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AN ANALYSIS OF THE DETERMINANTS OF MONEY WAGE CHANGES

IN JAMAICA 1958-64

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## Introduction

This paper, together with paper No. 8, was prepared as part of a research project on Jamaica within the work program of the Division, which is concerned with the use of quantitative techniques as aids for country economic analysis. The choice of Jamaica, made in consultation with the Area Department, was based on the need to include within the work program an example of a small country. It was also felt that Jamaica was a country in which the Bank was likely to be involved operationally. The project consists of three inter-related parts; (1) a structural model (circulated in draft form in November, 1966) and now under revision. (2) special studies of problems relating to employment, wage levels, productivity and savings behavior of which this paper and paper No. 8 represent the first draft conclusions. (The work on savings behavior will be incorporated in the revised version of the structural model). The problems of employment and wages structure were raised by the Western Hemisphere as likely to be crucial areas for consideration in their continuing economic work on Jamaica.

The object of the paper is to test out the widely held view that the level of wages in Jamaica has been artificially distorted as a result of the economic and political strength of the trade unions. The economic structure of Jamaica presents a cross-section ranging from capital intensive mining operations, producing for a world market where prices and wages need bear little relationship to the domestic economy; at the other end of the spectrum there is a labor intensive plantation economy producing tropical crops for export alongside a domestic agricultural sector still largely based on family farms. The paper makes use of econometric techniques to test whether the data available bears out the assertion that wage levels have tended to become divorced from productivity.

This paper was prepared by Marshall Hall of the University of Washington, St. Louis, as a consultant to the Economics Department. The work was done in the Bank during the summer of 1967. The author wishes to acknowledge the assistance of Dawn Elvis in its preparation.

AN ANALYSIS OF THE DETERMINANTS OF MONEY WAGE CHANGES IN JAMAICA 1958-64

1. The Jamaican economy in the 1950's and 1960's has experienced a rapid rate of growth, a large outward migration of the labor force to Britain and persistent and chronic unemployment. This perverse behavior of unemployment has been explained or rationalized by pointing out, among other things, that the growth has occurred to a large extent in capital intensive industries and that wages, due in part to powerful trade unions, have increased rapidly thus diminishing the demand for additional workers.<sup>1/</sup>

2. This study will focus only on the experience in money wage changes, although in the conclusion we will comment on the relevance of the capital intensive thesis as an explanation of the continued high rates of unemployment. Specifically, we are concerned with analyzing the determinants of changes in money wages over time (by time series) and among industries (by cross-section analysis).

3. Since our analysis is concerned with money wage changes demand and supply equations, as such, are not analyzed. Instead, the focus is on what has been termed wage adjustment equations or the wage price-productivity nexus.<sup>2/</sup> Wage adjustment equations for developed countries - particularly the

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<sup>1/</sup> The belief that trade unions are responsible for "high" or "too high" wages and that in part this slows down employment is a popular one in Jamaica. Ineed according to Cumper even the unions believe it. He states that union leaders "aware that their actions may face the employer with the alternative of employing more workers at lower wages or fewer at higher wages deliberately adopt the high wage policy in the avowed belief that 'government' must take care of unemployment - and apparently in the confidence that it will be able to do so".

G.E. Cumper "Labor and Development in the West Indies: Part II" Social and Economic Studies Vol. II March 1962, p. 31.

<sup>2/</sup> Bodkin, R.G., The Wage-Price Productivity Nexus, University of Pennsylvania Press, Philadelphia 1966.

United States and Britain, have been analyzed by a number of economists.<sup>1/</sup> Their studies suggest that the key explanatory variables of money wage changes are changes in unemployment, changes in consumer prices and changes in productivity, although other explanatory variables such as the profit rate and degree of trade unionization have also been introduced.

4. The expected relationship between changes in money wages and these variables is fairly straight forward -- changes in unemployment are expected to have a negative relationship and changes in prices and productivity a positive effect. For a country like Jamaica, however, it is not clear, a priori, that there exists a mechanism which would translate the variation in these variables into changes in money wages or that these are even the key variables in the explanation of money wage changes.

5. The continued high rate of unemployment - 18% in 1960 - might mean that except for a small number of skill categories money wage changes are very inelastic to changes in unemployment rates. At 1960 unemployment rates a change of 9 percentage points - a 50% decrease in the rate of unemployment - would leave unemployment rates still oppressively high by most standards.

6. The relation of price changes to money wages is supposed to reflect "the well known tendency for wages to be adjusted" to changes in the cost of living.<sup>2/</sup> In an open economy, however, it is not immediately obvious how

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<sup>1/</sup> Bodkin, R.G. *ibid.*, and G.L. Perry, Unemployment, Money Wage Rates and Inflation review and summarize the work of, among others, A.W. Phillips, R.G. Lipsey, L.R. Klien, R.J. Ball, William Bowen, L.A. Dicks-Mireaux and J.C.R. Dow in this area.

<sup>2/</sup> Bodkin, R.G., *ibid.* p. 26.

changes in consumer prices, which very often reflect import price movements, lead to increases in money wages. Even if one begs the causality issue as to whether price changes determine wage changes or the other way around it is still not intuitively obvious that in an open economy - with increasing food imports - money wage changes will be associated with consumer price changes. The analysis of money wage changes in the U.K., for example, indicates that although consumer price changes are statistically significant variables in the explanation of money wage changes they account for only a small proportion of the variation in wage changes.<sup>1/</sup>

7. The positive relationship between productivity and money wages has many explanations. At the traditional theoretical level money wage changes are related to real wage changes and productivity increases to changes in the marginal product of labor. In a competitive, "ceteris paribus", setting this means that the marginal revenue product or wage should increase. Given the high unemployment rates of Jamaica and the oft mentioned, but rarely verified zero marginal productivity of labor assumption for less developed countries, the lack of competition and the many institutional constraints, it is difficult to assume simply that the factors of production, in particular labor, receive a payment equal to their marginal revenue product.

8. Another explanation is based on the assumed constancy of relative shares between labor and non-labor income. This view would require wages to change at the same rate as productivity, thus leaving the relationship between labor income and non-labor income unchanged. The constancy of relative shares seems a highly unlikely phenomenon in economies dominated by a few industries and at the same time undergoing structural change. Consider, for example, the

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<sup>1/</sup> R.J. Bhatia "Unemployment and the Rate of Change of Money Earnings in the U.S. 1900-1958," Economica August 1961 and the works of the writers mentioned in footnote 1 on page 2.

labor intensive nature of Jamaican sugar production as contrasted with bauxite mining and the likelihood of a higher rate of return to capital in bauxite and it is obvious that a number of changes must just offset each other for the constancy of relative shares to remain. Furthermore, in a country like Jamaica where incomes and wealth are highly unequally distributed - more unequally, it has been suggested, than most developed and less developed countries - it would seem natural for labor's share to increase eventually.

9. Other "ad hoc" views emphasize the "right" of the worker to share in increased productivity and the ability of labor unions to obtain that right.

10. The above is not meant to argue that the traditional wage adjustment equations are unimportant in the Jamaican context, but rather to suggest that enough possible qualifications exist to make a careful, detailed empirical analysis of money wage changes a necessity if one is to understand that phenomenon and relate it to crucial variables such as unemployment.

11. In the Jamaican context the degree of trade unionization and the upward pull on all wages of the high wage modern sector-mining, are also regarded as important determinants of money wages. The high wages in the mining (bauxite) sector serve as a guide to the employees and the unions (particularly the unions) in determining the appropriate wage change. The existence of only two powerful unions (both non-craft) also suggests that gains and losses in wages relative to the modern sector will not go unannounced.<sup>1/</sup>

12. In the analysis of money wage changes both changes in the wage rate and changes in the average earnings have been used as the variable to be

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<sup>1/</sup> Maunder, W.F., *Employment in An Underdeveloped Area - A Sample Survey of Kingston Jamaica* University of Maryland, 1964, p. 34.

explained.<sup>1/</sup> Wage rates may differ from average earnings because of a premium (overtime pay), or because different wage rates for the same occupation may exist. Both wage rates and earnings are used in this study and it is assumed that the same model can be applied to both concepts. The precise role of trade unions in money wage changes among industries or firms, or non-unionized and unionized employees in the same firm, is difficult to determine as it seems unlikely that unions will be able "ceteris paribus" to secure continually greater wage increases for their members than wage gains obtained by non-union workers.

13. The basic equation considered for analysis is  $W = a + b_1 U + b_2 P + b_3 \pi + b_4 W_m$  where  $W$  is the change in wages,  $U$  the change in employment,  $P$  the change in prices,  $\pi$  the change in productivity and  $W_m$  the mining wages in  $t-1$  divided by the wage rate of the particular industry lagged one period. Standard multiple regression analysis is the method of analysis used in this paper.

#### Data

14. Data on labor -- unemployment, labor force, labor force participation, wage rates, earnings, extent of trade unionization -- are very poor for the less developed countries and Jamaica is no exception. No such thing as an unemployment or labor force series exists and the data on wages and earnings are not truly continuous series.

15. Research on Jamaica cannot, however, await the provision of good data and the researcher must either gather his own or make use as best he can of the existing data. In this study the latter path has been followed and has utilized all of the relevant published data.

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<sup>1/</sup> British studies tend to use wage rates and American studies average earnings. This may well reflect data availability rather than a disagreement over which is the correct variable.

16. Three bodies of wage data exist - wage rates, average earnings and the detailed wage and salary data from the 1960 survey. The wage rate and average earnings data are used for the explanation of changes in money wages and overtime and the survey data for the cross section analysis of wage differences among industries.

17. A detailed explanation of the data is given in the appendix and below we merely point out the essential feature of each variable used in the analysis. The following is a list of variables with a brief explanation on how they were derived.

18. Wijt = Wage rates for the *i*th industry in the *j*th job occupation in the *t*th year. Data on wage rates and hours worked by industry by occupation have been published twice a year -- March and September since 1957. These data pertain to large establishments only and a range of wage rates for each occupation in each industry, rather than the actual or average wage rate for each occupation, is presented. For purposes of this study the occupations were combined into three broad classes - skilled, unskilled, and office. For each class we computed an average wage rate defined as the mean for both periods of the high and low estimates for all occupations which make up a class. The unit of measurement is a week. The wage rate data is, therefore, a crude average of wage rates in broad skill categories in large establishments. Because only three occupational classes are defined, and because the wage rate is the mean of the entire range in each class for the two periods it seems safe to regard the computed average rate as representative of the wage rate of that class.

19. Eit = Average weekly earnings of the *i*th industry in the *t*th year. Average weekly earnings data have been prepared quarterly on an industry

basis since 1957. The estimate used here is an average of the four quarters for each industry. No occupation data were available on earnings.

20.  $P_t$  = General retail price index for Kingston.

21.  $O_{it}$  = Gross domestic product or output for the  $i$ th industry in the  $t$ th year.

22.  $W_{mt}$  = Wage rates for the mining industry computed similarly to  $W_{ijt}$  discussed above.

23.  $E_{mt}$  = Average weekly earnings for the mining industry computed similarly to  $E_{it}$  discussed above.

24.  $\pi_{it}$  = Productivity for the  $i$ th industry when  $W_{ijt}$  is the dependent variable. A measure of productivity was obtained by defining the output of a particular industry as the gross domestic product of that industry. The number of workers, in man-weeks, was obtained by dividing the wage bill for each industry - total wages and salaries - by the weekly wage rate of skilled workers -  $W_{ijt}$  where the subscript  $i$  refers to the skilled occupation class. The gross domestic output of each industry was then divided by the number of workers, in man-weeks, to obtain output per man-week for each industry. More formally, let the wage bill be defined as  $W_{ijt}.N$ . This equals total wages and salaries for each industry, where  $W_{ijt}$  is the weekly wage for the industry and  $N$  the number of weeks worked by all workers; then  $W_{ijt}.N/W_{ijt}$  will yield  $N$ , the yearly total number of man-weeks worked in each industry. Gross domestic output divided by the total number of man-weeks worked is the measure of productivity used. Skilled wages were used for the  $W_{ijt}$  in the analysis of weekly wages as we were unable to devise a suitable weighting to combine the wage rates of all occupational classes.

25.  $E_{\pi_{it}}$  = Productivity for the  $i$ th industry when  $E_{it}$  is the dependent variable. The industries for which  $E_{it}$  was available were not identical to

the industries for which  $Wijt$  was available.  $E\pi_{1t}$  was computed similarly to  $\pi_{it}$ , except that the wages and salaries for each industry were deflated by the average weekly earnings for the entire industry, since the earnings data are not classified by occupation.

### The Estimated Equations

26. Four distinct money wage variables - skilled weekly wage rates, unskilled weekly wage rates, office weekly wage rates and average weekly earnings (all skill categories) are then to be explained. The basic equation estimated for each of the wage categories is:

$$\frac{Wijt}{Wijt-1} = a + b_1 \frac{Oit}{Oit-1} + b_2 \frac{Pit}{Pit-1} + b_3 \frac{\pi_{it}}{\pi_{it-1}} + b_4 \frac{Wijt-1}{Wmjt-1} + E$$

The dependent variable is the average annual change in weekly wage rates or average annual weekly earnings.  $Oit/Oit-1$  is a proxy for unemployment as no continuous series exists for either unemployment or the size of the labor force. This variable was expected to capture the interaction of demand and supply inherent in the unemployment variable. Ideally, it should be deflated by the labor force of the occupational category to take account of the different rates of growth in the labor force and output. No data is available on a continuous basis for the size of the labor force, but given Jamaica's high unemployment rate it was decided that the output undeflated could be used. The expected sign for unemployment, if it were available, would be negative, but the output variable is supposed to reflect increasing employment, therefore the expected sign is positive. The other variables, prices, productivity and the advantage of the mining sector are expected to be positively related to money wage changes.

27. The change in output variable has negative and significant coefficients for both the skilled occupation class and the (earnings) all occupa-

tions and is insignificant for both the skilled and office category. The negative and significant coefficient is contrary to expectation as it implies that increases in output are highly correlated with increases in unemployment or decreases in wages, the exact reverse of the reasoning we used for introducing the change in output variable as an explanatory variable. One possible explanation is that the labor force increased at a faster pace than output and that the increased output being concentrated in capital intensive industries failed to generate much employment yielding the perverse result of unemployment and output being positively correlated. This explanation is offered with great diffidence, however, as the migration of the labor force to the United Kingdom would argue against this explanation. It should, perhaps, be noted that the simple correlation coefficients of the various money wage change variables with changes in output was positive, but small - less than .20 in all four cases.

28. The changes in price variables were not significantly different from zero in all cases. The usual positive relationship was expected to be weakened considerably by the open nature of the economy and the general non-significance confirmed this expectation. Moreover, the simple correlation coefficients between the wage rates or weekly earnings either lagged one period or for the current period with prices of the current period were not particularly high, suggesting that inflation in Jamaica is not of the wage-push variety. The simple  $R^2$  ranged between .36 and .06. In other words, neither wage rate changes and price changes nor wage rates and prices are very highly correlated.

29. The changes in productivity variables have a positive and significant coefficient in all equations and emerge as the key explanatory variables of

Table 1

Results of Regression Analysis

Dependent Variable  $\frac{W_{ijt}}{W_{ijt-1}}$

where  $j =$  skilled, unskilled office & all occupations (earnings)

Dependent Variable	Constant Term	$\frac{O_{it}}{O_{it-1}}$	$\frac{P_{it}}{P_{it-1}}$	$\frac{w_{it}}{w_{it-1}}$	$\frac{W_{ijt-1}}{W_{mjt-1}}$	
Skilled	.390 (.901)	-.149 (2.555)*	-.166 (.394)	.930 (25.892)*	1.101 (.592)	$R^2 = .398$ D-W = 2.303 N = 54
Unskilled	1.125 (.650)	.55 (.238)	-.698 (.419)	.306 (2.245)*	.144 (2.944)*	$R^2 = .174$ D-W = 1.854 N = 54
Office	2.163 (2.357)*	-.211 (1.459)	-1.578 (1.474)	.182 (2.217)*	.069 (1.153)	$R^2 = .084$ D-W = 2.113 N = 50
All Occupations (Earnings)	.560 (1.356)	-.172 (2.478)*	.024 (.063)	.640 (8.883)*	-.003 (.905)	$R^2 = .665$ D-W = 1.835 N = 42

Notes: The significance ratio for each coefficient appears in parenthesis. The coefficients significant at the 5% level are denoted with a star (\*). N = number of observations and D-W = Durbin-Watson statistic.

changes in money wages. The coefficient is in every case less than one which implies that relative changes in wage rates are inelastic with respect to productivity.

30. The strong relationship between changes in wage rates and changes in productivity denotes the existence of a fairly rational labor market. The inelastic relationship suggests that, to the extent that labor unions have increased wages for their members, these gains have been at the expense of non-unionized workers rather than non-labor income. The inelastic findings are also at variance with the constancy of relative shares hypothesis as it indicates an increasing share for non-labor income. The dependent variable is changes in money wages, however, and a proper test of the constancy of relative shares hypothesis would require a comparison of total labor income - fringe benefits, indirect payments as well as wages with non-labor income. It is difficult to make a simple analysis of the constancy of relative shares from the national income accounts because the category "income of unincorporated enterprises" includes both labor and non-labor income; the statistics as they stand, however, do not refute the possibility that labor's share might have fallen. See Table 2. Since the productivity variable is in essence output per skilled worker rather than output per worker it is not meaningful to comment on the relative importance of productivity among the three occupational classes.

Table 2

Relative Shares in Net National Product

<u>Compensation of Employees as a % of Net National Product</u>		<u>Compensation of Employees plus Income of Unincorporated Enterprises as a % of Net National Product</u>
1959	59.9	81.2
1960	60.5	81.6
1961	60.4	81.2
1962	60.8	80.5
1963	60.5	79.8
1964	61.7	80.1

31. The upward pull on wage rates by the "modern" sector, mining, is significantly different from zero in the unskilled occupation class only, although the sign is generally positive. This variable is expected to operate through trade union pressure and what may be termed the demonstration effect. Union pressure arises because as indicated above wages in the "modern" mining sector is the pace setter and unions are apt to view their wage gains in relation to the wages in the mining sector. The demonstration effect works through the workers individual demands as they compare their earnings with the earnings of similar workers in the "modern" mining sector and the desire of their employers not to be "raided" of their better employees. The results indicate that this effect is generally not very significant and that even in the significant unskilled case the coefficients of .1 indicates great inelasticity in the impact on money wage changes of the relative difference of wages in the mining sector. It would require a 50% difference in wage levels between mining unskilled and other unskilled to generate a 5% increase in the wage rates of the other unskilled.

32. The percentage of the total variation explained in changes in money wages is very small in the unskilled and office occupational groups and it was thought that at least in the unskilled case the degree of trade unionization of the industry might be important. An attempt was made to determine the effect of the degree of trade unionization by introducing a set of industry dummy variables. These variables take the value "1" for the industry to which they refer and the value of "0" elsewhere. The rationale behind the use of these variables is that the effect of the union is the same for all firms in a given industry and that this effect is a constant over time.

33. The introduction of the seven dummy variables actually decreases the  $R^2$  in both the skilled and earnings (all occupations) equations and adds

very little to the explanation of money wage rate changes among office workers.<sup>1/</sup> To the extent that the assumptions about the effect of unions are correct the results suggest that unions are unimportant in explaining the relative changes in the wages workers receive. More generally the dummy variables indicate that the industry, per se, is unimportant in the explanation of money wage changes.

#### Cross Section Results

34. The analysis of wage rates and earnings discussed above focused on the explanation of changes in money wage rates and changes in average weekly earnings over the period 1958-1964 for a cross section of industries. In this section an attempt is made to explain the variation in the level of wages among industries for a given occupational class at one point of time. The analysis is thus entirely cross sectional with the data taken from the Report on a Survey of Establishments: Industrial Activity, Mining, Manufactures and Construction 1960.

35. The survey lists wage and salary information for the week ending Dec. 17, 1960 for 3 broad occupational groups - (1) Managerial, Supervisors, Clerical and Sales Workers (2) Craftsmen, Technicians and Machine Operators (3) Unskilled, Manual and Service Workers and the wage and salary per worker by industry for 1960. It is the variation in each of these measures of wages among the industries reported in the survey that this section seeks to analyze. The basic question being asked is the extent to which the variations in the level of wages among industries depend on differences among industry productivity, industry profits and trade union power. No data is available on an industry basis on the degree of union power, but the larger the variation explained by productivity and profit rates the smaller is the possible role

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<sup>1/</sup> Seven dummy variables rather than eight were used as the dummy variable formulation requires that some variables be deleted to prevent perfect colinearity with the constant term.

of unions.

36. The following is a list of variables used in this section, all of which came from the Survey source.

$E_{oi}$  = Weekly earnings of the oth occupational class in the ith industry defined as total earnings of that occupational class for the week ending December 17, 1960 divided by the total number of workers in that occupational class in that week.

$W_i$  = Wages and salaries per person employed in industry i in 1960.

$\pi^i$  = Productivity per worker in the ith industry, defined as the industry's gross domestic output divided by the total number of workers in that industry.

$R_i$  = Rate of return on fixed assets, defined as sales (total revenue) minus total specified costs (total costs) divided by fixed assets.

$\bar{R}_i$  = Rate of return on sales, defined as sales minus total specified costs divided by sales.

$K_i/O_i$  = Capital output ratio for the ith industry defined as the ratio of fixed assets of the industry to gross domestic output.

37. The weekly earnings of each occupational class and the wage and salaries per person were regressed against the same independent variables - productivity and rate of return. The results reported in Table 3 below indicate that industry productivity differences account for a significant and large share of the variation in wages among industries. These results are in agreement with our findings on causes of the changes in money wages and confirm our previous conclusion that a rational labor market exists in Jamaica. The capital/output ratio,  $K_i/O_i$ , was used independently of productivity with basically the same results except that the capital/output ratio explained a smaller proportion of the variation in wages among industries. That productivity per worker and capital output ratios have the same effect on wages is, of course, not very surprising.

Table 3

Industrial Cross-section Regressions of Occupational Weekly Earnings and Overall Average Wages and Salaries

Dependent Variable		Constant Term	Productivity per worker $\pi_1$	Rate of return on fixed assets $R_1$	Rate of return on sales $R_1$	$\bar{R}^2$
Managerial	1	11.17 (8.19)	1940.0 (4.41)*			.52
	2	11.39 (7.17)	1977.0 (4.2)*	-5.34 (.289)		.491
	3	9.76 (6.48)	1476.0 (3.02)*		12.03 (1.77)	.578
Craftsmen	1	5.443 (7.926)	1079.0 (4.87)*			.57
	2	5.12 (6.54)	1023.0 (4.4)*	.80 (.88)		.566
	3	4.93 (6.19)	913.2 (3.5)*		4.30 (1.20)	.584
Unskilled	1	2.674 (5.911)	79.62 (5.45)*			.63
	2	2.56 (4.88)	777.0 (4.99)*	.27 (.45)		.609
	3	2.43 (4.53)	717.0 (4.11)*		2.05 (.85)	.662
Wages and Salaries per person	1	166.3 (5.025)	71950.0 (6.75)*			.72
	2	171.8 (4.4)	72900.0 (6.38)*	-13.66 (.30)		.707
	3	125.4 (3.5)	58500.0 (5.17)*		348.7 (2.2)*	.778

Note: The significance ratio for each coefficient appears in parenthesis. The coefficient significant at the 5% level are denoted with a star (\*).

38. The rate of return variables were introduced on the premise that a portion of profit which might be regarded as rent - returns to scarce entrepreneurial talent, monopoly position from protection "etc." might be paid out in wages rather than dividends. The expectation was that the wages of the managerial-office occupational class would be most likely to vary with the rate of return. The rate of return on assets was never significant and the rate of return on sales was significant only for total wages and salaries per person and in that case it did not increase the amount of explained variation by very much - 72% to 78%. It is possible that the kind of wage payment that would vary with profitability is the lump sum bonus payment which these data apparently do not measure.

39. It is our suspicion that the impact of trade unions should be greater in explaining differences in the level of wages (cross-section) among industries rather than in explaining wage rate changes. The possibility of a trade union obtaining and maintaining an absolute positive wage difference for their members seems more likely than the possibility of trade union members' wages increasing at a faster rate than other wages continually. The analysis does not deal directly with the role of unions, but it does indicate that productivity is the single most important variable in explaining wage differences among industries and given the findings on money wage changes our guess, and it is a guess, is that the role of trade unions as a factor in wage differences among industries is small.

#### Conclusion

40. The main finding of the analysis is the strong association between money wages and productivity both in explaining the variation in wages among industries and the changes in money wages overtime. This does not, it should be stressed, indicate in any way that workers receive a wage comparable to

their marginal revenue product. It does, however, indicate that wage changes and wage levels depend on productivity changes and that the pattern of wages that exists in Jamaica is not what might be termed "completely traditional" with factor payments bearing no relation to the underlying demand and supply conditions.

41. It will be argued by many that the data used leaves much to be desired and we agree. It is our contention, however, that the similarity of our results from bodies of data collected and processed quite differently cannot simply be dismissed as chance results from poor data. It should, however, be mentioned that our results apply only to the wages of the large firm (15 or more employees). We suspect, however, that wages in the smaller firms cannot be independent of wages in the larger firms and therefore this analysis is not without meaning for the entire economy.

42. 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. In the matter of inflation it also appears that increases in money wages is an insignificant factor.

43. The other explanation for the continued high rates of unemployment given at the start of this paper is the capital intensive nature of Jamaica's growth. That much of Jamaica's growth industries in the 1950's and 1960's are capital intensive cannot be denied. What is surprising, at least at first glance, is that the "trickling down" effect has been so inconsequential. Most economists trained in the Keynesian tradition are accustomed to think of income and unemployment as virtually the same variable and therefore maximizing income growth is tantamount to maximizing employment. The experience of the

United States in the last ten years, however, where fast growth rates and high unemployment rates (U.S. standards) moved together is at variance with this thesis. Many now argue that the United States has structural unemployment and a look at the U.S. government and private investment in technology designed to automate a vast array of jobs suggests that this should not have been unexpected - indeed one might make the case that the structural unemployment was carefully planned. The Jamaican experience is not directly comparable to that of the United States, but Jamaica does appear to be playing the straight income maximizing game and ending up with the perverse income growth and high unemployment. Automation may not be the villain in the Jamaican context, but with institutions (incentive laws) encouraging capital using production and a consumption pattern that has a high import content as income grows it is beginning to look as if there might exist a trade off between employment and growth in Jamaica. A goal of full employment rather than maximizing income per capita might change the investment priorities and consequently the institutions designed to foster investment.

44. The distribution, or full employment problem, is not identical with the income growth problem and a recognition of the difference is very necessary if the unemployment as well as the growth problem is to be solved.

## APPENDIX

### Derivation of Wage Rates

#### Sources:

Wage Rates and Hours in Selected Industries and Occupations. 1960, 1961.  
Dept. of Statistics, Jamaica.

Wage Rates. 1962, 1963, 1964. Dept. of Statistics, Jamaica.

The object was to obtain a series for wage rates in the period under study (1957-1964) in various industries by occupation. The nature of the information available limited the choice to the industries and occupations listed, and also made necessary some simple assumptions in the process of transforming the listed data into a form suitable for the purposes of the study. Thus certain industries covered by the surveys were not included in the study - Construction, because of the incomplete information for some occupational categories; Distribution and Selected Services, because their job categories could not easily be reconciled into the broad occupational groups we used (see below). Similarly, information on Agriculture was incomplete for the office categories in the years 1957 through 1960, and for the Textile industry there was no information for 1960 and 1961. Both these industries were, however, included in the study, but the analyses of the broad occupational groups are carried out with two fewer observations for the textile industry, and the analysis of the occupational group "office" was carried out with four fewer observations for the agriculture industry.

The industries used in the study were, therefore:

Agriculture (defined to exclude sugar cane growing)

Sugar (manufacture and growing)

Food and beverages (excluding sugar)

Textiles, made-up textile, and footwear

Furniture and other wood products

Printing and publishing

Metal products (manufacture)

Transportation

Mining. (Mining was used to represent the modern sector.)

The various occupational categories for which data was available were reclassified into three broad groups, viz., office workers, skilled workers, and unskilled workers. In the office groups were included the following occupations: Typist and Stenographer, General Office Clerk, Overseer, Bookkeeper, Floorwalker, Sales Clerk, Telephone Operator, Supervisor. In the skilled group all occupations were included that were not listed as unskilled, except for the classification "apprentice" in the Printing and Publishing industry, which was omitted altogether on the grounds that it did not constitute an occupation in the sense that the others did. Similarly, in the Sugar industry, the occupation "Distiller" was omitted altogether, since, on a priori considerations, it seemed to introduce distortions into the scales of pay.

In the source of information used a range of wage rates is given for each occupation, computed as a mean per establishment (per person, 1962-1964, except for agriculture) per week, or day, or hour according to the usual basis of payment. This information is given for the two survey months March and September (which correspond with the high and low peaks, respectively, in employment in certain major industries). These observations were converted to an annual average weekly wage rate for each of the broad occupational groups, Office, Skilled, Unskilled.

The above task was carried through in four steps. First, where it was necessary to convert the usual basis of payment to a weekly basis, a

standard conversion rate of five and a half days per week, and forty hours per week were used as being a reasonable approximation to reality. Next, from among the occupations comprising our broad groups, the lowest at the lower end of the range and the highest at the upper end were selected to constitute the lower and upper ends of a new range of wage rates encompassing the broad occupational group. This range of wage rates was then converted to an average wage rate simply by getting the mid-point of the range; to the extent that the majority of the workers are not grouped around one or other extreme of the range the mid-point would be representative of the true mean. Finally, it was assumed that the September and March observations were representative of the variation in wages throughout the year, and a simple average of these was taken to represent the wage rates paid throughout the year. For the year 1962 the source did not cover the September survey and the simplifying assumption was made that wage rates were the same as those in March.

The result was a series of average weekly wage rates (converted into pence) by broad occupational groups for each of the industries we used, for the years 1957 to 1964.

#### Derivation of Average Earnings

Source: Annual abstract of statistics - 1967.

The industries used in the analysis of average earnings are -- Agriculture, Sugar, Manufacturing, Electricity, Commerce and Transportation. Mining was used to represent the modern sector. Average earnings are presented quarterly and an average of the four quarters for each industry over the period 1957-64 was used to compute the average earnings.

The data for the period 1957-1961 was based on establishment averages while that for 1962-1964 was weighted by all number of workers per establishment. It is unlikely, however, that this change in classification introduced any major distortions in the earnings data.

#### Derivation of Productivity

The wage rate or earnings data used in estimating productivity are the same as that discussed above. Total wages and the gross domestic output are from the national income accounts. Each industry used in the wage rate and average earnings analysis was assigned to the industry in the national income accounts which best approximated all industry classification of the wage and earnings data.

The productivity variable in the single cross section analysis was output divided by the total number of workers.