occupations within the consumer goods producing industries. The industrial activities of workers in subgroup 7 are, on the whole, related to more dynamic sectors of the economy: more highly capitalized and, from what information is available, depending on more skilled personnel. These doubts are relevant to our inquiry and led us to re-interpret these last findings. In any case, in this situation we lack any obvious statistical indication. Having failed to reject two alternate null hypotheses we cannot be justified in selecting one over the other.

Motivated by this ambiguity we attempted to perform some further experiments, recasting the definition of subgroups. To begin with, we thought to form new subgroups

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(32) The estimated result is: $y = 261.52^{a} + 1.91^{c}$ Age − 63.29 (Group 6) + 1.62 (Age − Group 4); $R^2 = 0.172$.

(33) The estimated result is: $y = 205.29^{a} + 0.65$ Age + 1.91 (Group 7) + 1.21 (Age − Group 7); $R^2 = 0.056$.

involving all of the occupations in the already established subgroups 4, 6, and 7, but reorganizing them so as to form only two units. One including the more desirable white and blue collar occupations, and another, the less desirable small enterprise and industrial occupations. For this purpose we tested the following hypotheses:

H_o e $(0_{02}) = e(0_{14}) = e(0_{26}) = e(0_{27}) = e(0_{29}) = e(0_{30})$

and

H_o: $e(0_{10}) = e(0_{21}) = e(0_{22}) = c(0_{23}) = e(0_{28})$

and, similarly, for $p(0_{10}) = \ldots = p(0_{28})$

The calculation of the tests on these hypotheses is presented in Tables D-4 and D-5. The results indicate that the proposed subdivision is a feasible one, in that none of the hypotheses are rejected. Moreover, both of these new subdivisions could be treated as a single unit. This is contradictory, and must be the result of some statistical artifact. Indeed it appears that in the calculation of the common subgroup mean the various occupations together act so as to counteract the influence of the other. It thus appears that this last revision is inferior to the previous one. A similar tryout, involving a rearrangement of the occupations in subgroupings 5, 8, and 9, brought about equally unsatisfactory results.

The final assessment of these hypotheses must rest on their applicability to the analysis of occupational mobility in the thirty-year period of Monterrey's history. From that perspective we are willing to consider the unity

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of subgroups 4 and 6, and of subgroups 7 and 8. The reason for this is straightforward. The occupations in groups 4 and 6, although different in the nature of the work performed, are competitive in attractiveness.(34) It is unlikely that a shift from a position of mechanic to that of office worker or chauffeur would unambiguously represent an increase in earnings. Although it is likely that these occupations stand in different paths of occupational mobility, they represent positions of comparable importance in the hierarchy of work.

The same could be said of a grouping of the industrial subgroups 7 and 8. On the whole, given the internal heterogeneity of the productive sectors, it is not clear that workers and craftsmen associated with textiles, metals and chemical processes belong, as a group, to more capitalized and unionized enterprises than those involved in the production of foodstuffs, furniture and wood products or even construction.

All results, as Table AI-4 indicates, are nevertheless sensitive to the choice of comparisson groups. When thrown in with the jobs of group 5, the aggregation of 7 and 8 seems unfeasible. Taken on their own, the differences do not appear to be significant.

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(34) For an interesting discussion of the various (and conflicting) theoretical reasons justifying this treatment, see Jelin (1974).

Table: A.-4

Occupational classification: further aggregations of the 1965 job distribution

Occ. Group	α intercept[1]	β age[1]	Occ. Group	α intercept[1]	β age[1]	T^2
1^A	450.95[a] (103.94)	14.71[a] (2.45)	5 + 8	-8.97 (25.45)	1.61[a] (0.62)	0.59
2^A	181.71[b] (96.23)	10.68[a] (2.42)	7 + 8	28.79 (29.05)	1.42[a] (0.70)	9.81[a]
3^A	122.90[c] (96.60)	5.98[a] (2.54)	5+7+8	-0.44 (24.24)	1.77[a] (0.58)	8.70[a]
4^B	105.42[a] (49.58)	1.27 (1.20)	4 + 6	68.41[c] (43.22)	2.31[b] (1.04)	1.63
5^C	-19.68 (24.67)	1.85[a] (0.68)	4+6+7	56.60[c] (41.04)	2.28 (0.98)	2.41[b]
6^B	15.64 (54.99)	3.80[a] (1.34)				
7^{BC}	24.61 (60.10)	2.14[c] (1.37)				
8^C	22.69[d] (19.26)	0.93 (0.94)				
9^A	109.11 (158.95)	-1.78 (3.41)				
10*	182.89[a] (18.20)	-0.27 (0.42)	10*	182.59[a] (18.20)	-0.27 (0.42)	

Job Group	(1) α intercept[1]	(1) β age	(2) α intercept	(2) β age	(3) α intercept	(3) β age
31*	168.05[c] (125.44)	1.58 (3.18)	(occ. group 8*)			
23	34.47 (152.95)	-0.77 (3.80)	205.29[a] (49.75)	0.65 (1.20)	(occ. group 7+8*)	
24	51.31 (144.29)	-1.32 (3.61)			211.39[a] (32.24)	1.15[c] (0.79)
22	9.25 (165.92)	0.38 (4.27)	(occ. group 7)			
25	78.85 (136.88)	-0.22 (3.44)	1.91 (65.53)	1.21 (1.57)		
28	15.28 (151.61)	0.60 (3.91)				
R^2	0.0649		0.0557		0.0104	
N	204		204		204	
T	(base)		0.36		1.23	
T	-		(base)		4.79[a]	

Legend: *indicates control group, all other coefficients are measured as deviations from this group.
A, B and C indicate regression groups; $R^2_A = 0.7368$ (N=687); $R^2_B = 0.2137$ (N=673); $R^2_C = 0.1967$ (N=649).

Notes:

[1]Weekly income is measured in 1965 pesos. Age is measured begining at 20 years.

[2]Contrasting, respectively, regressions with: 5, 8, 7 and 10, and 4, 6, 7 and 10. For definition of the stastic T see table and C.

3 - The Occupational Classification

Table A -4 also presents the final summary computations for the occupational classification of the Monterrey sample. The estimated earnings function is of the form:

$$y_i = \sum_{s=1}^{10} g_s O_s + \sum_{s=1}^{10} h_s (A_i O_s) \qquad (6)$$

where the O_s's are occupational binary variables defined as before, Ai is the age of the worker in 1965 and the yi's, the weekly earnings of a worker in occupational O_s, measured in 1965 pesos. We assume that these earnings are normally distributed with variance σ^2 and mean equal to μ_1 for workers in group 1, μ_2 for workers in group 2, and so on. For estimation purposes, all workers belonging to any of the occupations in subgroup 10 were assigned neither an occupational dummy nor an age variable; their values being computed as linear combinations of the remaining occupation and age variables.

Due to limitations in the capacity of the OLS regression program emplyed, equation (6) was estimated in three parts, as explained in a footnote to the table. Since in all regressions the left out occupation-age group was the same, the procedure is, in principle, identical to a single regression on all of the subgroups, save for sampling variation around the true population variance σ^2.(35)

(35) In actuality we are losing some efficiency in being forced to estimate equation (6) by parts. Given the assumption that the variance of the error terms is constant for all subgroups, the estimate of σ^2 will be more efficient when based on all observations. In the estimates of the variance based on any of the subsamples, the information about in contained in the other subsamples is not utilized. Nevertheless, it is not likely that this impediment be of great empirical relevance for the case at hand.

As would be expected from the results shown in the preceding sections, several re-grouping possibilities are suggested by the findings in Table AI-4. An interesting possibility - and one which we had not considered previously - is the unification of subgroups 9 and 10; the jobs at the bottom of the occupational scale. Another, also as yet untried re-grouping, involves subgroups 5 and 8. Further testing shows that such a re-grouping is possible. And, the juxtaposition of subgroups 4 and 6 is confirmed by the results of Table A -4.

Surprisingly, the results in the last column and row of the table contradict the test applied in the preceeding column-row combination. Here, the blending of occupations in subgroups 7 and 8 is refuted; upholding the differences earlier encountered. While the subgroups have similar intercepts and equally insignificant age coefficients, the interesting result is that, when joined, subgroups 7 and 8 display a very significant, positive and large relationship between earnings and age. Moreover, the results in Table AI-4 also indicate that, possibly, subgroups 8 and 10 be considered a single occupational category. Nevertheless, since subgroups 9 and 10 were already deemed a possible single category, further testing involving the incorporation of the additional occupations in subgroup 8, yielded negative results.

Negative results, rejecting the null hypothesis invoking the aggregation of subgroups, were also found in other experiments attempting to integrate three or more sub-

groups into a single unit. These tests involved subgroups 4, 6, and 7, and 5, 7 and 8 (See Table A -4). Combinining all these findings we can present the occupational classification described in Table AI-5 and graphically displayed in Figure AI-1.

4 - Theoretical Interpretations of the Occupational Hierarchy

The seven-fold partition for the 1965 jobs, although based only on age-earnings profiles, describes well some of the principal characteristics of the occupational distribution in Monterrey. During the principal work years of a career (ages 20-60), not only do the individuals in privileged occupations begin with higher incomes, but they continuously secure greater increases in income. Thus, all other things being the same, the distribution at age 60 is more inequitable than that at age 20.(36)

This conclusion can be derived equally well from either the human capital or the segmentationist model.

a. The Human Capital View: The cornerstone of the human capital view of increasing differentials lies in their assertion that, on the whole, individuals that begin with higher quantities of accumulated capital, have a greater marginal propensity to re-invest in additional capital. According to the theory, the reasons for this are two-fold.

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(36) We are aware that we are dealing with imputed cross-sectional references to the longitudinal career. We shall return to this in the next section.

Consider first the problem of producing additional units of human capital, for individuals with equal age and life expectancy, but with different initial stores of human capital. The marginal cost of such an investment will be lower for individuals with already large amounts of human capital. In part, this is due to the assumption, often made but rarely explicated, that the more educated (i.e., with more human capital) are able to learn more efficiently, thus increasing their efficiency in producing new units of human capital. Moreover, although foregone earnings will be higher for persons of higher income, given their greater efficiency in production, a smaller share of their productive time needs to be directed towards new accumulation. Thus, actual foregone earnings could be a smaller percentage of total earnings for workers with greater education. By implication, human capital theorists are likely to argue that at equal levels of investment, marginal costs will be lower for the better endowed workers.

On the other hand, given the imperfections in the operation of financial markets for human capital investments, persons who already have higher degrees of education are more likely to borrow at lower interest rates than less educated workers.[37] And the advantage is likely to be even greater when one considers the fact that many investments in human capital are self-financed, either directly or through

(37) An extensive discussion of this point can be found in Thurow (1970), pp. 77-83.

the family. For all these reasons, the discount rate applied to the prospective investment would be higher for the less educated worker.(38) Consequently the rate of return on a given outlay would be smaller. In general, the marginal revenue schedule for a less educated worker would be lower than that of a more educated worker of equal age. The theoretical foundations for the human capital explanation of increasing occupational differentials can be summarized in Figure A -2.

What Figure AI-2 shows is that with a higher rate of return schedule, and a lower cost of funds, the static equilibrium quantify of additional human capital acquired by the more educated (skilled) is larger than that for the lesser educated (unskilled). As long as some differential like $OI_e - OI_u$ exists for all ages, the pattern depicted in Figure AI-1 will emerge.(39)

b. The Segmentationist Approach: Having outlined the human capital explanation of increasing inter-occupational earnings differentials, we now shall attempt to reconstruct the same result departing from a segmentationist view of the la-

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(38) An excellent discussion on the choice of interest rates for discounting purposes can be found in S.A. Marglin, Public Investment Criteria. Cambridge, Mass.: MIT Press (1967), Chapter 2.

(39) More precisely, in the usual human capital argument, all that is required for the "fanning out" of occupational age-earnings profiles is that the total post-schooling investment of workers in more skilled occupations be greater (in volume) than that of workers in less skilled jobs. It should be clear that we are not analyzing experience-earnings profiles. In U.S. estimates (using educational instead of occupational categories), it has been commonly found (cf. Mincer (1974), Chapter 4) that only age-earnings profiles fan-out with age. Experience earnings profiles schedules tend to be more parallel.

FIGURE A -2

Investment in additional human capital

(one period analysis)[1]

[1]The subscript t in all variables serves to remind us that the position and shapes of the curves may change over time, either due to market circumstances or to life-cycle changes during the worker's career. The shapes of the curves in Figure 1 assume: (a) convexity of the marginal rate of return schedule, implying that the additional stream of earnings originating from an investment (r) is subject to diminishing return. Presumably this should reflect the fact that, with a fixed life expectancy, the additional investment programs undertaken in a given period rank lower in their expected present values; (b) concavity of the marginal cost of investment schedule. That is, the imputed cost of "borrowing" funds for new investments, rises as the quantity of funds to be invested increases. This could result from any number of risk accounting and time-preference procedures. Considering a single borrower, the larger the investment the greater the risks involved and the payback period involved in lending the funds toward that investment. This treatment follows the usual neoclassical view of investment. See, for example, W. Baumol, Economic Theory and Operations Analysis (1972), Chapters 18 and 19. For a fuller treatment see F. Lutz and V. Lutz, The Theory of Investment of the Firm (1951). Alternatively, in the case of "internal borrowing", usually associated with human capital investments, the rising costs may be regarded as the result of an increased disutility due to the corresponding individual postponement of consumption. Nonetheless, the gist of the preceding argument would hold even if the i-functions were drawn horizontally, reflecting a perfectly elastic rate of supply of funds for each category of labor.

bor markets would also support a pattern of divergent income differentials. Indeed, this empirical regularity is, if anything, of greater significance within this approach; for cumulatively it leads to the predicted dichotomy in work opportunities. To understand the segmentationist view of the process of increasing income differentials it might, nevertheless, be useful to arbitrarily divide the process into two consecutive phases; namely, the determinants of first job, and the evolution of the worker's career.

The Determinants of First Job Attainment: In any kind of structured work environment (that is, one not dependent upon the sole use of family labor or other similar forms of nepotistic conduct) the decision to hire a beginning worker must by necessity be based only on expectations of his production.(40) It is not surprising therefore that most entry level employment decisions are heavily influenced by signalling mechanisms such as educational credentials, recommendations, testing, and so forth. Young workers that perform well according to these criteria - which one can postulate vary in accordance with the desirability of the position sought - will be successful in attaining good jobs. The others must settle for inferior slots in the hierarchy of work.

What, then, is peculiar to a "segmentationist" approach to access to first jobs? To begin with it appears

(40) Although the same could be said of any hiring decision, the degree of uncertainty must be greater when no comparable set of performance standards is available. For a more complete treatment (See Spence (1974), Chapter 10.

essential to recognize that the various types of signalling devices are culturally determined variables, not constants; and that from an economic standpoint what is in fact of main interest is the variation in the ways in which groups differentially located in the social and productive structures actually respond to and attempt to acquire the variously perceived signals. What a corporation manager expects of an incoming business graduate is clearly very different from what a small shop owner expects of a new helper. Similarly, from the point of view of the supply of labor, the orientations toward work will vary depending upon the type of work sougt. In a segmentationist view it is the social organization of production within the enterprise, its relations with other enterprises, as well as its particular technology, that come to determine the characteristics of the enterprise's demand for labor. One of the most profusely treated topics in the segmentationist literature has been the specification of the demand for labor under varying historical and technological conditions. Two ideal types of organization have received particular attention: bureaucratically organized production systems and informal-open market contractual systems.(41)

Among the more bureaucratized firms, in designing criteria for contracting labor services demanded, employers are likely to want to pursue three simultaneous objectives: technical efficiency in production, maintenance of hierarchical control and discipline, and "legitimation of the

(41) See for example, Stone (1975), Edwards (1975).

authority structure and property relations of the enterprise".[42]

In meeting these objectives employers will settle for a non-exhaustive search for predetermined worker characteristics. In a number of papers Bowles and others have attempted to elucidate what these characteristics might be in a modern enterprise. They include, in addition to cognitive attributes and demonstrated skill credentials, attributes of

> Personality traits (such as motivation, perseverance, docility, dominance, flexibility, or tact), modes of self-presentation, such as manner of speech and dress, patterns of peer identification and perceived 'social distance' from individuals and groups of different social position ... [and] ... characteristics such as race, sex and age.[43]

The important thing about these characteristics is that they, as well as the credentials, are molded, so to speak, manufactured through the educational system.[44] Hence the educational system, and in particular, the differences in the types and qualities of education received, emerge as important determinants of first jobs.

Directly, the output of the educational system limits the composition of the new occupational or skill structure of labor services. The human capital view of the operation of labor markets would like to believe that it is only cognitive ability, developed in school, which is demanded in

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(42) Bowles (1973).

(43) Bowles, op.cit., p. 350.

(44) See Gintis (1971).

the market. Although the preceding arguments would question this naive and optimistic view, we might at this stage simply accept it as fact, that many jobs are closed to all but those individuals showing the necessary school, or professional, credential. Both theories would therefore accept the proposition that, inasmuch as schooling is influenced by parental affluence, entrance into first jobs is in part an inheritance of status.

In a society where public education is generally available, and where the level of family income is high enough to make child labor unnecessary, human capital theorists could, if they chose to, assume that educational investment decisions follow some imaginary utility maximizing scheme. In Mexico this assumption is unacceptable. Even if we were to reject the broader assessment of the role of education in production, it is unquestionable that in the actual conditions we are dealing with, access to many occupations is controlled through the supply of schooling opportunities. In other words, even if we were to temporarily accept the human capital framework of economic inheritance through education, we must realize that we are in fact dealing with a situation akin to that which classical economics would call non-competing groups. Even if an individual or a family should want to gain access to education, and is willing to borrow towards that purpose, unless they already belong to a certain occupational status, such efforts would prove to be fruitless, if not impossible.

The following figure (A.-3) reproduces the results of Balán, Browning and Jelin's analysis of educational attainment within the Monterrey sample. As the authors point out, the three measures of socioeconomic origin considered (father's education and occupation, mother's education) have moderately high influences on respondent's education. These correlations, although bespeaking the influence of social background on education do not however account for all of the combined effects of origin in the determination of educational attainment. This total effect is best exemplified in the charts shown in the accompanying figure, also reproduced from Balán, Browning and Jelin. Here the influence of origin variables, and their interactive effect, can best be examined.

Whilst the estimated model most probably has statistical problems, the influence of socioeconomic background on education seems almost irrefutable.(45) At least half of the contributions to the total variance in education are attributable to background related variables.(46) Moreover, the influence of these variables has decreased by less than 16 percent in over thirty years of the most radical trans-

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(45) The model as estimated fails to consider any "ability" measure in determination of educational attainment. If this were to be an important contributor, the presented results are biased, perhaps attributing to the observed explanatory variables some of the true influence due to "ability". Studies with American data do however confirm the importance of background data and the randomness of ability, once other variables are controlled for. See, for example, Bowles (1972), Blay and Duncan (1967), and Sewell and Hauser (1975), Chapter 3.

(46) It is clear from the shown results that the estimates are also affected by multicollinearity and hence probably unstable. BBJ report no confidence interval for their estimates arguing against the validity of such measures in this type of research. They do maintain that all estimates would fall within a 95% region, in the standard F-test. See Balán, Browning and Jelin (1973), p. xv.

Figure A.-3

Path coefficients in determinants of educational attainment, by age cohort: the Monterrey sample[1]

Source: Balán, Browming and Jelin (1973), p. 273.

[1]The key refers to the following table:

		Respondent's education (X) Zero-order correlation coefficient
A	Father's education	0.58
B	Father's occupation	0.54
C	Mother's education	0.57
D	Size clars of community of origin	0.38
E	Region of community of origin	0.35
F	Birth cohort	0.25
G	Number of siblings	-0.06
H	Age of respondent at father's death	0.10

Source: Balán, Browming and Jelin (1973) p.271.

formations in Mexican society. Undoubtedly the mean educational level of the population has increased. Already by 1960, 72.5 percent of the Mexican population between 10 and 24 years of age could read and write. Nevertheless, the variance in educational attinment does not appear to have diminished, and the author's findings attest to this.

Unequal access to education, and the formation of non-competing groups, would explain the differential access to first jobs. It would also, as we have just seen, account for the fanning out of age-earnings profiles. But the idea of non-competing groups, and for that matter, the human capital view that economic status is passed from generation to generation through inequality of educational opportunity alone, is as much misleading as it is informative. The studies of Gintis, Bowles and others have shown that it is the actual social economic background of individuals that is in a way demanded, not their schooling levels.

The school system, in its differentiation acts so as to reinforce class differences; it ratifies them contributing to the reproduction of the social structure while transforming individual attributes into marketable commodities with specific use values. As Bowles has stated it:

> The complementarity relationship between family socialization and schools serves to reproduce social class differences in personality development from generation to generation ... The operation of the labor market translates these differences into income inequalities and occupational hierarchies. The personality traits, values, and expectations characteristic of different class cultures play a major role in determining and individual's

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> success in gaining a high income. The apparent contribution of schooling to higher income, far from being the result of the independent role of schooling in the development of cognitive capacities, seems to be explained primarily by the personality characteristics of those who have higher educational attainment.(47)

This observation is crucial for the segmentationist presentation of access to first jobs. It is the indirect effects of education that matter. Quite clearly the privileged elite positions - which have control over actual physical wealth - are transmitted such as to preserve the cohesiveness of the capitalist class. It so happens that, whether they are demanded to or not, individuals filling these positions, usually have attended the best schools and passed through the higher grades of university. Families who desire their children to emulate the career of the elites would likewise make the sacrifice of securing for their children the necessary traits and credentials. The importance of personality traits should not be downplayed. As Gintis has shown, the very success of an individual <u>in the schooling system</u> will depend on the perception teachers and fellow students have of the socioeconomic background of the individual.(48) Moreover, after schooling, in the search for the first job, the success of the candidate with respect to all other graduates, will hinge on this ability to demonstrate to the prospective employer that he, and not others, has the characteristics demanded. But this "ability", as we have

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(47) Bowles (1972).

(48) Gintis (1971), pp. 271-277

seen, is not only - or even predominantly - cognitive, rather it is a product of the processing, through the schooling system, of ascribed social advantages.

The whole process does not, however, hinge only on the actions of discriminating employers. The acquisition of necessary credentials, in addition to molding the employable characteristics of the future worker, also helps develop his orientation towards work: his wants and expectations with regard to his career.(49) Thus, also from the perspective of the sale of labor power, individuals from different backgrounds will choose differing options. Some will choose the more rewarding work with higher pay in the future. Those committed to ears the immediate rewards of their investment, will opt for higher immediate gains. As we shall soon see, this decision is one likely to influence the career prospect of the worker.

At the other extreme of the hierarchy of work, laborers who have no access to the educational system, and who come from the poorer families, will be, by default, relegated to the least desirable of entrance jobs. They will acquire characteristics akin to those of their class, and thus readily identifiable, and ill remunerated in the market. They will also develop their own sort of orientation towards

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(49) The concept of job orientation is fully developed in Goldthorpe, et al.(1968). It is important to recognize that quite significant patterns of differentiation exist within the working clan as a whole, and not only between "managers" and "laborers". Although most of these differences spring up from the environment and technology of work, not all of then are determined within the job. See beynon and Blackburn (1972), esp. Chapter 4.

work - which may well be the traditional fatalistic attitude of the lower working classes - not willing to take chances in a society where the odds are overwhelmingly against them.(50)

The limitations of the concept of "inheritability of economic status through schooling" became even more apparent when we consider the boundaries between those workers that, having comparable amounts of schooling, attain first jobs of very different qualities. As we have just argued, employers search for more than skills in a worker. Therefore, those who have come from comparatively weel-todo families and better schools will continue to secure positions within the so-called "aristocracy of labor". But here we must make it clear how much and for what does this attainment matter. After all, it may well be that an apprentice, having better credentials, initially earns less than other semi-skilled workers do, during their first job.

Occupational careers: The important thing to remember about the segmentationist view of the market is that, while in the human capital approach individuals are free to make the post-schooling investments of their choice, in this view they are severely constrained by the type of enterprise and the job in this enterprise, to which they belong. Consider the following description of a typical market.

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(50) The question of behavioral attitudes of secondary workers and their influence on career prospects has been explored in. Doeringer and Piore (1971). Their explanation in many wags resembles the "culture of property" view which has, justifiably, been 20 radically condemned by recent analysts. Never theless, their identification of this characteristic and its impact in the labor market remains as a significant contribution to our understanding.

A given firm tries to match a pre-established hierarchy of jobs with the supply of manpower available for employment. If the firm operates within an internal labor market, or any other form of bureaucratized management rules, the supply of workers to the higher echelon positions will tend to be internally, and not externally, constrained. Therefore, managers will train workers only is a much as they think this internal constraint might be effective in the future. Should it be the case that a firm can operate without any margin of specificity for any of its jobs, it would follow that it would neither require nor offer internal training.

No such case is likely to exist in a capitalist labor process, founded on wage labor and based on specialization, hence on the division of labor. At least some positions in the enterprise will require specific adaptability to work tasks. Indeed, as the vast literature on internal labor markets has demonstrated, in a modern, typically large and monopolistic enterprise, only a very few of all the job slots are free from training requirements. It may well be taht the actual work content of the job has been simplified, that work control has been objectified - that is, removed from the worker and incorporated in the machines he serves. Nonetheless, the increaning complexity of the social environment of work demands new patterns of behavior and performance. While both the degradation of labor and what has been called its "decollectivization" are, to a certain extent, built into the productive technology itself, the proportion

of workers directly attached to machines has decreased. Hence the submission of labor to capital continues to depend on subjective as well as real (ie: objective) means.[51] Moreover, the actions of a firm in creating an internal labor market necessarily restrict the labor market of its competitors. Therefore, the probability that in the future higher echelon spots will have to be internally filled increases.

It is not our immediate interest to attempt to establish how such a situation arises. It will suffice to outline its consequences. In the first place, it is important to recognize that not all specialized labor must belong to an internal labor market; just as not all while collar workers must participate in a bureaucratic environment. For a number of historical circumstances, at a given point in time in a particular economic system, only some enterprises will develop internal labor markets; and then, only for some of its job-clusters.[52] It follows that an employee in searching for his first job may or may not gain access to an internal labor market. Since internal labor markets are created having in perspective the career of the worker in the enterprise, it is natural that entrance requirements into them should be more stringent than those into a firm hiring a day's worth of labor services. Therefore, only workers,

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(51) See: ehrenreich and Ehrenreich (1976), p. 13. The process of "dequalification - overqualification" of labor has been extensively analysed by Freyssenet (1977), and 'unfortunately) largely ignored by doctrinary readers of Braveman's (1974) seminal contribution.

(52) See , per example, Gordon (1972), chapters 4 and 5.

who for the reasons we have previously discussed, rank high on the list of credentials, cognitive and personality characteristics, will be admitted.

And what will they gain once admitted? They will gain the chance of bettering their position in the hierarchy of work, tracing over their lifetimes a pattern similar in appearance to that we employed in the discussion of the human capital model.

Workers who fail to enter an internal labor market will be those employed in the more routine and subordinated operations, neither demanding nor offering training. Alternatively, they may be employed in enterprises that although requiring some training only request that kind which is generally available with any skill. The labor demanded by the firm is undifferentiated from that supplied at the market. The forces of competition are in full operation reducing each labor cost to its "private" reproduction cost, and no more.(53) Workers outside an internal labor market - that is, belonging to the socalled "secondary" or "informal" sectors -. will show therefore almost no increase in earnings over their careers. Such is the case with our workers of group VII, and perhaps VI.

But much more than an equilibrium level of wages is at stake. The rules governing the use and compensation of labor power are different within an enterprise that knows

(53) By "private" we mean not borne by the firm, but including - as it must - the State's expenditures on the reproduction of labor.

that its own economic welfare depends partly upon the stability of the work force. Management will be less willing to incur the distrust of workers by causing momentary unemployment in a cyclical downturn; it will be more sensitive to grievances over work rules and comparative salaries in the trade. The very size and economic structure of the enterprise, by permitting long-range planning over investments, facilitates the creation of a stable work force.

Workers within a highly developed internal labor market are likely to develop a bureaucratic orientation towards work. One in which:

> The primary meaning of work is as service to an organization in return for steadily increasing income and social status and for long-term security - that is, in return for a career (in which) economic rewards are regarded not as payments for particular amounts of work done or of labor expanded, but rather as the emoluments appropriate to a particular grade and function or to a certain length of service.(54)

This would encourage employees to respect and utilize the institutions of the internal labor market, reinforcing the regimentation mechanisms within the economy. In so far as a strictly hierarchical system is maintained this could explain why, at any age, the differential between any two categories of workers increases.

Highly developed bureaucratic attitudes are however, rare among non-managerial workers. These usually display in "instrumental" orientation towards work - one

(54) Goldthorpe et al. (1968), p. 40.

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primarily geared to extrinsic, that is, economic, satisfaction. One in which the employment link is based preponderantly on the economic benefits derived from the job.

Such motivation, albeit consistent with that of the model of "economic men", is not however incongruous to the operation of internal labor markets. Given the manpower requirements defined, by the historicaly assemplbed social and technical relations of production it will be indispensable (not to say automatic), for the enterprise to train its labor force; and hence, to compensate it adequately - at least to the point of preventing their exit into another employment or, worse, poor job performance. By the same token, given the training received, few enterprises would be willing to compensate an incoming worker with more than what he recceved in the tarks for which he learned the specific skills and on the basis of which he is remunerated. On account of this we can explain the fanning out of age-occupational differentials, even without a strictly bureaucratized environment; although at the cost of employing a theoretical construct apparently as amenable to human capital theory as it is to the theory of market segmentation. By this is only in appearance, as we shall attempt to demonstrate when we return momentarily to this point.

In sum, the combination of entry requirements, determined in greater part by the socioeconomic background of the individual, with the dominance of internal labor markets over the most attractive jobs in the economy, could

also and equally well explain the pattern of age-earnings profiles, depicted in Figure A -1.