AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY
Batch 65

1. SUBJECT CLASSIFICATION
A. PRIMARY
TEMPORARY
B. SECONDARY

2. TITLE AND SUBTITLE
Investment composition and employment in Turkey

3. AUTHOR(S)
McCabe,James; Michalopoulos,Constantine

4. DOCUMENT DATE
1971

5. NUMBER OF PAGES
29p.

6. ARC NUMBER
ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS
AID/PPC/PDA

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(In AID discussion paper no.22)

9. ABSTRACT
(ECONOMICS R&D)

10. CONTROL NUMBER
PN-AAE-094

11. PRICE OF DOCUMENT

12. DESCRIPTORS

13. PROJECT NUMBER

14. CONTRACT NUMBER
AID/PPC/PDA

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C.

Bureau for Program and Policy Coordination

A.I.D. Discussion Paper No. 22

INVESTMENT COMPOSITION AND EMPLOYMENT IN TURKEY

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and
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October, 1971

NOTE

This paper was prepared while the authors were on the staff of the Bureau for Program and Policy Coordination in the Agency for International Development. The authors are indebted to John Eriksson, Edwin Cohn, Alexis Lachman and Robert Muscat for their valuable criticisms and suggestions, and to Keith Jay for his assistance with the computations.

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I. INTRODUCTION

Various analysts have commented recently on developing countries' trade and exchange policies which permit importation of capital equipment at favorable exchange rates. These policies make capital cheap, by lowering artifically the ratio of capital to labor costs, and induce the adoption of capital intensive imported technology and/or the undertaking of capital intensive projects; the projects appear profitable to the private entrepreneur but may well not be profitable for the country as a whole if correct prices were used. The net effect is to reduce the employment opportunities in the modernized industrial sector of developing countries and the rate of absorption of labor released from traditional sectors [3]. In a related analysis Pack and Todaro have pointed out that the underpricing of imported capital goods inhibits the establishment of capital goods industries in developing countries; this is undesirable because such industries would presumably produce equipment which is more labor intensive and presumably better adapted to the relative factor endowment of such countries [4].

Neither the factors affecting the composition of capital stock nor the employment effects of using various mixes of imported and domestically produced capital equipment have been subjected to rigorous empirical testing. Our study has two objectives: First, to examine the factors that affect the composition of capital stock

as between domestic and imported equipment in a developing country, Turkey. This will be done by time series regression analysis for the period 1950-1963; second, to test the hypothesis that in a developing country such as Turkey industries employing processes that are heavy users of imported equipment are more capital intensive than industries with a low component of imported equipment. The hypothesis is tested by intersectoral regression analysis using data drawn from Turkey's 1964 Census of Manufacturing Industries and Business Establishments [5], which covers business activity in 1963.

II. FACTORS AFFECTING THE COMPOSITION OF CAPITAL STOCK

The impact of the distribution of capital stock in employment can best be considered in the context of an aggregate production function:

$$V = F(K_m, K_d, L) \qquad (1)$$

where V is value added, K_m is imported equipment, K_d is domestically-produced equipment, and L is employment.

Suppose that aggregate employment is a linear function of the two forms of capital. This implies that the aggregate capital-employment ratio is a function only of the composition of capital. Let us also assume that the elasticity of substitution between domestic and imported equipment is constant.[1] Under these assumptions, the cost of a particular capital good (C_i) to a user is given by the expression:

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1. This only means that, as capital accumulation occurs, the ratio of the percentage change in K_m/K_d to the percentage change in their relative prices is constant. It seems reasonable, in the absence of specific information on how producers respond to changes in relative prices of capital goods as the capital stock grows.

$$C_i = P_i\ (r_i + g_i)\ -\ E\ (\Delta\ P_i/P_i) \qquad (2)$$

where P_i is the price of the capital good, r_i if the interest rate, g_i is the rate of depreciation, and $E\ (\Delta\ P_i/P_i)$ is the expected rate of inflation. Assuming that the price level is expected to remain stationary, this reduces to:

$$C_i = P_i\ (r_i + g_i) \qquad (2a)$$

In competitive equilibrium, entrepreneurs maximize profits when they maintain a stock ratio of imported to domestically-produced equipment which is inversely related to their respective user cost. For, by equating the ratio of user costs with the ratio of marginal productivities we get:

$$K_m/K_d = A\ \ (F_m/F_d)^{-s_m} = A\ (C_m/C_d)^{-s_m} \qquad (3)$$

where the subscripts d and m refer to the two types of equipment and s_m is the partial elasticity of substitution. This is the basic equation that will be estimated through regression analysis in order to identify the factors affecting distribution of domestic capital stock.

Estimates of the <u>stock</u> of imported and domestically produced equipment cannot be made; in the 1963 census of manufacturing, such a breakdown is only available for gross equipment investment. Hence the ratio of imported equipment to domestic equipment investment (I_m/I_d), a flow concept, had to be used.

This use can be justified only under certain assumptions about the process of stock adjustment to changing prices. First, it is

necessary that substitution occurs ex ante and not ex post. This seems a reasonable assumption insofar as substitution involving different types of equipment already installed is generally difficult on technical grounds. Second, relating relative cost in each time period to the investment ratio implies that the investment ratio is equal to the equilibrium stock ratio in each period. This of course can only be an approximation. Actual stock adjusts to the equilibrium one with a considerable lag and the investment ratio in each time period would be a function not only of relative costs in the current period but also of costs in earlier periods. The discrepancy between the equilibrium ratio and the investment ratio would tend to be lower however, to the extent that there are no abrupt changes in the relative cost trend. This has generally been true in the case of Turkey as seen in Table 1.

Substituting the ratio of gross investment in the two types of equipment I_m/I_d for the stock ratio in (3) and taking logs we obtain:[1]

$$\log I_m/I_d = \log A - s'_m \log (C_m/C_d) \qquad (4)$$

Specifying the ratio C_m/C_d also represents considerable problems. In the first place, though information on the relative prices of the equipment is available, there is evidence in Turkey that these prices understate the relative scarcity of imported capital equipment. This is because exchange controls have been used to restrict imports in general

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1. Note that $s'_m \neq s_m$ and that s'_m is only a proxy for the elasticity of substitution, since it relates costs to the investment ratio. In general it could be argued that $s_m > s'_m$.

and equipment in particular. Those importers, however, who obtain permission to bring in equipment do so at favorable effective exchange rates. Since most imports of equipment in industry are directly made by the producers that use them to expand or replace capacity, the price of imported equipment is likely to be less than its scarcity value. The biggest change affecting the import control regime in the period under examination occurred after the 1958 devaluation. The devaluation and the attendant changes in import controls resulted in a large net increase of the relative cost of imported capital equipment. To account for these changes in trade and exchange policy and, hence, on the scarcity price of imported equipment an additive dummy variable (D) was introduced in equation (4).

In Turkey external credit is generally used to finance imported equipment while internal credit can be used to finance either kind. External credit is granted on more concessionary terms than domestic credit. However, it would be inappropriate to use the ratio of the interest rates under which credit could be secured in specifying (4) because in both instances it tells us little about the relative scarcity of capital. There was a constant ceiling on bank loans during most of the period examined, and the borrowing rate probably was well below the internal rate of return on capital. Credit was rationed and relative availability of credit was far more important than terms.

Since capital goods imports were subject to licensing controls, the relative availability of overall external credit, a macro concept

had an impact on the distribution of investment at the micro level in the following way: Licenses for capital goods imports would be granted far more easily if the financing of these imports was done through private credits from abroad. Similarly, the overall availability of foreign exchange, a significant component of which was U.S. assistance, would play a role in determining the ease with which import licenses were granted. On the other hand, while domestic credit could be used to finance capital goods imports, licenses for such imports still had to be obtained and the possession of a domestic credit line was not an important advantage in times of overall foreign exchange stringency.

Under the circumstances just described it would seem more reasonable to assume that the factor cost ratio is a function of relative prices and the availability of the two types of credit, external (R_e) and domestic (R_d), rather than of prices and the ratio of interest and depreciation rates as specified in (2a). As a result, the use of the ratio R_e/R_d will provide an unbiased estimate of the relative availability of credit to finance the two types of capital goods. Let us assume that the relation between terms and availability takes the following form:[1]

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1. Whereas the shadow interest rate may be a decreasing function of the availability of credit, the rate of depreciation may be either an increasing function of credit availability or totally unrelated to this variable. Differences in the depreciation rates, as well as the rates themselves, are so small that these effects may be neglected.

$$(r_m + g_m)/(r_d + g_d) = B\ (R_m/R_d)^{-c} \qquad (5)$$

Thus:

$$C_m/C_d = (P_m/P_d)\ B\ (R_m/R_d)^{-c} \qquad (5a)$$

Rederiving (4) by using (5a) and introducing a dummy variable for devaluation we obtain:

$$\log I_m/I_d = \log A - s_m' \log B - s_m' \log (P_m/P_d) + \\ + cs_m' \log (R_m/R_d) - dD \qquad (6)$$

This expression was fitted to Turkish data for the period 1950-1963, shown in Table 1. The investment variable was defined as the ratio of imported to total equipment investment in constant 1961 lira prices. Similarly, the price ratio is an index of lira prices of capital equipment, external credit availability is defined as the net annual increase in external credit outstanding deflated by a lira import price index and domestic credit availability is the net annual increase of internal credit outstanding divided by the GNP deflator. Finally, D takes the value of one after 1958 and zero otherwise.[1] The results are shown in equation (7):

$$\log I_m/I_d = 2.40 - \underset{(.04)}{.03} \log (P_m/P_d) + \\ + \underset{(2.57)}{.26} \log (R_e/R_d) - \underset{(-6.51)}{1.60}\ D \qquad (7)$$

$$R^2 + .89,\ D.W. = 2.33,\ F = 28.0$$

The F ratio is significant at the .01 level and the overall fit is quite good. The regression shows that the composition of investment between imported and domestic equipment is strongly related to the

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1. The source for the price indices and investment composition is Korum [1]. The definitions of the credit variables as well as the credit data were obtained from Yaser [6]. They include only those amounts of internal and external credit monetized. Numbers in parentheses are t values. D.W. is the Durbin-Watson statistic.

Table 1

TURKEY - CREDIT SOURCES AND INVESTMENT COMPOSITION

Year	Ratio of imported to domestically-produced equipment investment (current prices)	Ratio of imported to domestically-produced equipment investment (1961 prices)	Ratio of net changes in external to net changes in internal credit* (1961 prices)	Relative price index of imported to domestically-produced equipment investment 1961 = 100
1950	7.3	7.3	.2	100
1951	7.7	8.4	.3	92
1952	8.1	8.4	.5	97
1953	6.6	7.8	.2	85
1954	6.5	8.2	.1	79
1955	8.1	9.1	.6	88
1956	5.7	6.9	.2	81
1957	3.0	4.4	.1	69
1958	3.1	3.5	3.3	87
1959	4.1	3.4	7.5	121
1960	4.6	4.3	4.5	108
1961	3.0	3.0	5.0	100
1962	2.6	2.6	1.7	100
1963	1.9	1.9	1.2	102

*External credit deflated by lira price index for imports valued cif.; internal credit deflated by the GNP price index.

SOURCES: Price indices and investment data taken from U. Korun [1, Tables 4.1c, 4.3, 4.8b]. Credit data taken from B. Yaser [6, Table 53].

relative cost of such equipment. The regression coefficient for the credit variable is positive and statistically significant at the .05 level, suggesting that the relative availability of external versus internal credit affects the composition of investment as between imported and domestic equipment. The negative and equally statistically significant coefficient for the devaluation dummy variable shows that devaluation would tend to reduce the relative amount of imported equipment investment by increasing its price (cost) relative to domestic equipment.

Since, as noted earlier, the price data used are not entirely reliable, it is not surprising that in this equation the price variable itself was not significant.[1] However, this fact should not detract from the validity of the conclusion that cost variables are important determinants of investment composition: The devaluation appears to have changed the cost relationship considerably providing a once and for all shock which affected the relationship of imported to domestic equipment investment. The price ratio after the devaluation fell but to higher levels than those prevailing prior to 1959.[2] Rather, these results suggest strongly that credit and foreign exchange policies

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1. In addition, the estimated equation assumes implicity that inflationary expectations are stationary. This, of course, is a questionable asumption. To the extent that the expected rate of change in P_m/P_d is positively correlated with P_m/P_d , the coefficient for this variable will be biased toward zero (See above equation (2)).

2. It should be noted that, if the devaluation dummy is excluded from the estimation equation, the price variable still is not significant, so that it cannot be argued that devaluation is "taking over" the effects of the price ratio.

that would affect the relative cost of using imported equipment have a significant impact on the composition of investment and the capital stock. These policies can thus be used by the government to promote both foreign exchange and investment objectives.

III. EMPLOYMENT EFFECTS

We turn now to the impact of the composition of investment and the capital stock on employment. Under competitive conditions, if the cost of imported equipment rises and other factor costs and output are held constant there is a presumption that employment will rise, assuming the elasticity of substitution between capital on the whole and labor is more than zero; and similarly with a rise in the price of domestic capital. Our basic contention is that, assuming the overall capital to labor price (cost) ratio remains constant, an increase in the relative price of imported equipment will increase total employment because techniques using imported capital are more capital intensive than techniques using domestic equipment. An increase in the price of imported capital would give rise to substitution for domestic equipment both directly in each production process and indirectly by encouraging more investment in sectors which are intensive in the use of domestic equipment and decreasing the relative price of goods produced by such sectors. The mere substitution of domestic for imported capital would lead to an increase in overall

employment because of the differential labor intensity in each technique.[1]

The data available for Turkey enable us to undertake only partial tests for the presence of these effects. In the first place, we will be able to address ourselves only to the employment effects resulting from differences in the composition of investment by sector. Since we ignore the possibilities of direct substitution, our results are likely to reflect only the minimum responses of changes in employment as a result of changes in the relative price of imported equipment. Second, the lack of capital stock data again necessitates the use of simple two-factor production functions and marginal productivity side relations.[2] Finally, the dependent variable is not employment per se but a proxy, the relative share of labor in total factor payments.

A. The Model

Suppose that production in each manufacturing sector involves either one or a combination of two techniques. These techniques correspond to the two types of capital equipment, imported and domestic,

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1. It is possible, of course, that an increase in the price of imported equipment could give rise to the domestic production of the same type of equipment which was previously imported. If that practice was widely followed, it could well be that no differences in the capital/labor ratios of domestic and imported equipment would be observed.

2. Investment ratios will again be used as proxies for stock ratios. The implications of this specification for our findings are explored below. See pp. 17-19.

and may be represented by production functions of the form:[1]

$$V_d = A_d K_d^{(1 - b_d)} L_d^{b_d} \tag{8a}$$

$$V_m = A_m K_m^{(1 - b_m)} L_m^{b_m} \tag{8b}$$

where V is value added, K is capital stock and L is employment. The subscripts d and m refer to outputs and factor inputs associated with techniques using domestic and imported equipment respectively; b_d and b_m are the labor shares in each technique. Under conditions of competitive equilibrium, the total capital share may be expressed as a weighted average of the capital coefficients corresponding to the two techniques:

$$(1 - W/V) = K_m/K \ (1 - b_m) + (1 - K_m/K) \ (1 - b_d) \tag{9}$$

where W/V is the wage share and K is total capital stock. Rearranging (9), and introducing the investment ratio I_m/I we obtain:[2]

$$W/V = b_d - (b_d - b_m) \ I_m/I \tag{10}$$

Our null hypothesis is simply that the labor share in sectors employing techniques which use domestic equipment (b_d) is higher

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1. The production functions assumed here of the Cobb-Douglas form, which is a special case of the general CES function implicit in the earlier argument. In Cobb-Douglas functions, the factor elasticities with respect to output are equal to the factor shares under competitive equilibrium, a characteristic that makes it easy to fit these functions empirically.

2. The ratio I_m/I rather than I_m/I_d was used in the intersectoral analysis to avoid the estimating problems that would result if $I_d = 0$ in a given sector.

than the labor share in techniques using imported equipment (b_m):

$$b_d > b_m$$

We tested this hypothesis by regressing the relative share of labor against the investment ratio (I_m/I) using data for three and four digit manufacturing sectors. Obviously, if $b_d > b_m$, the coefficient for I_m/I would be negative. The relationship estimated from a sample of 60 sectors took the form:[1]

$$W/V = .43 - \underset{(-2.47)}{.20} (I_m/I) \qquad (11)$$

$$R^2 = .10, \; F = 6.1$$

The coefficient is of the hypothesized sign and significantly less than zero at the five per cent level. This allows us to conclude that indeed our simple hypothesis is borne out and b_d is larger than b_m.

Assuming that K_m/K equals I_m/I and that the ratio of the user cost of capital to the real wage is equal among sectors, the estimates imply that the employment-capital ratio is a great deal higher in a sector using only domestically-produced equipment than it is in one using only imported equipment. The employment-capital ratio in sector i is given by the equation:

$$(L/K)_i = b_i (1 - b_i) C_i/W_i \qquad (12)$$

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1. Using only large establishments (i.e. those occupying 10 or more persons).

Since the C_i/W_i are equal among sectors, the ratio of L_d/K_d to L_m/K_m is given simply by the expression:

$$(L_d/K_d)/L_m/K_m) = \frac{b_d/(1 - b_d)}{b_m/(1 - b_m)} \qquad (12a)$$

Then the percentage difference in the capital-labor ratio of two sectors, (Δ L/K), one using exclusively imported and one using exclusively domestic equipment, is given by the following expression:

$$\frac{\Delta L/K}{L_m/K_m} = \left[\frac{b_d/(1 - b_d)}{b_m/(1 - b_m)} - 1\right] 100 \qquad (12b)$$

From (11) we obtain that $b_d = .43$ and $b_m = .23$. Substituting these estimates into (12b) we find a <u>152% difference</u> in the capital-labor ratios of the two sectors at the extremes.[1]

It could be argued, of course, that, while sectors employing more domestic equipment are more labor intensive, value added in such sectors is relatively low because domestic equipment is simple, antiquated and generally less efficient than imported equipment. Thus, expansion of investment in sectors which are heavy users of domestic equipment might well result in higher employment levels but at the cost of lower value added per unit of capital when compared with expansion in sectors with high import intensity of investment. If this were the case, both value added per worker and value added per unit of capital would be lower in sectors which are heavy users of domestic equipment.

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1. These calculations assume homogeneity of the labor force employed in the two sectors. For an elaboration, see below p. 16.

Our data permits us to test this possibility. Assuming the wage rate is equal among sectors,[1]

$$b_m/b_d = \frac{V_d/L_d}{V_m/L_m} \tag{12c}$$

The percentage difference in the value added per worker ($\Delta v/v$) is given by the identity:

$$\Delta v/v = \Delta V/V - \Delta L/L \tag{12d}$$

Consequently, by knowing the percentage difference in employment ($\Delta L/L$) as well as $\Delta v/v$, we may obtain an estimate of the percentage difference in value added. If capital services along with relative factor prices are equal in the two sectors, the value added per worker will be 53% lower in the sector using domestically produced equipment, but value added itself will still be 99% higher. For, as already noted, employment will be higher by 152%. This finding would suggest that a shift in the composition of investment to sectors with a high component of domestic capital goods imports would have beneficial effects on employment as well as on output.

B. Some Qualifications

1. The finding that I_m/I is related to the wage share does not automatically imply that it is also inversely related to employment. It could be that sectors with a high concentration of imported capital equipment, are sectors with high concentration of low wage,

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1. When the wage rate was regressed against I_m/I across sectors, both the coefficient and the F ratio were insignificant at the level .05 hence, it can be concluded that the wage rate does not vary significantly among sectors.

low skill labor. In the absence of data on skill composition by sector, this possibility cannot be ruled out completely. However, this is extremely unlikely to occur; and, in fact, imported capital equipment usually is considered complementary (in the Hicks sense) with skilled labor in the developing countries.

2. In addition, it is possible that I_m/I is positively correlated with the scale of production in each sector. Since relative capital intensity may well be an increasing function of scale, negative association between I_m/I and the wage share may be the result of omitting a variable from the regression equation. To account for the possibility of scale affecting factor intensity, we assumed that the labor elasticity of output is inversely related to the value added per firm and that this relationship may be expressed by a hyperbolic function of the form:

$$b_o = f_o + \frac{f_{1i}}{V/N} \tag{13}$$

where N is the number of firms in each sector.

Substituting this relationship into (9) we obtain:

$$1 - W/V = I_m/I \left(1 - f_o - \frac{f_{1m}}{V/N}\right) + (1 - I_m/I) \left(1 - f_o - \frac{f_{1d}}{V/N}\right) \tag{14}$$

This reduces to:

$$W/V = f_{1d} + f_o V/N - (f_{1d} - f_{1m}) I_m/I \tag{15}$$

Fitting this equation to the sample of 60 manufacturing sectors yields:

$$W/N = 1199.7 + \underset{(17.2)}{.25}\ V/N - \underset{(-2.1)}{3132.2}\ I_m/I \qquad (16)$$

$$R^2 = .85,\ F = 152.4$$

Again, the coefficient for I_m/I is negative and significantly less than zero at the five per cent level. The F statistic is also significantly greater than zero at the one per cent level. This analysis indicates that in two sectors with the same value added per firm, the sector with higher import intensity of equipment investment will still be expected to have the lower wage bill per firm.

3. Our results in this as well as in earlier sections, are based on the assumption that the ratio I_m/I is a good proxy for the ratio K_m/K. In the time series section this was justified on grounds of ex ante versus ex post substitutability of capital goods. Such grounds are clearly inappropriate in cross-sector analysis. In particular, it is quite possible that the ratio I_m/I is considerably smaller than the ratio K_m/K since import substitution in capital equipment has increased rapidly. The ratio of imported to domestic equipment declined from 9 to 1 in 1955 to 2 to 1 in 1963. Hence, the estimates of b_d and b_m may well be biased. The available evidence, however, fails to indicate that our estimate of the discrepancy between b_d and b_m is too high.

Suppose that:

$$K_m/K = \alpha_o + \alpha_1 \quad (I_m/I) + u \qquad (17)$$

where u is a normally distributed random variable whose mean is equal to zero. Then, if the relationship of K_m/K to I_m/I is as posited in (17), regression equation (11) takes the following form:

$$W/V = b_d - (b_d - b_m)\ \alpha_o - (b_d - b_m)\ \alpha_1\ I_m/I + u \qquad (18)$$

The magnitude of α_1, which determines the bias of the estimated value of $(b_d - b_m)$, depends on the degree to which the discrepancy between K_m/K and I_m/I is correlated with I_m/I. For,

$$K_m/K - I_m/I = \alpha_o + (\alpha_1 - 1)\ I_m/I + u \qquad (19)$$

If the discrepancy increases (decreases) as I_m/I increases, then α_1 must exceed (be less than) unity.

We would expect the difference between K_m/K and I_m/I to be greatest in those industries where the capital stock has grown relatively slowly. Estimates of the rate of growth of capital during the period preceding 1963 are available only for the State Economic Enterprises (SEEs). But these enterprises did account for over 50 percent of equipment investment in manufacturing during 1963. Comparing the rate of growth of deflated capital stock with the I_m/I ratio for different categories of SEEs provided little evidence of a systematic relationship. In fact, the relationship appears parabolic. (See Table 2.) Consequently, α_1 may well be

close to 1. This implies that the bias in the estimated value of $(b_d - b_m)$ is not large.

If K_m/K exceeds I_m/I and α_1 is positive but not greater than one, then α_o must be positive and the estimate of b_d must be biased upward. Under these conditions, the difference in the employment-capital ratio will exceed 152 per cent between sectors which are intensive in the different types of equipment. This statement must be qualified by the fact that the estimate of W/V may well be biased downward. The census estimates of State Enterprises wage shares were considerably lower than Land's [2]. This discrepancy, provided the wage rate does not exceed the marginal product of labor, implies that the estimate of b_d may be biased downward rather than upward. In this situation, the percentage change in the employment-capital ratio between sectors using different forms of equipment may be overstated even though the estimate of $(b_d - b_m)$ is not biased upward.[1]

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1. Consider an additive error, e, which has the same sign and magnitude for b_m and b_d. In equation (20), $e = -(b_d - b_m)\alpha_o$. Let:

$$z = \left[\frac{(\hat{b}_d + e)\ (1 - \hat{b}_m - e)}{(\hat{b}_m + e)\ (1 - \hat{b}_d - e)} - 1 \right] 100$$

where $\hat{b}_d$ is the original estimate of b_d and $\hat{b}_m$ is the estimate of b_m obtained from b_d after correcting for the bias in the estimate of $(b_d - b_m)$, i.e., $\hat{b}_m = \hat{b}_d - (b_d - b_m)$. The dependent variable, z, represents the percentage change in the employment-capital ratio adjusted for the two forms of error. It can be shown that $dz/de < o$ provided that $\hat{b}_d > b_m$ and

$$e < \frac{1 - b_m - b_d}{2}.$$

Table 2

CAPITAL STOCK GROWTH RATES AND INVESTMENT SHARES FOR SEE'S

Sector	Percentage increase in deflated capital stock between 1960 and 1962[1/]	Ratio of imported to total equipment investment in 1963
Food Manufacturing	6%	.03%
State monopolies (beverages & tobacco)	12%	11%
Textiles	15%	70%
Heavy industry	55%	66%
Other manufacturing	127%	32%

1/ This calculation is based on end-of-year estimates for 1960 and 1962.

SOURCE: State Institute of Statistics. Census of Manufacturing Industries and Business Establishments: Manufacturing, Table 9 - and James Land, "Economic Accounts of Non-Financial Public Enterprises in Turkey, 1939-1963", Table 3-11.

IV. CONCLUSIONS

A. Findings

Over the period examined, the composition of investment as between imported and domestic equipment in Turkey underwent substantial changes. Imported equipment accounted for 88% of total equipment investment on the average between 1950 and 1952 but only 70% in 1961-63. Of these amounts, it is estimated that about 14% of the total in 1950-52 and 13% of the total in 1961-63 were financed through U.S. assistance programs.

The shift in investment composition is explained by a combination of factors: cost factors, including the exchange rate adjustment in 1958 which increased the cost of imported equipment to users on one hand, and the relative availability of external to internal credit on the other hand.[1] On the basis of our findings, an increase in net foreign capital inflow (as provided, for example, through foreign assistance) leads to an increase in the ratio of imported to domestically-produced equipment investment. Thus, even though the 1958 devaluation discouraged the utilization of imported equipment in investment, the ratio of imported to domestically-produced equipment investment in fact

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1. The industrial sector in Turkey became far more sophisticated and diversified between 1950 and 1963. Thus the overall capacity to produce investment goods in the later period was substantially higher. But this capacity itself was obviously affected by various domestic policies including the relative cost of domestic to imported equipment.

rose above its 1958 level in 1960 (see Table 1). This is mainly attributable to the fact that the ratio of external to internal credit rose by a large amount as a consequence of a considerable inflow of stabilizing foreign assistance in 1959. This in turn made it easier to procure licenses for the importation of capital equipment.

In 1959 U.S. assistance accounted for over 95% of the total net foreign capital inflow. It could thus be concluded that U.S. assistance made it possible for Turkey to offset the devaluation effect of reducing the ratio of imported to domestic equipment investment. While external credit was generally granted on more concessionary terms than internal, foreign exchange and credit availability rather than terms was the deciding factor in Turkey, where the borrowing rate for all capital was well below the internal rate of return and credit had to be rationed.

B. Policy Implications

1. The analysis suggests that with total capital stock held constant, both employment and value added are negatively correlated with the ratio of imported to total equipment investment. The relationships between capital composition, employment and value added have been detected in regressions involving a cross-section of industrial sectors. These results imply that in Turkey, ceteris paribus, for any given level of investment, policies that stimulate shifts of investment allocation to industrial sectors with a high

component of domestic equipment investment will increase aggregate employment and value added. If final demand is at least somewhat elastic, increasing the aggregate ratio of domestically-produced to imported equipment will increase aggregate employment[1] and aggregate value added. The validity of these conclusions rests on the assumption that the ratio of imported to domestic equipment investment is positively correlated with the ratio of imported to domestic capital stock.

The results point to variability of proportions between sectors. But we have not examined the variability of techniques and factor proportions within each sector and have presented no evidence on the impact on employment of a shift in the investment composition within sectors. But, there is a theoretical presumption that increases in the ratio of domestic to imported equipment will also increase employment through direct substitution of labor for capital within each sector. Thus the employment effects shown in this paper can be considered to be the minimum likely to occur as a result of a shift in investment composition favoring domestic equipment investment.

2. It has been argued that policies whose objectives are to raise the user cost of capital may dampen investment and hence long-run employment.[2] Our results show that policies influencing the user

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1. By reducing the opportunity cost of producing relatively labor intensive commodities.

2. These arguments are based on the neoclassical theory of investment as formulated by Jorgenson in [7].

cost of capital may stimulate employment both in the long and short run by subsidizing one form of equipment investment and taxing another.

3. Our findings in no way suggest that foreign assistance should not be used for the importation of capital goods, nor that donors should not lend to developing countries at soft terms. Rather, it is important that the conditions under which such goods are obtained by the final user be carefully determined, because of the possible effects of the composition of investment both on employment and value added. In all instances it is important that the price paid for these imports reflect relative scarcity. In cases where credit is rationed and availability is more important than terms, increased access to foreign credit and increased availability of foreign exchange may well involve an increase in the import content of investment with adverse effects on employment. Under such circumstances, it might be appropriate to combine foreign assistance with increased capital equipment tariffs and expanded internal credit.

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