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WAGES, OUTPUT, AND THE EMPLOYMENT LAG IN JAMAICA

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INTRODUCTION

As concern with urban unemployment in less developed countries has grown, the role of industrialization as a major source of labor absorption has been reassessed. In general, this reassessment has induced widespread pessimism about the ability of industry -- manufacturing in particular -- to generate a significant rate of employment expansion. In the first place, the realization has spread that where the modern industrial sector is a small proportion of total economic activity, rates of growth must be very high to make much impact on total employment growth.[1] Secondly, it has become increasingly apparent that even in cases where industrial output has grown rapidly employment has frequently lagged far behind.

The extent of the employment lag in manufacturing can be seen in Table 1. For the less developed countries as a whole, a 1% increase in output has been associated with a .62% increase in employment. Outside of Asia, however, the employment lag has been much more serious and pervasive. Using the ratio of employment growth to output growth as a crude measure of the output elasticity of employment, it appears that only two of the fifteen non-Asian countries for which data are presented have

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[1]For sobering calculations of this nature, see Folke Dovring, "The Share of Agriculture in a Growing Population," Monthly Bulletin of Agricultural Economics and Statistics, Vol. 8, (August-September, 1959), pp. 1-11. Reprinted in Carl Eicher and Lawrence Witt (eds.), Agriculture in Economic Development (New York: McGraw-Hill, 1964), pp. 78-98.

TABLE 1

AVERAGE ANNUAL RATE OF OUTPUT AND EMPLOYMENT GROWTH IN MANUFACTURING IN LESS DEVELOPED COUNTRIES

	Time Period (1)	Employment Time Period (1)	Output %	Employment %	Ratio E/O
All less developed countires	1955-65		7.1	4.4	.62
East and South East Asia	1955-65		8.1	5.0	.62
Latin America	1955-65		5.8	2.5	.43
Argentina	1950-60		4.4	-2.0	-.45
Brazil	1947-60	1949-59	9.8	2.6	.27
Chile	1950-60		5.4	1.7	.31
Colombia	1950-60		7.6	2.5	.33
Costa Rica	1957-63		6.3	1.7	.27
Mexico	1950-61		6.5	0.4	.06
Peru	1950-60		6.6	4.4	.67
Venezuela	1950-60		13.0	2.1	.16
Other					
India	1950-60		6.8	3.3	.49
Egypt	1956-60	1947-57	5.5	3.9	.71
Kenya	1954-64		7.6	-1.1	-.14
Zambia	1955-63		12.5	2.0	.16
Greece	1950-61		8.9	2.0	.22
Puerto Rico	1950-62		9.6	4.2	.44
Trinidad and Tobago	1951-60	1946-60	8.2	1.0	.12
Jamaica	1950-65		8.4	4.1	.49

Notes: (1) Unless otherwise noted in column 2, the time period for output and employment is the same.

Sources:

Area groupings: David Turnham and Ingelies Jaeger, The Employment Problem in Less Developed Countries: A Review, OECD Working Document for Second Working Conference on Research into Employment Problems in Developing Countries, (Paris, December, 1969), CD/R/69.2 2nd Rev., multilith.

Costa Rica: John R. Eriksson, "Wage Change and Employment Growth in Latin American Industry," Manpower and Unemployment Research in Africa, Newsletter of the Centre for Developing Area Studies, McGill University, Vol. 3, No. 2, (November 1970), p. 59.

Kenya and Zambia: Michael P. Todaro, "The Urban Unemployment Problem in Less Developed Countires: An Analysis of Demand and Supply," Yale Economic Essays, (Fall 1968), pp. 338-9.

TABLE 1 (con't)

Greece: Cited from other sources in John R. Harris and Michael P. Todaro, "Wages, Industrial Employment and Labour Productivity: the Kenyan Experience," Eastern Africa Economic Review, (June 1969), p. 29.

Puerto Rico: Calculated from rounded figures given in Lloyd G. Reynolds and Peter Gregory, Wages, Productivity, and Industrialization in Puerto Rico, (homewood, Illinois: Irwin, 1965), p. 35.

Trinidad and Tobago: Output figures from Frank Rampersad, Growth and Structural Change in the Economy of Trinidad and Tobago 1951-1961, Institute of Social and Economic Research, University of the West Indies, Jamaica, no date, p. 12. Employment figures from Jack Harewood, Employment in Trinidad and Tobago 1960, Institute of Social and Economic Research, University of the West Indies, Jamaica, no date, p. 75.

Jamaica: Output figures derived from Jeannette Bethal, "Some National Income Aggregates for Jamaica, at Constant Prices," Social and Economic Studies, (June 1961), pp. 128-155, and Jamaica, Department of Statistics, National Income and Product 1965-1966, (Kingston: Department of Statistics, 1968). Employment figures are from Jamaica, Annual Report of the Labour Department 1958, (Kingston: G.P.O., 1952) and from unpublished figures of the Ministry of Labour.

All other countires: Werner Baer and Michael E. A. Herve, "Employment and Industrialization in Developing Countires," Quarterly Journal of Economics, (February 1966), p. 91.

elasticities as great as .5, whereas two others actually have negative elasticities.

Explanations of the employment lag tend to fall into one of two categories. In the one case, lagging employment is attributed to rising wage levels which induce the substitution of other factors for labor. The other set of explanations has stressed the inevitability of an employment lag. Among the many reasons advanced to explain why we can continue to expect output growth in manufacturing to outpace employment growth regardless of what happens to wages are the following:

(1) The development of technologically-dominant, labor-saving techniques in developed countries which are then imported into the less developed countries.

(2) The existence of economies of scale.

(3) The need to shift the output mix to include more capital-intensive industries as import-substitution possibilities in labor-intensive consumer goods industries are exhausted and as export outlets for these goods are closed by protection in developed countries.

(4) Increased productivity through "learning by doing."

(5) In countries where dependence on foreign investment is high, the tendency of foreign firms to use familiar, highly capital-intensive techniques of production without regard to factor supply conditions in the local market. [2]

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[2]This is widely believed to be a major cause of slow employment growth in Jamaica. An alternative version of this argument is that foreign firms do adjust their production methods to factor price ratios, but the price ratios they face are quite different from local firms.

(6) A skill or high-level manpower constraint which forces firms to economize on scarce skills by introducing more capital-intensive techniques. [3]

(7) The element of fixed costs in high-grade manpower, or even experienced production workers, combined with low rates of capacity utilization. When output expands some workers will simply be more fully utilized so that employment will expand far less than output. [4]

(8) The possibility that large increases in output may result from increased X-efficiency, i.e., through more efficient use of existing conventional capital and labor inputs. [5]

It is important to distinguish the causes of the employment lag because of the widely differing policy implications. If wages are the main cause, then the government may be able to intervene to increase employment growth without sacrificing output growth. If the other set of reasons is responsible, a lag may be unavoidable and perhaps not even a cause for concern. For example, the effect of economies of scale is to increase the output obtainable from a given quantity of labor and capital. In a capital-constrained economy, the absence of economies of scale might reduce the employment lag, but it would do so by reducing output growth and not by increasing employment growth.

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[3] Werner Baer and Michel E.A. Herve, "Employment and Industrialization in Developing Countries," Quarterly Journal of Economics (February, 1966), pp. 88-107.

[4] See Michael P. Todaro, "The Urban Employment Problem in Less Developed Countries: An Analysis of Demand and Supply," Yale Economic Essays (Fall, 1968), p. 391. A similar point is made in C.R. Frank, Jr., "Urban Unemployment and Economic Growth in Africa," Oxford Economic Papers (July, 1968), p. 257. On labor as an overhead cost, see Walter Y. Oi, "Labor as a Quasi-Fixed Factor," Journal of Political Economy (December, 1962), pp. 538-555.

The purpose of this paper is to investigate the sources of the employment lag in Jamaica, an economy with exceptionally high unemployment. In particular, we will try to see how much of the lag was due to the non-controllable factors associated with output growth and how much was due to rising wages.[6] Following this quantitative analysis of the sources of the employment lag, we will discuss in more detail the relationship between wages and employment in less developed countries. Finally, we will examine briefly the relationship between trade policy and employment growth.

The major points which will be developed are: (1) Wages have been an important determinant of employment growth in most sectors, both fast and slow-growing. (2) Employment growth would still lag behind output growth with wages held constant in most non-manufacturing sectors. (3) Even when modern sector employment grows rapidly there are good reasons to expect the net employment effect on the whole economy to be less. (4) The employment effects of a wage increase are not confined to the sector in which the increase occurs. (5) Attempts to use trade policy to secure both employment growth and rising wages in the modern sector will usually both aggravate the unemployment problem and misallocate resources.

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[5]Harvey Leibenstein, "Allocative Efficiency vs. 'X-Efficiency'," American Economic Review (June, 1966), pp. 392-415.

[6]In practice we cannot divide effects so neatly. For example, rising wages may lead to improved X-efficiency as well as to capital-labor substitution. Managers may be induced by

I. Labor Absorption in Jamaica Since 1950

The reason the labor absorption question commands attention in Jamaica can be stated succinctly. From 1950 to 1965 real GDP grew at 7.5% per year, the labor force scarcely grew at all because of heavy migration, and yet open unemployment probably stood at about 15% of the entire labor force at both the beginning and the end of the period.

Part of the explanation for this phenomenal disparity between output and employment growth lies in the high capital intensity of the leading sector. Bauxite mining, beginning only about 1953, accounted for about 10% of the total output in 1965. Direct employment in bauxite in 1965, on the other hand, was about 1% of the labor force.

This still leaves a large part of the employment lag unaccounted for, as total output excluding mining still grew at 6.7% per year. What we would like to know is how employment and output are related in other sectors and why. This section examines how they have been related.

Over the entire period 1950-1965 employment in Jamaican manufacturing grew at about half the rate of real output. This

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rising wages to reorganize production to offset wage increases by productivity increases. According to Reynolds and Gregory this is what has happened in Puerto Rico. See Lloyd G. Reynolds and Peter Gregory, Wages, Productivity, and Industrialization in Puerto Rico (Homewood, Illinois: Irwin, 1965). Increased wages may also motivate workers to work harder and thereby increase output per worker.

relative rate of growth of employment compares quite favorably with most non-Asian countries for which data are presented in Table 1. Moreover, since real output growth in manufacturing was substantial (8.4% per year), the rate of employment growth, in spite of the lag, was a respectable 4.1% per year.

The employment lag in manufacturing varied considerably by time period. The lag was more pronounced in the early part of the period than in the latter, though the magnitude of the lag is very sensitive to the exact years chosen.[7] For example, the periods 1953-60 and 1957-65 have an overlap of four years and yet the crude output elasticity of employment is twice as high for the latter period (see Table 2 on page 9). Obviously, the year-to-year relationship between output and employment change is not very stable, which suggests the need to examine closely the sources of the annual fluctuations in the relationship.[8] For present purposes, it is important to stress that

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[7]This is true for other countries as well. In Colombia, for example, if the period 1953-63 is chosen instead of the period 1950-60, the rate of growth of output in manufacturing is 7.6% in both periods, but the rate of growth of employment is 2.5% from 1950-60 and 4.0% from 1953-63. The 1953-63 figures are from Eriksson, loc. cit.

[8]The three most likely explanations are: (1) we have not disaggregated enough and the apparent fluctuations in the overall relationship are due to changes in the industrial mix within the manufacturing sector, (2) another important variable, wages, has been left out of the analysis or (3) there is a non-linear relationship (or linear, but not from the origin) between output and employment. On this last point, see Frank, op. cit., pp. 257-259.

Table 2: Average annual rates of growth of output and employment in manufacturing in Jamaica

Period	Output	Employment	Ratio E/O
1950-65	8.4	4.1	.49
1953-60	9.0	3.3	.37
1957-65	5.9	4.2	.71
1950-55	9.8	3.5	.36
1955-60	8.3	4.8	.58
1960-65	7.2	4.2	.58

Source: Same as Table 1, plus National Income and Product and Annual Report of the Department of Labour for other years. The title of these two publications varies.

on average, over periods of 5 years or greater (and especially in recent years), employment growth in manufacturing has not lagged too seriously behind output growth.

Not surprisingly, agriculture has been a labor-expelling sector. Agricultural employment fell by 3.9% per year from 1953 to 1960 while real output grew modestly at 2.6% per year. This decline more than offset employment increases in manufacturing, construction, mining, and transportation.

No census or labor force survey has yet been published since 1960. However, annual estimates have been made for four major sectors and several industries within the manufacturing

sector for the years 1957-1965.[9] Within manufacturing the relationship between output and employment has varied enormously, with employment growth actually exceeding output growth in several industries. Outside of manufacturing, the employment performance was generally dismal. Employment in mining grew at 2.0% per year from a small base, while employment in sugar and transportation declined at faster rates from much larger bases (Table 3 gives the figures). The net result was to reduce

Table 3: Average annual rates of growth of output and employment by sector and industry, Jamaica 1957-65

	Output	Employment	Ratio E/O
Sugar[1]	3.9	- 6.3	- 1.62
Mining	6.6	2.0	.30
Transportation[2]	7.3	- 3.1	- .42
Manufacturing	5.9	4.2	.71
Sugar manufacturing[1]	4.5	- 0.4	- .09
Other food & beverages	2.7	2.3	.85
Tobacco	7.3	6.9	.95
Textiles & footwear	7.0	9.1	1.30
Furniture & wood products	3.7	7.5	2.03
Chemicals	9.7	1.1	.11
Non-metallic mineral products	8.0	12.2	1.53
Metal products & repairs	10.3	2.8	.27

Notes: 1. Sugar manufacturing is included in the sugar sector as well as being shown separately.
2. Includes storage and communication.

Source: See Appendix.

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[9]These are estimates and they do not correspond to Census definitions. Manufacturing employment, for example, includes only employment in registered factories. See the Appendix for a discussion of statistical sources.

total employment in these five important sectors from 87,991 to 78,262, a decline of 1.5% per year. At the same time, real output in these same sectors grew at 6.2% per year.

II. The Output Mix and Employment Growth

An employment lag may be caused either by lags within particular industries or by the faster growth of output of sectors with higher output per worker. It will be helpful, before analyzing the determinants of employment growth within each sector, to apportion the overall employment lag to these two sources.

A measure of the proportion of the lag attributable to sectoral shifts can be obtained by comparing hypothetical employment increases with actual employment increases. Let a = total employment when employment grows at the same rate as output for the entire economy, b = total employment when employment grows at the same rate as output in each individual sector or industry, and c = actual employment at the end of the period. Then the proportion of the lag due to sectoral shifts = $\frac{a-b}{a-c}$. By this measure, 13.4% of the employment lag for all five sectors was due to changes in the composition of output. Output in the most labor-intensive sector, sugar, grew more slowly than output in other sectors thus aggravating the employment lag caused by lags within each sector.

The above calculation ignored changes in the composition

of output within manufacturing. By the same measure, changes in output mix were responsible for 58% of the lag in manufacturing (including sugar manufacturing). This is misleading, however. There was an employment lag caused by the slower growth of output in the relatively labor-intensive industries -- employment would have grown by only 4.3% per year had output per worker remained constant in each industry, compared to the overall growth rate of real output of 5.9%. But the modest additional employment lag was the resultant of two conflicting trends -- large employment lags in some sectors partially offset by employment "leads" in other sectors. In fact, leaving sugar manufacturing aside, the leads actually outweighed the lags. Changes within manufacturing industries, then, were far more important than changes in the output mix.[10]

Is there any reason to expect that shifts in the output mix will normally tend to produce an employment lag? To put it differently, should we expect a negative correlation between the labor-intensity of an industry or sector and its rate of growth?

The answer to this question depends primarily on the income level, size, degree of openness (itself largely a function of size and location), and natural resource base of the country in question. A detailed analysis is neither feasible nor

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[10]It is likely that the degree of aggregation of industries is great enough that some of the differential in output and employment growth rates within industries may still be attributable to changes in the product mix.

necessary here,[11] but a brief sector-by-sector analysis will help identify the major forces which shape structural change in a developing economy.

Agricultural output can normally be expected to grow more slowly than average because income and price elasticities of demand are low for most agricultural products. This expectation is strengthened for economies, such as Jamaica, which are not land-abundant and therefore do not have an incremental comparative advantage in agricultural production. Since agriculture is typically one of the most labor-intensive sectors, below-average output growth will contribute to an employment lag.

The growth of mining and other natural resource-based industries tends to be the result of exogenous factors. Such industries are usually very capital-intensive, however, and where mining is a leading sector there will be an employment lag directly attributable to its growth. The indirect effects of a large mining sector are not as easily predictable because policy-makers have a great deal of leeway in their determination. Mining is a classic vent-for-surplus industry, especially in a small economy with neither the political bargaining power nor

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[11] There is a large literature on the pattern of structural change. See especially, Simon Kuznets, "Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labor Force," Economic Development and Cultural Change, Supplement (July, 1957); Kuznets, Modern Economic Growth (New Haven: Yale University Press, 1966); Hollis B. Chenery and Lance Taylor, "Development Patterns: Among Countries and Over Time," Review of Economics and Statistics (November, 1968), pp. 391-416.

the large internal market necessary to promote forward-linkage-based industries. Therefore, the main effect of mining development is usually to provide a lot of foreign exchange and government revenue. This extra foreign exchange raises the equilibrium exchange rate, thereby encouraging the development of home industries and discouraging the development of both import-competing and export industries. In short, a large mining sector tends to inhibit the growth of manufacturing[12] and to facilitate the growth of construction, government services, transportation facilities and the like. Because a large portion of the income from mining usually accrues to the government, there is, on the other hand, considerable scope for deliberate modification of these natural tendencies. The government of Jamaica, for instance, has used its mining revenues in part to grant tax holidays to manufacturing enterprises.[13]

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[12]See, Chenery and Taylor, op. cit., pp. 314-415, for evidence.

[13]Seers argues that the availability of foreign exchange in a mining economy erodes the will to resist wage increases. Wage increases result in increasing unemployment but not in balance-of-payments crises as they would in other economies. It is the immediacy and visibility of the latter manifestation of wage increases that is more likely to trigger resistance to rising wages, according to Seers. Of course, insofar as mining provides a "foreign exchange umbrella" under which wages can increase more rapidly, the effect is to discourage even further the production of tradeable goods, and especially the more labor-intensive ones. This is quite apart from the effect of wage increases on capital-labor substitution within industries. See, Dudley Seers, "The Mechanism of an Open Petroleum Economy," Social and Economic Studies (June, 1964), pp. 233-242.

The rate of growth of construction, a labor-intensive sector, is primarily a function of the rate of growth in mining, manufacturing, and social overhead investments.[14] In Jamaica there was a mild accelerator effect as construction grew faster than GDP during the big spurt in mining and manufacturing growth during the fifties, but then fell to a lower than average rate as the overall growth rate decelerated. The rate of growth of construction can perhaps be more heavily influenced by government policy than most other sectors, however, so that the relationship to overall output growth is not determinate.

The pattern of industrial growth within the manufacturing sector is of as much interest as broader sectoral movements. Is there any reason to expect manufacturing growth to be biased in favor of industries with high output per worker?

Perhaps the best means of getting at this question is to hypothesize a typical (not necessarily desirable) industrialization pattern. In the very early phases of growth the new industries which will be established and grow rapidly will for the most part be consumption-good industries with an established

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[14] Strassman found that construction growth is greatest relative to GDP growth for middle income ($400-1000 per capita) countries. Jamaica is in his sample of middle income countries. He attributes this pattern to the emergence of housing construction into the monetary sector at middle-income levels. His argument is not necessarily at odds with mine and there is certainly evidence to support both. See W. Paul Strassman, "Construction Productivity and Employment in Development Countries," International Labour Review (May, 1970), pp. 507-509.

domestic demand previously supplied by imports. If left more or less to market forces, e.g., if a uniform effective tariff rate is imposed on all imports, the new industries will be those enjoying some degree of natural protection (market-oriented commodities such as beer), and unskilled-labor-intensive goods with simple technologies. In addition labor-intensive or naturally-protected intermediate good industries such as bricks and cement may be established during this early phase. The industries established in this early phase tend to be fairly labor-intensive as manufacturing industries go. Once the beer, boots, and bricks phase is completed more countries proceed to encourage import substitution in most remaining consumer goods industries for which the domestic market is large enough to support a plant of minimum economic scale. Value added per worker (in domestic prices) tends to be high in these industries so that employment growth lags behind output growth. Having completed this "easy phase" of import substitution, most countries then face the dilemma of whether to extend import substitution to heavier industries or whether to attempt to promote exports of existing industries. For small countries the choice is basically whether to pursue economic integration as a means of extending the life of the import-substitution strategy or to promote exports.[15]

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[15]Both market size and protectionism in developed countries constrain the choice of strategy. Small countries, with higher elasticities of export demand and less visibility to

The point to be stressed here is that policy-makers exercise more influence over the relative growth of sectors and industries than is commonly believed. It is true that agricultural output will tend to grow more slowly and manufacturing more rapidly than average and that the growth of mining may be determined largely by fortuitous events. Nevertheless, policy-makers have a good deal of discretion over the use of mining revenues, over the rate of growth of construction, and very importantly, over the kinds of manufacturing industries which are developed. In particular, they can choose whether to emphasize import substitution or export promotion. As a general hypothesis we would expect exportable manufactures to be more labor-intensive than import substitute manufactures.[16] Therefore,

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hostile interests in developed countries, are better-placed to pursue an export-promotion strategy. Although the above pattern has been described as typical there is nothing inevitable about its sequence. Very large countries such as India have developed heavy industry quite early in the industrialization process. Also, export promotion can begin at an earlier stage and need not be the extension of a basically domestic industry to foreign markets if the marketing problem emphasized by Linder is attacked by encouraging foreign firms to produce for export to their domestic markets. See Staffan B. Linder, An Effay on Trade and Transformation (New York: Wiley, 1961). Jamaica has relied on foreign investment to penetrate export markets for many years, following the advice of W. Arthur Lewis, "The Industrialisation of the British West Indies," Caribbean Economic Review (May, 1950), pp. 1-61.

[16]This is what the Heckscher-Ohlin model would predict. On the prospects for exporting labor-intensive manufactures, see Hal B. Lary, Imports of Manufactures from Less Developed Countries, National Bureau of Economic Research (New York: Columbia University Press, 1968). Hirschman, however, has noted that many producer-goods industries are relatively labor-

we would also expect export-oriented economies to have less of an employment lag in manufacturing than countries whose policies are oriented toward import-substitution. This may be one reason why East and South East Asia has so much less of an employment lag than Latin America.

Jamaica has long followed a more export-oriented policy than most countries, but in recent years has also encouraged import substitution in a wide range of consumer goods. These have included products such as detergents, cigarettes, razor blades, and tires, none of which have generated much employment in relation to output growth. In fact, the employment impact of domestic tire production may have been negative, as the production of new tires seems to have affected the more labor-intensive tire-recapping industry adversely. However, the labor-intensive textile industry increased both exports and production rapidly with a marked effect on employment expansion. With the exception of cement, Jamaica conforms to the general expectation that a given increase in export production will

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intensive and small-scale. See Albert O. Hirschman, "The Political Economy of Import-Substituting Industrialization in Latin America," Quarterly Journal of Economics (February, 1968), p. 15. Galenson has argued that the big contribution manufacturing makes to employment is the indirect stimulation of related service industries which are labor-intensive. This raises the intriguing question of whether import-substitution industries might have more linkages with labor-intensive service industries than do labor-intensive export industries. See Walter Galenson, "Economic Development and the Sectoral Expansion of Employment," International Labour Review (June, 1963).

generate more employment than a comparable increase in import-substitution production.

One other factor influencing the relative rates of output growth in different industries is the rate of growth of wages. Given the same income and price elasticity of product demand and the same elasticity of substitution in two different industries, a wage increase of a given amount will cause the more labor-intensive sector to grow more slowly. If, for example, the price elasticity of demand for the products is 2.0, the elasticity of substitution is zero, and labor is 10% of total costs in one industry and 30% in another, a wage increase of 10% will reduce total output 2% in the first industry and 6% in the second. There is no assurance that all the relevant elasticities are independent of labor-intensity, but the presumption is that in an economy with rising wages, output in labor-intensive industries will tend to grow more slowly. Thus, quite apart from any effect on employment growth within an industry when output growth is given, rising wages tend also to produce an employment lag by restricting the output of the most labor-absorbent industries. This wage-induced bias in output growth may be less important quantitatively than some other factors which contribute to the employment lag, but it does occur. Relative price changes as well as income changes do affect the pattern of demand and production -- compare, for example, the consumption of domestic services of people of comparable incomes in developed and less developed countries.

The conclusion, then, is that much of the trend toward increasingly capital-intensive leading sectors is the result of particular policies -- an over-emphasis on import substitution and the encouragement or passive acceptance of large urban wage increases. Both of these policies in turn discourage the growth of agriculture -- the first by discriminating against agricultural exports with an elastic demand and the latter by raising agricultural wages and encouraging migration to urban areas. Slower growth of agricultural output increases the employment lag.

III. Determinants of Employment Growth Within Sectors

Multiple regression analysis has been used to analyze the components of the employment lag within sectors. In the interest of comparability with other studies, and because the underlying production function is more easily identifiable, change in labor productivity has been used as the dependent variable in most of the regressions. Productivity growth -- i.e., labor productivity growth -- is of course synonymous with an employment lag. Thus far, we have avoided using the term productivity growth because of its mystique of desirability in most people's minds. Only some kinds of productivity growth under certain conditions are desirable in a labor-surplus economy.[17]

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[17]Assume that both increased employment and greater output are policy objectives. Further assume two inputs: labor, which is relatively abundant, and a bundle of scarce resources called

and we have sought to counter its positive connotations by using the more perjorative term, employment lag. Recognizing the shortcomings of both terms, however, henceforth they will be used interchangeably.

According to Harris and Todaro,[18] the equation

(1) $\dot{V} = a + b\dot{W} + c\dot{Q}$

can be derived from a CES production function, where $\dot{V}$ = percentage change in labor productivity, $\dot{W}$ = percentage change in real product wages (wages deflated by the product price index), and $\dot{Q}$ = percentage change in real output (value added). The coefficients are interpreted as follows: a measures the rate of increase in labor productivity due to technological change (assumed to be neutral and disembodied), b estimates the

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capital. Labor productivity will be increased by either a movement along an isoquant or by a downward shift of an isoquant. If there is unemployment, increased productivity resulting from a movement along an isoquant is unambiguously undesirable because it both reduces employment, and by using more scarce capital per unit of output, also reduces output for the economy as a whole. The effect of increased productivity resulting from a shift in an isoquant (or a movement to a higher isoquant when there are economies of scale) is not so clear. A neutral shift will release scarce capital which can be used to employ the displaced labor in another industry or in increased output in the same industry. If, however, the isoquant shifts (and swivels) due to labor-saving technological change or improved X-efficiency, the result may be increased output but decreased employment -- especially given wage rigidities and other obstacles which typically impede the transformation capacity of less developed countries.

[18] John R. Harris and Michael P. Todaro, "Wages, Industrial Employment and Labour Productivity: The Kenyan Experience," Eastern Africa Economic Review (June, 1969), pp. 29-46. I have used their notation.

elasticity of substitution between labor and all other factors, and c measures the effect of output growth on labor productivity. The output coefficient c picks up but does not distinguish between all output-induced productivity changes, such as economies of scale, learning by doing, and embodied, labor-saving technological change.

Relatively reliable data on wages, employment, and output for several industries and sectors are available for the years 1957-1965. Estimates for the construction industry are less reliable and therefore are treated separately. The output figures are official estimates of gross domestic product at factor prices. These are available in both current and constant prices by sector and industry. Wages are average earnings of workers in firms employing ten or more workers. We implicitly assume in using these figures that wages in smaller firms have changed in a similar fashion, or that small firms represent an insignificant proportion of total employment. Employment figures have been obtained in two ways: by using annual survey data on the number employed in registered factories where these are available[19] and by dividing the wages and salaries component

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[19]Census data on employment are available for only one year. Employment in registered factories is probably more relevant to an analysis of employment growth in Jamaica, anyway. The survey of registered factories covers most wage earners and it seems reasonable to assume that most output growth in manufacturing has come from this sector. Since, in any case, there is no handicraft tradition in Jamaica to lay a base for the expansion of cottage industries, there is no need to fear that we are neglecting a potentially important source of labor absorption.

of national income by the wage rate in other cases. There is further discussion of statistical sources, methods of calculation, and limitations on figures used for particular industries in the Appendix.

The regression results

Equation (1) was estimated for each of the six manufacturing industries, but in only two industries -- sugar manufacturing and non-metallic mineral products -- was either the wage or output coefficient significant at the 5 percent level. The estimated relationship in sugar manufacturing was:

$$(2)\quad \dot{V} = -.104 + \underset{(.18)}{.70}{}^{*}\dot{W} + \underset{(.80)}{1.94}{}^{*}\dot{Q}$$

$$R^2 = .65 \qquad d = 2.30$$

Coefficients which are significant at the 5 percent level are starred. The figures in parentheses are standard errors, R^2 is adjusted for degrees of freedom, and d is the Durbin-Watson statistic. The same equation was estimated for non-metallic mineral products with the following results:

$$(3)\quad \dot{V} = -.010 + \underset{(.32)}{.91}{}^{*}\dot{W} - \underset{(.50)}{.62}\,\dot{Q}$$

$$R^2 = .52 \qquad d = 3.02$$

The wage coefficients in both industries are significant and are somewhat less than unity. The output coefficient for sugar implies that as output grows employment will actually fall,

whereas in non-metallic mineral products the negative output coefficient shows a tendency (not significant) for employment to grow faster than output with wages held constant.

An attempt was made to obtain more information about individual manufacturing industries by estimating equations in logarithmic rather than percentage change form. For this the equation

(4) $\log E = \log a + b \log W + C' \log Q$

was used, where E denotes employment. The wage coefficient, b, can be interpreted as the wage elasticity of employment and the output coefficient, C', is the output elasticity of employment.[20] The log formulation provides an extra observation and tends to explain much more of the variance than the first difference form, though the danger of multicollinearity and autocorrelation is increased. The results of these regressions for all six manufacturing industries are shown in Table 5.

The wage coefficients were significant in all industries except food and beverages and metal products and repairs. The output coefficients were significantly different from zero in all but sugar manufacturing and metal products and repairs. A more interesting test of significance for the output coefficient is whether it is significantly different from one. A coefficient

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[20] If a log of productivity had been used as the dependent variable, a and b would have been exactly the same magnitude but with opposite signs and the c coefficient would equal (1-c'). In equation (1) the output elasticity of employment approximately equals (1-c).

Table 5. Estimates of equation (4), by industry

Industry	a	b	C'	R^2	d
Sugar manufacturing	4.60	-.49* (.19)	.60 (.27)	.46	1.65
Other food & beverages	-1.76	-.64 (.48)	1.28* (.49)	.53	1.26
Textiles & footwear	-1.62	-.55* (.23)	1.36* (.24)	.79	2.03
Furniture & wood products	-7.26	-2.95* (1.12)	2.51* (.73)	.62	2.65
Non-metallic mineral products	-5.18	-1.01* (.23)	1.86* (.15)	.96	3.01
Metal products and repairs	5.97	-.51 (.58)	.38 (.25)	.10	1.16

of one in the log regression means there are constant returns to scale (and no learning effects or the like), whereas the constant-returns coefficient in equation (1) is zero. In three industries the output coefficient is significantly different from one. It is significantly greater than one in furniture and wood products and in non-metallic mineral products and significantly less than one in metal products and repairs. Both coefficients are suspiciously high for furniture and wood products, however, and further investigation shows that the estimates for this industry are unreliable because of multicollinearity.[21] Since the estimate for metal products and

[21]The simple correlation between the log of real wages and real output is .95 and the addition of time as a variable changes the wage and output coefficients drastically. Further

repairs fails to explain much of the variance, this leaves us with four of six manufacturing industries for which reasonable estimates of the effect of output and wages or employment are available.

An attempt was also made to estimate the average impact of wage and output growth on employment growth for the manufacturing sector as a whole. Equations (1) and (4) were estimated using total manufacturing output, employment, and productivity and average manufacturing wages, but the results were not significant. In order to increase the number of observations and to eliminate the effect of changes in the output mix within manufacturing, equation (1) was also estimated for a pooled cross-section, time series sample. The basic assumption underlying the use of a pooled sample is that all observations are from the same population. This is a very restrictive assumption, though perhaps no more so than the assumptions underlying quite common attempts to estimate a meaningful aggregate manufacturing wage and output coefficient. Mining was included in the sample because it has a technology which is reasonably similar to most manufacturing industries. The results of the pooled regression were:

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evidence of multicollinearity is that in the estimate for equation (1), neither coefficient came close to being significant, yet the adjusted R^2 was .65. Some multicollinearity was undoubtedly present in other industry estimates, but it does not appear to have been very serious.

$$(5)\quad \dot{V} = -.026 + \underset{(.09)}{.27}\dot{W} + \underset{(.14)}{.50}\dot{Q}$$

$$R^2 = .40 \qquad d = 2.26$$

The same regression was run using industry dummy variables, but since all the coefficients and the adjusted R^2 were practically the same, the results are not presented.

Both coefficients in the pooled regression are highly significant, but the estimates are low compared to individual industry estimates (including mining, which is shown separately below). It is thus hard to view the pooled regression results as a meaningful average for the manufacturing (and mining) sector, in spite of the highly significant coefficients.

Most of the other sector estimates are more straightforward. The estimate for mining is

$$(6)\quad V = -.026 + \underset{(.34)}{.66}\, W + \underset{(.10)}{.38^*}\, Q$$

$$R^2 = .69 \qquad d = 2.16$$

The output coefficient is significantly larger than zero, which means that employment expands less than proportionately with output. The wage coefficient just misses being significant at the 5 percent level, but is significant in the log regression given below.

$$(7)\quad \log E = 2.89 \log a - \underset{(.14)}{.37^*} \log W + \underset{(.13)}{.62^*} \log Q$$

$$R^2 = .89 \qquad d = 1.71$$

The estimated output effect is approximately the same in both regressions -- a one percent rise in output yields about six-

tenths of one percent rise in employment. A one percent rise in wages is associated with a fall in employment of one-third to two-thirds of one percent.

The inelasticity of employment growth with respect to output growth in mining is not surprising, but the existence of a wage elasticity of about the same magnitude as in most manufacturing industries probably comes as a surprise to many Jamaicans. Of all the industries in Jamaica, the most likely to have a wage-inelastic demand for labor would be bauxite mining. The industry has always been capital-intensive and the Jamaican operations (mining and alumina reduction) are only a small part of value added in this completely vertically-integrated and oligopolistic industry. It is widely assumed that wage increases in bauxite will have little, if any, effect on employment. As a result, bauxite wages have risen steadily and in 1965 the average unskilled rate was 2.6 times the average unskilled manufacturing wage. However, studies of extractive industries (coal and iron ore) in the United States have estimated elasticities of substitution to be about unity[22] so that the much lower estimates for Jamaican mining do not seem impossible. On the other hand, the correlation between wage and productivity

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[22]Unpublished studies by R.I. McKinnon and G.S. Maddala, cited by Marc Nerlove, "Recent Empirical Studies of the CES and Related Production Functions," in Murray Brown (ed.), The Theory and Empirical Analysis of Production, National Bureau of Economic Research Studies in Income and Wealth, Volume 31 (New York: Columbia University Press, 1967), pp. 100-101.

increases may simply mean that wages tend to follow productivity. It will be argued in the next section that, in general, wage increases induced productivity growth rather than the reverse, but in mining it is quite plausible to think that productivity may have been the independent variable.

In transportation nearly half the workers are dock-workers. The sector also includes railway and road transport workers and some workers in warehousing and communications. It is not surprising, given this composition, that the wage elasticity is relatively large and highly significant. The estimated equation is

$$(8)\quad \dot{V} = -.024 + \underset{(.22)}{.79^{*}}\,\dot{W} + \underset{(.42)}{.57}\,\dot{Q}$$

$$R^2 = .86 \qquad d = 2.35$$

The output coefficient is not significant, meaning we cannot reject the hypothesis that there was no employment lag due to output growth.

Sugar (including both field operations and sugar manufacturing) is the sector in which most observers would probably expect wages to have the biggest effect on employment. The constant price estimates of equation (1) failed to show a significant wage coefficient, however, so a regression using current prices was run. In the case of sugar, where annual prices fluctuate considerably, we might in any case expect employers to be more responsive to changes in money wages than to changes in

real product wages which reflect the vagaries of the international sugar market. The result of the current price regression was

$$(9)\quad \dot{V}_c = -.048 + \underset{(.68)}{1.68^*}\ \dot{W}_c + \underset{(.17)}{.83^*}\ \dot{Q}_c$$

$$R^2 = .86 \qquad d = 2.11$$

Pursuing this line of argument a bit further, the most plausible relationship that one could specify would seem to be <u>real</u> productivity growth as a function of growth in <u>money</u> wages and <u>real</u> output. The results of this regression were

$$(10)\quad \dot{V} = -.028 + \underset{(.72)}{1.43}\ \dot{W}_c + \underset{(.47)}{.81}\ \dot{Q}$$

$$R^2 = .51 \qquad d = 2.06$$

The wage coefficient just missed being significant at the 5 percent level (one-tailed). In spite of the failure to obtain results at the usual level of significance, however, the tendencies apparent in the results, along with <u>a priori</u> considerations, seem in this case to put the burden of proof on those who would argue that wages did <u>not</u> affect employment growth adversely.

Finally, an estimate was made for the construction sector. Unfortunately, the wage series in construction refers only to private construction workers, who comprise only about half of total employment and whose wages are more than twice those of government construction workers. Thus, in using this wage series we have made some rather heroic assumptions. The results, below,

are clearly to be regarded with caution; even though they are highly significant statistically and are quite plausible on theoretical grounds.

$$(11)\quad \dot{V} = -.005 + \underset{(.06)}{.92}\,\dot{W} + \underset{(.09)}{.10}\,\dot{Q}$$

$$R^2 = .97 \qquad d = 1.29$$

Interpretation of the results

A number of interesting conclusions emerge from the regression results, though a large number of questions are also left unanswered.

In all sectors other than manufacturing, and in some industries within manufacturing, there was a tendency for employment growth to be inelastic with respect to output growth, even with wages held constant. However, in some manufacturing industries the output elasticity of employment was greater than one. Since we would not expect diseconomies of scale, negative learning effects, or reversals of most other trends normally believed to produce an inelastic coefficient, these results are puzzling. While it seems clear that the very high coefficient in furniture and wood products is an unreliable estimate, the other estimates cannot be dismissed as simply the result of multicollinearity because employment growth actually exceeded real output growth in three industries (including furniture and

wood products). A very small part of the explanation in textiles and footwear is that real product wages actually fell slightly between 1957 and 1965. But the only plausible explanation which seems to fit the observed trends is that the level of industry aggregation is too high and that within each industry the production of more labor-intensive products grew more rapidly than the industry average. Constant returns to scale in the production of each product would be consistent with employment growing faster than output for the entire industry in this case.

It is not possible from the data available to go a step beyond estimating output and wage coefficients to an analysis of the economic forces which determine the coefficients themselves. For example, we cannot find out whether an inelastic output coefficient is the result of economies of scale, learning-by-doing, differential rates of product growth, or some other force. Harris and Todaro did attempt to discover if wage increases in Kenya induced productivity growth by encouraging the substitution of capital for labor or by spurring managers to increase X-efficiency.[23] Their method was to compare the influence of wages upon productivity lagged one year with that of wages on productivity in the same year. They argued that investment decisions take time to implement and therefore capital substitution is a function of wage increases the previous

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[23]Harris and Todaro, op. cit., pp.

year. Unfortunately, distinguishing the two sources of wage-induced productivity growth is probably not that easy; data on capital (or detailed case studies) are needed. What is important for decisions to substitute capital for labor is the projected trend of wage increases and it seems just as plausible to assume that current capital investment is based on an accurate prediction from past trends that current wages would justify the investment. No attempt was made, therefore, to estimate a lagged relationship.

The major conclusion to be drawn from the regression results is that wage increases, through whatever mechanism they may have acted, had a considerable impact on employment growth. The estimated elasticities in Jamaica are somewhat lower than those found in most studies in other countries. In manufacturing and mining, for example, the elasticity of substitution was about .6 for most of the industries, compared to estimates elsewhere usually ranging from .70 to 1.00.[24] Moreover, the increase in real product wages was only about 2-6% per year in most industries and sectors. Nevertheless, the cumulative impact of wage increases over the eight year period 1957-1965 was enormous in many industries. Table 6 shows how much more employment would have grown in several industries in this period had real product wages remained constant, but assuming output had grown at the same rate. Apart from textiles

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[24] See ibid., pp. 38-39, for a brief comparison with other studies of less developed countries.

Table 6. The effect of wages on employment, by industry, 1957-65

Industry or sector	% Change in real product wages	Estimated % change in employment had wages remained constant
Sugar manufacturing	77	46
Other food & beverages	19	12
Textiles and footwear	-4.4	-2.4
Non-metallic mineral products	23	23
Metal products & repair	20	10
Mining	69	35
Transportation	136	108
Sugar	74*	106
Construction	61	57

* Money wage increase. The real product wage increase was about 79%.

and footwear, where employment benefitted from a slight fall in real product wages, the regression estimates imply that employment would have been from 10% to 108% greater had real product wages not risen.

The estimates are subject to several qualifications, of course. In mining, for example, it was suggested that productivity growth may be autonomous and that the correlation with wage increases may stem from productivity-linked wage bargaining. No great reliance can be placed on the wage coefficient for the

metal products industry or even that in the construction industry. Nevertheless, unless one views the estimated elasticities of substitution as wholly spurious, the conclusion must remain that wage increases had a large cumulative impact on employment growth in the period under review.

IV. Productivity Growth as the Determinant of Wages

The implication of the preceding analysis is that wage growth causes productivity growth. An obvious question is, how can we be sure that the direction of causality is not reversed -- that wage growth is not primarily a function of productivity growth? The question is especially pertinent in the case of Jamaica since the only other econometric study of the Jamaican wage-productivity relationship did, in fact, treat wages as the dependent variable.[25]

The direction of causation cannot be established conclusively, nor is there any reason to suppose that the relationship between wages and productivity was entirely uni-directional. Nevertheless, there are good reasons for thinking that, for the most part, wages caused productivity growth rather than the reverse.

One suggestive result is the relationship of wage changes

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[25]Marshall Hall, "An Analysis of the Determinants of Money Wage Changes in Jamaica, 1958-64," Social and Economic Studies (June, 1968), pp. 133-146.

to productivity changes in the preceding year. It seems plausible to assume that if productivity growth influences wage growth, it does so with a lag. A lag in the response of wages to productivity change seems especially likely if collective bargaining or government wage-setting is an important element in the process of wage-determination. The following equation was therefore tested for the pooled sample of six manufacturing industries plus mining:

$$(12)\quad \dot{W}_t = a + b\,\dot{Q}_t + c\,\dot{V}_{t-1}$$

The output variable was included on the assumption that demand conditions might have exerted a separate influence on wages, either because the demand curve for labor shifted along a fixed and inelastic supply curve or because the state of the product market influenced the willingness of firms to accede to union wage demands. The result of the regression with all variables measured in constant prices was:

$$(13)\quad \dot{W}_t = .027 + \underset{(.22)}{.43}\,\dot{Q}_t - \underset{(.20)}{.43}\,\dot{V}_{t-1}$$

$$R^2 = .23 \qquad d = 2.54$$

The same regression was run with all variables in current prices. The results are shown in equation (14). The current price subscript is omitted.

$$(14)\quad \dot{W}_t = .070 - \underset{(.08)}{.11}\,\dot{Q}_t - \underset{(.08)}{.10}\,\dot{V}_{t-1}$$

$$R^2 = .02 \qquad d = 2.30$$

The tests of the lagged relationship show that, not only was productivity change not a significant determinant of wage changes, the sign of the productivity coefficient was the opposite of that predicted. The fact remains, however, that productivity and wage changes in the same period are significantly correlated and that correlation does not establish the direction of causation.[26]

Another set of tests provides somewhat stronger evidence that wages should be considered the independent variable. If wages did, in fact, follow productivity then we would expect that over the entire nine year period 1957-1965 wage growth would be highly correlated with productivity growth. However, if wages were determined largely independently of productivity growth within individual industries -- whether by a largely free labor market or by union pressures to keep wage gains from varying too drastically among industries -- we would not expect wage increases to be highly correlated with productivity increases in individual industries. Moreover, if wages were the independent variable, we would expect less inter-industry variation in wage changes than in productivity changes.[27] In brief, if wages merely followed productivity growth the

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[26] It was not possible to test a lagged relationship for individual industries because there were too few degrees of freedom.

[27] This assumes that the elasticity of substitution varies by industry and/or that output growth and technological change also affect productivity growth.

correlation between wage and productivity changes over a lengthy period would be high and the variation in wage and productivity changes among industries would be similar. On both counts the evidence suggests we must reject the hypothesis that wages merely followed productivity. The simple correlation coefficient between (current price) wage and productivity changes for the period 1957 to 1965 in the six manufacturing industries plus mining and transportation was only +.175.[28] The comparative standard deviations of wage and productivity changes are shown in Table 7. It is obvious that inter-industry wage

Table 7. Inter-industry Variations in Wage and Productivity Changes, 1957-65

	Current Prices		Constant Prices	
	V	W	V	W
Mean	40.1	58.4	28.1	44.0
Standard deviation	44.4	28.4	53.9	46.6
Coefficient of Variation	110.7	48.6	191.8	105.9

variations were much smaller than inter-industry productivity variations.

Although some wage increases may have been facilitated

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[28]Sugar was excluded to avoid double-counting and construction because of data quality. This was the test used by Salter to determine if wages in the United Kingdom were the result of productivity growth. See, W.E.G. Salter, Productivity and Technical Change (Cambridge: Cambridge University Press, 1960), p. 115.

by prior productivity increases, it seems clear that in most cases the direction of causation was from wages to productivity.

V. The role of wages in employment growth

Even if we were to grant that wage increases are the consequence rather than the cause of productivity growth, it is impossible to sustain Hall's conclusion that,

> "The implications of our findings for the unemployment problem in Jamaica are obvious -- high wages are not the villains in the continued high rate of unemployment as wage changes do not appear to have kept pace with productivity gains." 29

Unfortunately, even if wages follow an autonomous increase in productivity growth, the increased wages may induce further productivity increases through factor substitution. So long as the elasticity of substitution between labor and other factors is greater than zero, any wage increase will either reduce employment as other factors are substituted for labor, or if the productivity increase is non-neutral, prevent the substitution of labor for other factors which otherwise would have occurred. In the previous section we concluded that, although wages are sometimes a response to prior productivity growth, wage increases do have an independent influence on productivity and hence employment. The best that can be said of wage

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[29] Hall, op. cit., p. 143.

increases in Jamaica would then seem to be that they may have only partially offset the potential employment benefits of autonomous productivity growth.

Hall is by no means the only writer to argue that wage increases have a minimal impact on employment. Therefore, it seems desirable to consider the question of wages and employment growth at some length, especially the arguments advanced against there being a negative relationship.

Consider first the question of factor substitution. In the rebuttal of Hall it was argued that wages do not just follow productivity growth but also cause productivity growth by inducing factor substitution. But suppose the possibility of factor substitution is ruled out. Suppose that the elasticity of substitution is zero. What then is the effect of wage increases on employment growth?

The direct effects of wage increases in a single industry are obvious. A wage rise when factor proportions are fixed raises costs[30] and hence product price, thereby reducing product demand and employment growth. The effects of general real wage increases are more complicated, but the end result is still to reduce the demand for labor in most cases. There are two reasons

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[30] In the case of a prior rise in productivity wage increases prevent costs from falling. If an industry is a price-taker -- as most export industries are, for instance -- a wage rise would reduce profits in the industry rather than raise prices, but the effect would still be to reallocate resources away from the industry and to slow down the rate of growth of output and employment.

for this. First, as noted earlier, a general rise in wages when no factor substitution is possible raises the relative price of labor-intensive goods. Therefore, unless wage-earners' demand patterns (in comparison with profit-earners' demand patterns) are sufficiently biased toward labor-intensive goods to offset the relative price effect, the wage rise will reduce employment. The other reason general wage increases affect employment growth is that they reduce output growth. Setting aside the question of changes in the output mix, employment growth in a fixed coefficient economy[31] is strictly a function of output growth. Output growth, in turn, is usually held to be a function of investment which is a function of profits. But an increase in real wages reduces profits. Therefore, even with invariable factor proportions a wage rise reduces the rate of growth of employment.[32] Of course the wage rise does not necessarily have this effect. Investment may be a function of mass consumer demand rather than of profits, in which case a wage increase may actually stimulate the growth of output and employment.[33] The presumption is, however, that wage increases

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[31]Eckaus first applied this model to employment problems in less developed countries. See Richard S. Eckaus, "The Factor Proportions Problem in Underdeveloped Areas," American Economic Review (September, 1955), pp. 539-565.

[32]Todaro, "The Urban Unemployment Problem," pp. 344-345.

[33]For the argument that redistribution to wage earners may increase the rate of growth see: Adolph Sturmthal, "Economic Development, Income Distribution, and Capital Formation in Mexico," Journal of Political Economy (April, 1955), pp. 183-201,

will reduce employment growth even when no factor substitution is possible.

Parenthetically, it should be noted that in an economy with unemployment, even wage rises which increase employment are second-best policy measures. The beneficial effects of higher wages come from the redistribution of income, but wages are both a source of income and a cost of production. The optimal solution to increasing employment would be to redistribute incomes by means other than wage increases.[34]

Closely related to the argument that wages don't matter because of limited factor substitutability is the argument that wages don't affect employment much because wage costs are only a small proportion of total costs. For example, Brewster notes that in Jamaica:

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and W. Paul Strassman, "Economic Growth and Income Distribution," Quarterly Journal of Economics (August, 1956), pp. 425-440. The argument is that, without a mass market, the rate of return on additional investment falls sharply so that profits are consumed rather than saved. With a better distribution of income, savings and investment would rise. Say's Law is reversed; if the investment opportunities are there the savings will be forthcoming. In fact, so long as savings must come out of profits, the logical conclusion of investment being a positive function of the wage level is that there is an optimum distribution of income. In an economy the size of Jamaica, the relevance of this argument is dubious. In any case, if the domestic market is to be widened a strong case can be made for raising rural incomes and expanding urban employment at constant wages rather than raising urban wages. The rich certainly do appear to consume a high proportion of their incomes in Jamaica, but this is more likely an argument for redistributing incomes to the government than to urban workers.

[34]For an excellent discussion of the conflict between wages as a distributive and an allocative instrument, see James

> "The weight of labour costs in manufacturing is low . . . In only four cases . . . does it rise above 25 per cent. The implication of this is that wage rises would have a substantially smaller effect on selling price than tends to be popularly believed. Thus, for example, although total money wages in manufacturing rose by about 54 per cent between 1957 and 1962 this would, other costs and productivity being unchanged, only make for a rise of about 13 per cent in the selling price of manufacturing output. That is an average of 2½ per cent a year." 35

This can be very misleading, for if there is a general wage increase throughout the economy, the price of intermediate inputs also rises and the effect on total costs is substantially greater than suggested by a comparison of direct labor costs to total cost. More precisely, to quote Knight, "Provided the intermediate goods used by an industry have the same local wage content as its value added, and capital goods have no local wage content, the wage costs as a percentage of value added can be shown to indicate the effect on the industry's costs of production resulting from a general doubling of wages."[36]

E. Meade, "Mauritius: A Case Study in Malthusian Economics," Economic Journal (September, 1961), pp. 521-534.

[35]Havelock Brewster, "Wage, Price and Productivity in Jamaica, 1957 to 1962," Social and Economic Studies (June, 1968), pp. 122-123. In fairness to Brewster, it should be noted that he recognizes "that the cost of those raw materials which are produced in Jamaica is itself influenced by the labour costs of production" (p. 123). However, he does not pursue this point and in some earlier articles written for a political journal he does not even mention it. See, Public Opinion, September 25 and October 2, 1964.

[36]J.B. Knight, "Earnings, Employment, Education and Income Distribution in Uganda," Bulletin of the Oxford University Institute of Economics and Statistics (November, 1968), p. 276.

Wages and salaries were about half of value added in Jamaican manufacturing in 1960. Of course wages as a percentage of value added overstates the importance of labor costs insofar as raw materials are imported. In Jamaican manufacturing, however, purchases from the rest of the world were less than 8% of total output in 1958.[37]

We conclude that the price effects of wage increases are more serious than suggested by Brewster. This can be a particular problem for employment in export industries facing very high elasticities of demand. Not only is the expansion of output and employment in existing industries discouraged but also the location of new firms or industries. Even for export industries relying wholly on raw material imports, rising wages deter export expansion because the only thing to distinguish Jamaica from its competitors in these footloose industries is its comparative rate of wage increase. In this regard it must be remembered that the wage coefficients estimated in a previous section understate the importance of wages on employment growth if wages are increasing. The coefficient estimates the effect of wage changes on employment when output is held constant, but fails to measure the effect of wage changes on output growth itself.

We have considered three arguments frequently heard to

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[37]Calculated from figures given in Carleen O'Loughlin, "Long-Term Growth of the Economy of Jamaica," Social and Economic Studies (September, 1963), pp. 274-275.

explain why wages "don't matter very much" and have argued that they are essentially fallacious. The first argument, that wage growth is unimportant because wages are induced by, but lag behind, productivity growth, is questionable on factual grounds. In the preceding section we argued that the evidence points to wage increases as the cause more than the consequence of productivity growth. Even when wage increases do follow productivity growth it seems very likely that they may induce further productivity growth in some industries. The second argument, that wages don't matter in industries with no possibility of factor substitution, was also shown to be fallacious unless the distribution of income is assumed to be a strong deterrent to output growth. Finally, a closely related argument -- that output (and hence employment) growth is little affected by wage increases because wages constitute a small proportion of total costs -- neglects the effect of wage pyramiding. Moreover, it fails to consider the impact of the wage level and wage trends on locational decisions.

A fourth misconception about the effect of wages on employment is the widely-held notion that wage increases only affect employment in the industry in which they occur. This is perhaps the most pernicious fallacy of all, though it is rarely expressed explicitly because so many regard it as self-evident.

The most obvious way in which wage increases in one sector may affect employment elsewhere, even though they may

have little direct employment effect, is through union pressure to raise wages in other sectors. This has undoubtedly happened to some extent in Jamaica, but it is not necessary to invoke widespread labor market "imperfections" to account for the spread of higher wages. Individuals acting alone, in their own self-interest, will create conditions in which wages will tend to spill over into other sectors.

The arguments run as follows. When a wage gap develops, some workers will leave their lower-paying jobs to seek employment in the high wage sector. If too many seek employment in relation to the number of jobs available, some workers may remain unemployed in the expectation of receiving a high-paying job later. That is, they will remain voluntarily unemployed with respect to low-wage jobs but involuntarily unemployed with respect to high-wage jobs. Arthur Lewis has suggested that this happens in Jamaica. He notes that "if your cousin is getting £ 8 per week working on a bauxite mine, . . . you are no longer willing to accept £ 3 per week for working on the roads."[38] Lewis attributes this rise in the reserve price of labor to envy, but it can be a perfectly self-interested response. For if one can get some means of support while unemployed and if one's chances of getting a high-paying job are enhanced by leaving his other job (as they might be if the

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[38]W. Arthur Lewis, "Closing Remarks," in Werner Baer and Isaac Kerstenetzky (eds.), Inflation and Growth in Latin America (Homewood: Irwin, 1964), p. 27. Lewis makes a similar remark

two jobs were in different parts of the country), then some workers will have a higher expected lifetime income by remaining unemployed for a time than by working in a low-wage job. The expected income at a future date of a presently unemployed worker is the wage the worker would receive if employed at that date times the probability of actually having a job. The stream of these expected incomes discounted is the present value of expected lifetime earnings. If either the wage or the probability of getting a job in the high-wage sector rises, then the present value of expected lifetime earnings of unemployed workers rises relative to the present value of lifetime earnings of those employed in the low-wage sector. The major implication of this is that unemployment is almost inevitable so long as a wage-gap exists. Moreover, workers may continue to pour into the cities where the high-wage jobs exist in spite of higher levels of urban unemployment. Todaro has dealt with all this rigorously and at some length in several articles.[39] Here, the point to be stressed is a little-noted implication of the development of this wage-structural unemployment -- that wages throughout the economy may rise in spite of heavy unemployment.

The point can be illustrated with the help of Figure 1.

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in Development Planning (London: Allen and Unwin, 1966), p. 77.

[39]Two key references are: Todaro, "The Urban Unemployment Problem," and "A Model of Labor Migration and Urban Unemployment in Less Developed Countries," American Economic Review (March, 1969), pp. 138-148.

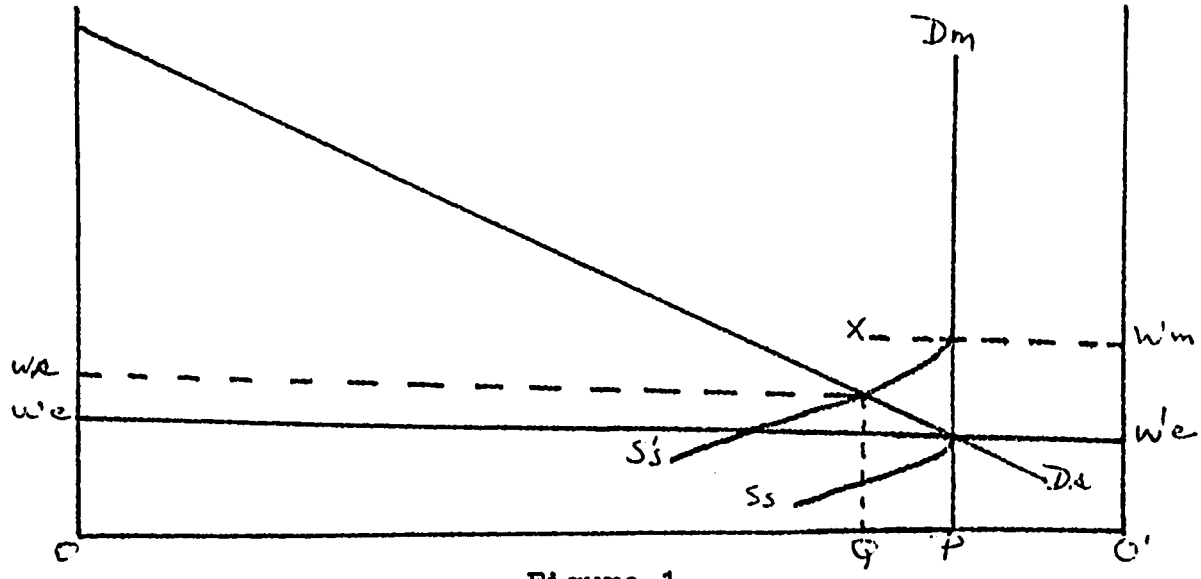

Figure 1

The diagram portrays a two-sector wage economy. The demand curve for labor in the sugar industry (Ds) is shown on the left side of the diagram and the demand curve for labor in mining (Dm), assumed to be perfectly inelastic, is shown on the right-hand side. The origin of the mining sector is O' and labor demand is measured from right to left. With a stationary labor supply of OO', the equilibrium wage rate is We, with OP workers employed in sugar and O'P employed in mining. The supply curve of labor to sugar (Ss) is shown as quite conventionally upward-sloping, becoming vertical at the equilibrium wage rate We. Suppose now that someone notices that a rise in mining wages will not affect mining employment and the mining wage is forced up to Wm. Mining employment does remain unchanged but some workers are now unwilling to work in sugar at a wage We since they have a chance to obtain a job in mining as old mining workers retire. (The stationary labor force does not assume

no turnover in jobs, only that new entrants balance attrition.) Thus the supply curve of labor to the sugar industry shifts to the left to Ss', thereby reducing employment in sugar to OQ, creating unemployment of PQ, and raising sugar wages to Ws. The supply curve of labor to mining is perfectly horizontal for a distance Wm X at the new mining wage Wm (so long as mining employment remains constant). Note, too, that if the demand for labor in mining were to grow (Dm were to shift to the left), the supply of labor to sugar would again shift to the left because the probability of getting a job in mining, and hence expected lifetime income from remaining temporarily unemployed, would rise.

Thus, so long as the labor force does not grow fast enough to offset them, the effects of rising wages or rising employment at constant wages in high-wage sectors will be to raise wages throughout the economy. This implies that the net employment effect on the whole economy may well be less than the direct employment expansion in the high-wage sector itself. As for wage increases, it means that even when higher wages have no direct effect on employment there is a likelihood that they will spill over into sectors where wages do affect employment. Furthermore, this general wage rise can occur in spite of the existence of open unemployment.

While a detailed attempt to establish that this has actually happened in Jamaica will be left to another paper, the following observations are suggestive. First, as shown in

Figure 2, wages have risen throughout the economy. Figure 2 unfortunately refers only to workers employed in establishments or farms with ten or more workers, the very ones most likely to be unionized. Thus, the observed wage trends may merely reflect union activity. Continuing complaints of "shortages" of workers for low-paid agricultural jobs suggests, however, that wage-pull from the high-wage sectors may be at work, too.

The second indication of the influence of high wages is an excellent study of internal migration by Adams.[40] Adams used multiple regression analysis to investigate the determinants of male labor force migration between the fourteen parishes of Jamaica in the years before 1960. The major results of interest here are that the median wage levels in both the sending and receiving parishes were highly significant variables and along with distance, explained most of the variation. Each one percent rise in the median wage level of the receiving parish, with everything else held constant, produced a three percent rise in the rate of migration.[41] This was not migration for a single year, but rather cumulative migration over several years (but

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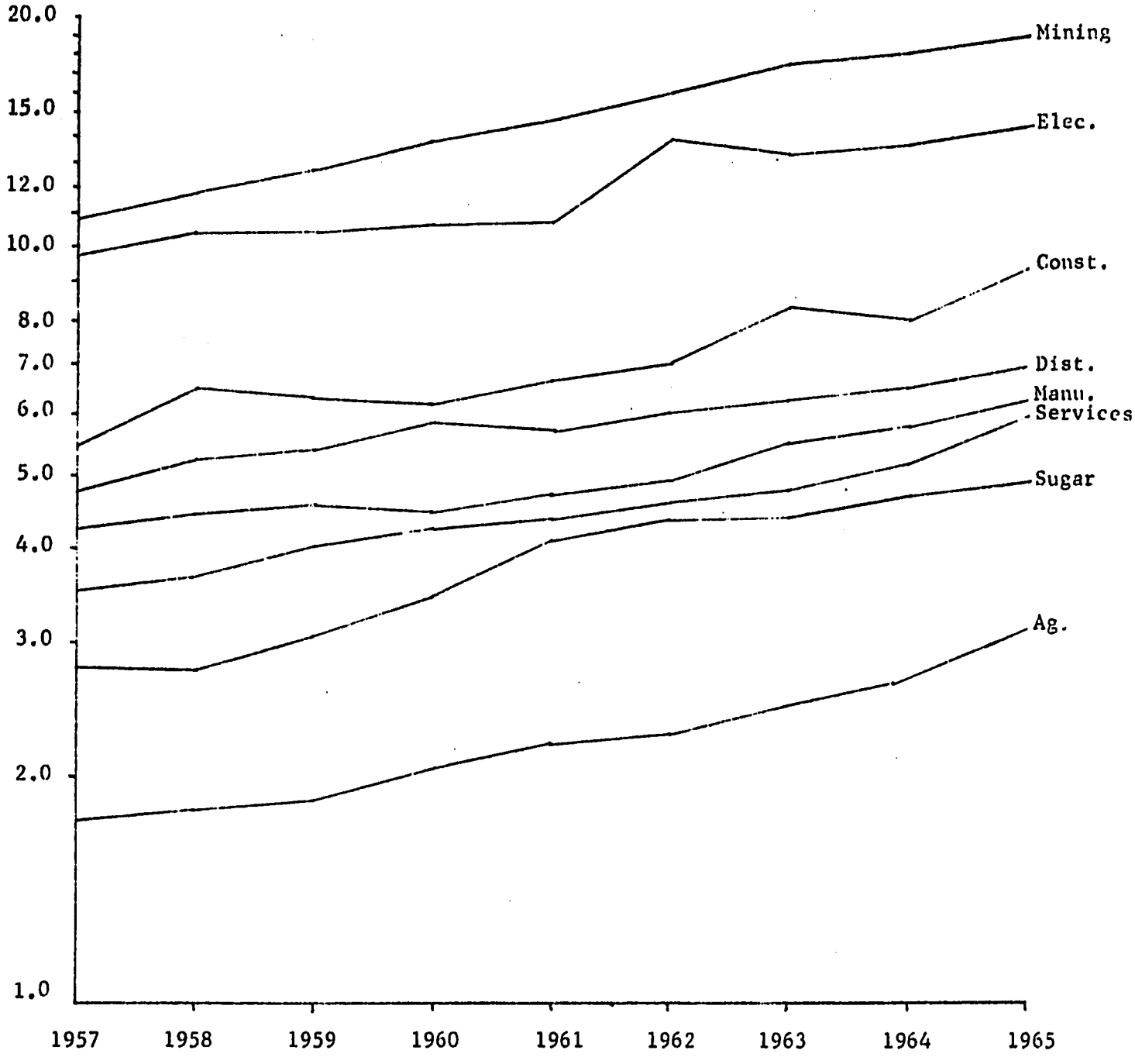
[40] Nassau A. Adams, "Internal Migration in Jamaica: An Economic Analysis," Social and Economic Studies (June, 1969), pp. 137-151.

[41] The rate of migration is defined as the ratio of the number of persons born in the sending parish but resident in the receiving parish divided by the population of the sending parish. Several different regressions using different variables were run. The coefficient referred to in the text was characteristic of the magnitude found in most of the regressions. A one per cent rise in wages in the sending area was associated with about a one percent reduction in the rate of migration.

Figure 2
Money earnings trends 1957-65, skilled plus unskilled workers.



excluding those who had returned to their parish of birth). Nevertheless, it indicates that a sustained wage gap will have a large impact on the supply of labor in the low-wage areas. Another finding of the research was that the unemployment rate in the sending area was significantly associated with the rate of migration but the unemployment rate in the receiving area was not. This also accords with expectations that workers will migrate to an area in spite of high unemployment if wages are high enough.

We conclude that wage increases will affect employment significantly if any of the following conditions hold: (1) The elasticity of substitution between labor and other factors is high; (2) The elasticity of product demand is high; or (3) The wage increases occur in an industry with above-average wages.

By these criteria a wage increase in almost any industry in the Jamaican economy will affect employment adversely. Thus, although the elasticity of substitution and the elasticity of product demand are relatively low in bauxite, a wage increase in that industry tends to spill over into other sectors with higher elasticities. Similarly, although the product elasticity of demand is probably relatively low in construction and transportation, the elasticities of substitution are quite high. Export-oriented manufacturing industries have high elasticities of product demand and usually are relatively labor-intensive and have a high elasticity of substitution as well. The same holds true for sugar and other agricultural exports. Finally,

wages in the public sector also have a large adverse impact on unemployment if there is a budget constraint. With minor qualifications, the wage elasticity of demand for labor in the public sector can be taken as unity.

This does not imply that wage increases always affect employment adversely or that even where they do, they are therefore necessarily to be avoided. Some manufacturing industries oriented toward the domestic market and some modern sector service industries may be able to raise wages with little direct or indirect impact on employment.[42] Moreover, rising wages have many beneficial effects[43] -- they tend to create a mass market, improve the distribution of income vis-a-vis the rich (though perhaps worsen it vis-a-vis the poor), and induce a search for ways to increase X-efficiency. Rising wages in a full-employment economy are clearly desirable, and it is partially for that reason that full employment is a desirable goal. However, in an economy with widespread unemployment most of the benefits of high wages come at the cost of employment growth. In some cases this creates an irreconcilable conflict in policy goals,

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[42]Even here there are possibilities for harmful effects which are not superficially obvious. The beverage industry, for example, faces low product elasticity of demand and already uses modern production techniques. However, a leading manufacturer plans soon to mechanize the loading of cases onto trucks because of anticipated future wage increases. Many industries with no scope for further mechanization on the production line may still be able to reduce labor input substantially in ancillary material-handling activities.

[43]For a well-balanced discussion of the pros and cons of wage increases in less developed countries see Knight, op. cit.

the cause of which is too few available policy instruments. In other cases, other policy instruments may be available to achieve essentially the same benefits of wage increases without their costs.

VI. Trade, trade policy, and employment growth

Frequent reference has been made to the importance of international trade or particular trade policies on employment growth in Jamaica and other developing countries. This section will summarize these references from previous sections and touch on other ways in which trade policy may have an important impact on employment growth.

In the first place, governments have a wide discretion in the choice of industries they may promote. At the margin (though not necessarily on average), there is a strong presumption that export industries will be more labor-intensive in countries with heavy unemployment than will import-substitution industries. It follows, therefore, that governments concerned with employment growth should not choose policies, e.g., overvalued exchange rates plus import quotas, which discriminate against exports in relation to import-substitute or non-traded goods.

See also Anthony D. Smith (ed.), Wage Policy Issues in Economic Development (New York: St. Martin's Press, 1969).

A fairly good case can be made for the proposition that the low employment lag in Jamaican manufacturing during the period 1957-65 is very closely related to the spectacular growth of manufacturing exports during this period. Manufacturing exports (sections 5-8 of the S.I.T.C.) very nearly quintupled between 1957 and 1965, from a low base of course. It should be added that 1965 was a bad year with manufacturing exports down about 8% from 1964. Put in terms of export shares, the share of manufacturing exports rose from 2.3% in 1957 to 7.0% of total exports in 1965, during a period when total exports increased by 50%. The bulk of these increased exports were the very labor-intensive products of the textiles and footwear industry. Exports of this industry expanded nearly ten-fold during the eight-year period and constituted about 60% of total manufacturing exports in 1965. Since about one-third of the increased employment in manufacturing occurred in textiles and footwear, it seems clear that export growth played a large role in the growth of employment in manufacturing.

A second conclusion is that wage growth has an especially important effect on employment in a very open economy. Wage increases in very labor-intensive industries -- as marginal export industries tend to be -- have an especially large impact on labor costs and hence on production methods, if these are subject to alteration, or on output growth, if increased labor costs must be reflected in higher product prices or lower profits. Moreover, the price elasticity of product demand, and therefore

the derived demand for labor, tends to be very high for labor-intensive export goods. In addition, location decisions in many of these export industries are extremely sensitive to wage trends. All of this means that, in a country heavily dependent on trade, the elasticity of substitution drastically understates the impact wage increases will have on employment growth in some of the most labor-intensive industries.

Again we can appeal to the example of the Jamaican textile and footwear industry to illustrate the point. Union officials in Jamaica have largely avoided attempting to unionize the textile industry and they admit freely that this is because they fear the effect this would have on employment. At the same time, these same officials continue to press for large wage increases in sugar, for dock-workers, and for many other industries where the elasticity of substitution is as high or higher than in textiles. In brief, though the unions are not notably sensitive to the employment implications of wage increases elsewhere in the economy, they feel that the wage elasticity of demand for labor is so high in textiles that it would be virtually impossible to raise wages without risking the jobs of most workers in the industry.

A third way in which trade policy affects employment growth is through its influence on the choice of technique. Especially in a very small economy, a high proportion of capital goods are imported. Thus exchange rate and tariff policy critically affect the relative price of capital and labor. An

overvalued exchange rate underprices capital and a graduated tariff structure with zero tariff on the import of capital goods on top of this accentuates the relative price distortion. Yet there is probably no more widespread fallacy in the less developed world than that the price of capital must be kept low so that the country can import more. Jamaica cannot be said to have an overvalued exchange rate but one of the policies which has been used to promote industrialization, tax allowances based on accelerated depreciation, has the same effect of distorting relative factor prices.

Finally, trade policy can affect employment growth adversely in the very attempt to use it as a shield to protect employment in high-wage industries. This paradoxical conclusion comes from extending the analysis of the adverse effects of a skewed wage structure on wage trends. The most spectacular cases of a wage gap are usually in extractive export industries such as bauxite in Jamaica. Such industries can sustain such high wages partly because substitution possibilities may be limited, but also because their comparative advantage is so strong that they are highly profitable even with high costs so long as there is a single export exchange rate. Indeed, the very high wages extracted from such industries can be viewed as a way to impose a perhaps otherwise unobtainable export tax, especially when the industry is foreign-owned. Whatever the origins of the wage gap, the argument of the previous section suggests that such a gap tends to slow employment growth because

wage increases spill over into other sectors of the economy. A similar phenomenon may have occurred in many countries' import-substitution industries. Employment in import-substitution industries can be artificially shielded from the effect of wage increases to some extent by raising the level of protection afforded them. The effect of such use of trade policy, however, is to open up a wage gap which may generate wage increases and reduce employment elsewhere in the economy.

Conclusion

There is growing disenchantment with the industrialization strategy of development, at least in academic circles. Part of this disenchantment stems from the mounting urban unemployment problem and from the apparent inability of manufacturing growth to make a dent in it.

This paper has argued that, so far as the growth of <u>demand</u> for labor in manufacturing (and other modern industries) is concerned, whether there is a lag in employment growth depends quite heavily on what happens to wages. High and growing wages were identified as the major cause of the excess <u>supply</u> of labor to the modern sector as well. Since wage trends also have a large effect on the rate of growth of output of very labor-intensive export sectors, the policy implication of our analysis is that small, over-populated countries like Jamaica may still find an export-oriented industrialization strategy the most

promising for both output and employment growth -- if they can gain the necessary control over wages.

Appendix to Section III

Output data

All output figures refer to Gross Domestic Product at Factor Price estimates taken from the government's National Income and Product, various years. Both current and constant price estimates are available by industry. For 1959-65 the constant price series uses 1960 as the base year. For 1957 and 1958 the base year is 1956. A continuous series of constant price estimates was obtained by splicing the two series.

Unfortunately, the Department of Statistics revised the GDP series beginning in 1959, but did not provide revised figures for earlier years. The old and revised series overlap, however. Thus for percentage change regressions the revisions present no real problems. In other cases, data from 1959-65 were taken from the new series and the old series was converted to the new basis by adjusting 1957 and 1958 estimates by the ratio of 1959 new to 1959 old figures.

Wage data

All "wages" are actually average weekly earnings. In all industries except sugar manufacturing the figures are derived from the official publication, Employment and Earnings in Large Establishments. Wage rate information was published by the

government during this period but it is not possible to compute a meaningful average wage since the only information published is the range of wages. Employment and Earnings, on the other hand, published total employment and earnings by skill level from a quarterly survey, so it was possible to compute weighted average weekly earnings for the entire year. Where possible, white collar workers were excluded from the industry average, so that calculations are usually based on average skilled plus unskilled earnings.

In sugar manufacturing (as opposed to the sugar industry as a whole), a wage series was not available for all years in Employment and Earnings. An average wage was therefore calculated by dividing total employment, taken from the Annual Report of the Ministry of Labour, into the wages and salaries component of GDP and converting to a weekly basis.

The average earnings figure relates only to firms employing ten or more workers (fifteen or more before 1963). Thus, the use of these figures in regression analysis assumes that all other wages moved in the same direction.

In some manufacturing industries adjustments were made to the wage data on the basis of information reported by the Department of Statistics. For example, in the transportation sector in 1964, a large number of highly paid dock workers were inadvertantly excluded from the Employment and Earnings survey, according to the 1965 report. Revised figures are not provided but a reasonably good adjustment can be made. Sea transportation

accounts for about 40% of total employment in transportation or 32.7% of employment including communications and storage. Average earnings in sea transportation rose 31.1% between 1964 and 1965 and all of this increase was due to the exclusion of the group of dock workers in 1964. (See Employment and Earnings, 1965, p. 32.) Multiplying 31.1% by 32.7% we find about 10% of the total 30% rise in 1965 was due to this exclusion. Thus 1964 average earnings were raised by 10% from 7.89 to 8.68. A similar adjustment was made in food and beverages. The chemicals and tobacco industries were omitted because of unreliable wage data.

Employment data

In manufacturing, employment figures were taken from the Ministry of Labour's annual survey of registered factories, reported in the Annual Report of the Ministry of Labour up until 1061 and supplied privately by the Ministry for later years. In other sectors, employment estimates were derived by dividing average wages into the wages and salaries component of GDP.