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Empirical Aspects of Unemployment in  
Barbados

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# **Empirical Aspects of Unemployment in Barbados**

by

**Roland C. Craigwell and Ann-Marie Warner**

## **Abstract**

**This paper discusses features of the labor market and develops an econometric model to examine the causes of unemployment in Barbados. It also examines the various labor market policies adapted by Government and other agencies to reduce unemployment.**

# Empirical Aspects of Unemployment in Barbados

*The sorest ill that heaven hath  
Sent on this lower world in wrath—  
Unemployment (to call it by its name)  
Waged war on economics,  
Sparing no country from the plague.  
They died not all, but all were sick.  
No jobs were left;  
So hope and therefore joy were dead...*

*Sneesens and Dreze. (1986)*

## 1. Introduction

Throughout the years, one of the main policy objectives of Barbadian governments has been to reduce the level of unemployment.<sup>1</sup> This has always been a concern because of its magnitude and the possible economic, social and political effects on the macroeconomy. Between 1980 and 1990, the average unemployment rate was 15.6%, but with the structural adjustment program in 1991, the rate rose from 16% in 1990 to 24.3% in 1993. It then trended downwards to reach 15.8% in 1996 (see Chart 1). But even with this decline, the Barbadian unemployment rate still lies above those of some other Caribbean and industrialized countries (see Table 1).

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<sup>1</sup> Brathwaite (1988) notes that concern about unemployment dates back to the 'Report on Poor Relief' of 1875.

What explains this rather high level of unemployment? How is this related to the broader economic changes that took place in the economy over the same period? Although these are important questions to policy makers, few Barbadian researchers have attempted to address these issues<sup>2</sup>. The aim of this paper therefore is to determine some of the causes of unemployment in Barbados over the period 1980-1996, in the hope of providing a better understanding of this problem.

To undertake this task, first, some features of the labor market in Barbados are discussed. These features, along with a review of the theoretical and empirical literature of labor markets in developing countries, lead to a specification of a labor market model that consists of labor demand, labor supply and real wage equations. These equations are estimated and the results are reported. The following section reports on the policy implications of these results, and finally, some conclusions are drawn.

## **2. Some Features of the Labor Market**

The following discussion of the trends and composition of the labor force, employment and unemployment in Barbados is hampered by serious data problems. For instance, different estimates of these labor aggregates appear from time to time over the period 1946 to 1980 (compare the figures in ABT Associates (1998), Brathwaite (1988) and Mascoll (1985)).

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<sup>2</sup> This sparse literature is reviewed in the Appendix.

Only from 1980 is consistent data on the composition of these aggregates (by age, education, sex, etc.) available. However, some of this data stops at 1993 and moreover, the inherent data problems still exist for most of these aggregates (see, for example, the discussion by Anyadike-Danes (1994) on the unemployment rate).

## *2.1 Participation Rates and the Composition of the Labor Force*

The overall participation rate rose from 64.7% in 1981 to 66.3% in 1993 and then to 67.6% in 1996. There were significant changes in the participation rates for women and men (see Chart 2 and Table 2). Rates for women increased, especially for those between 35 and 44 years of age. The participation rate for females in this age group rose from 73.4% in 1981 to 85.6% by 1993<sup>3</sup>. Rates for men, on the other hand, fell in all categories, but significantly so for those under 25 years old.

The rise in the female participation rate reflects the observation that increasingly, households are being solely led by females, but even in the cases where women are not required to earn a living to support their families, the society has evolved to a level where it is now considered a social norm for female school leavers to seek work.

With respect to the male participation rate, it can only be conjecture (data not available) that the decline in participation rates for young men was due to teenagers staying longer at school,

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<sup>3</sup> Note that data on the participation rates by age cohort are not available for the 1994 to 1996 period.

and more of them continuing with further education. This hypothesis has been proven in other countries (see for example Demekas and Kontolemis (1996) for the economy of Greece).

As a result of these developments, one can say that the profile of the labor force has become:

- i) More female oriented - women were 49% of the labor force in 1996, 48% in 1993, compared with 46% in 1980.
- ii) Somewhat older, as the majority of women entering the labor force are between 35 and 44 years old - workers over 30 made up 64% of the labor force in 1993 as opposed to 54% in 1980.
- iii) Better educated - according to Downes (1998), a substantial proportion of the labor force has at least secondary school education due to a compulsory school attendance requirement.

## **2.2 Employment**

Employment rose from 100,200 in 1981 to 114,400 in 1996 (Table 3). Government and other services has been the largest employer, followed by commerce and tourism, and then manufacturing. Their respective shares in 1981 were 37.1%, 10.8% and 14% respectively compared with 40.3%, 24.7% and 8.5% in 1996.

There has been a noticeable shift away from agriculture and manufacturing towards the service-oriented industries. For example, agricultural employment fell by 3,400 or 36.2% between

1981 to 1996, and manufacturing employment by 4,700 or 33.3% over the same period. In contrast, employment grew in the financial services sector (128%), construction and quarrying (57.1%), government and other services ( 24.3%) and commerce and tourism ( 20.5%).

The information from Table 3 indicates that both men and women were the losers from the decline in agriculture and manufacturing. In agriculture, more men lost their jobs over the period 1980-1996; the decline for men and women were 1,900 and 1,500, respectively. For manufacturing, more women lost their jobs; 2,800 and 2,300 for women and men, respectively. Overall, the share of women in total employment increased from 44.2% in 1980 to 46.3% in 1993 to 47.1% in 1996. However, the share of men fell from 55.8% in 1980 to 53.8% in 1993 to 52.9% in 1996, suggesting that the increase in employment reflected more jobs for women.

An interesting question to ask is whether the new jobs in the service sector went to workers released from agriculture and manufacturing or to new entrants? Data to answer this question properly is unavailable but looking at the data on the composition of employment by degree of educational achievement (Table 4) could give some indication. The data suggests that the composition of employment has changed in favour of educated workers, particularly secondary and university graduates which increased in 1981 from 47,000 and 4,400 respectively, to 59,200 and 10,600 in 1993. On the other hand, primary school graduates (less educated) fell by 23,300 to 24,900 over the period. As it is likely that workers leaving agriculture and



manufacturing were probably less well-educated than those entering the labor force, the tentative conclusion is that few of the workers who lost agricultural and manufacturing jobs were successful in finding jobs in the service sectors; the rest either became unemployed or dropped out of the labor market.

It is generally believed that a large majority of workers in the agricultural sector are self employed and/or unpaid family workers. But, from Table 5, it would appear that the fall in agricultural employment did not reflect a decline in the self-employed unpaid family worker and apprentice categories. Contrary to expectations, employment in these categories increased. However, the decrease in the private employees category probably reflects the fall-off in manufacturing workers.

### ***2.3 Size and Composition of Unemployment***

The number of unemployed in Barbados more than double between 1980 and 1993 (from 14,500 to 32,300) but fell to 21,500 by 1996. Who are the unemployed? Despite the substantial gains in employment made by women, the increase in female participation rate during 1980s and 1990s meant that most of the unemployed continued to be women (Table 6).

The age profile of the total unemployment pool appears to have changed dramatically: in 1981, 60% of the unemployed were less than 25 years compared to 37% in 1996, indicating that youth unemployment has declined significantly (see Table 7). Relative to other Caribbean

countries, youth unemployment appears to be in line with other Caribbean countries (see Table 8).

In both the men and women groups, Table 9 and Chart 3 indicate that the share of 15-19 year old unemployed persons declined as young people tended to stay longer at school. But the largest increase in unemployment for both men and women occurred in the 25-44 years age bracket. It is likely that these are the people who were originally employed in agriculture and manufacturing as private employees and, with the decline in these sectors, lost their jobs and were unable to find new employment.

It would be useful to study the educational profile of the unemployed since many commentators have stated that a large number of unemployed people are highly qualified. Data from official sources to prove this hypothesis are not available but Downes (1998) in a recent survey of the labor market indicates that "over 70% of the unemployed have at least secondary level education ... [and] ... there is very little unemployment among those with university and technical/vocational education" (pp. 3).

#### ***2.4. Duration of Unemployment***

The overall rise in unemployment in Barbados in the 1980s and the early 1990s has been associated with an increase in long-term unemployment (defined as those unemployed for over a year). Chart 4 shows that the share of unemployed workers who have been out of work for

less than a year declined from 62% in 1981 to 36% in 1993, while, simultaneously, the share of those who have been unemployed for more than one year rose from 18.9% in 1981 to 50.2% in 1993.

Both men and women were affected, but more so, the women (see Table 10). Furthermore, the incidence of long-term unemployment (the share of long-term unemployment out of total unemployment) was considerably higher for women than for men (Table 11). This confirms the finding that in countries where unemployment rates are high for women than men, the incidence rate for women also tends to be significantly high.

Again it would have been useful to look at the duration of unemployment by age but this data is not available.

## ***2.5 Unemployment, Wages, Prices and Productivity***

Table 12 shows that the worsening of Barbados' overall growth performance during the last 15 years or so is reflected in productivity growth, which fell from 5.9% in the 1980s to 1.8% in the 1990s. Wage and price inflation declined over the period while there was a large increase in unemployment. The decline in inflation partly reflects the prices and incomes protocol between the social partners. The protocols allowed for an 8% wage cut in public servants' salaries followed by a wage freeze and controls on prices. These and other issues are discussed fully in Craigwell and Stumpp(1998).

### 3. The Empirical Model

Above, it was seen that the increase in unemployment in Barbados over the period 1980-1996 reflected changes in the demand and supply functions of labor. Hence, any empirical model of the labor market must consider an aggregate labor demand equation, an aggregate labor supply equation and a wage setting equation. As it turns out, this type of structure is conventional (see, for example, Karanassou and Snower (1998) for developed countries, and Mascoll (1985) for Barbados). Here, an eclectic approach is used to specify the three labour equations, that is, they are based on what was said in the preceding section and a review of the developing countries' empirical literature on these functions. The Appendix provides the empirical literature review.

The preferred model is as follows:

$$\ln LF_t = f(\ln LF_{t-1}, \ln W_{t-1}, UR_{t-1}, \ln X_t)$$

$$\ln W_t = g(UR_{t-1}, \ln W_{t-1}, \ln PROD_{t-1}, \ln Z_t)$$

$$\ln E_t = h(\ln WEMP_{t-1}, \ln E_{t-1}, \ln Q_t)$$

$$WEMP = W + TSS$$

$$UR = 1 - (E/LF)$$

$$\ln PROD = \ln(Y/E)$$

where  $LF_t$  is the labor force,  $W_t$  is the real wage,  $UR_t$  is the unemployment rate,  $PROD_t$  is labor productivity,  $Y_t$  is the level of output,  $E_t$  is employment,  $WEMP_t$  is the wage paid by the employer, which is the real wage plus the tax rate on social security (TSS).  $X_t$  is a vector of

variables exogenous to the model that could affect the labor supply such as the working age population ( $WAP_t$ ),  $Z_t$  is a set of factors exogenous to the wage equation for example, the minimum wage ( $WMIN_t$ ), import prices, interest rates, etc. Finally,  $Q_t$  is a set of variables exogenous to the employment equation, for instance, technology, domestic credit, the price of capital etc.

Clearly the equations above, if estimated, could create problems with the degrees of freedom because of the large set of explanatory variables, and a limited set of observations. A more parsimonious set of equations is required. Data inadequacies (for example with import prices) allowed for a simpler model to be derived. Another procedure used to resolve the large number of variables is to seek a model that has strong theoretical foundations. Given these conditions, the model actually tested is as follows:

$$\ln LF_t = f(\ln LF_{t-1}, \ln W_{t-1}, UR_{t-1}, \ln WAP_t) \quad (1)$$

$$\ln W_t = g(UR_{t-1}, \ln W_{t-1}, \ln PROD_{t-1}, \ln WMIN_t) \quad (2)$$

$$\ln E_t = h(WEMP_{t-1}, \ln E_{t-1}, \ln Y_t) \quad (3)$$

$$WEMP = W + TSS$$

$$UR = 1 - (E/LF)$$

$$\ln PROD = \ln(Y_t/E)$$

$$X_t = WAP_t$$

$$Z_t = WMIN_t$$

$$Q_t = Y_t$$

The signs above the variables indicate their respective partial derivatives. Each equation uses a set of lags on both endogenous and exogenous variables to facilitate analysis of the adjustment processes and dynamics within the labor market.

Equation (1) is a labor supply equation and follows a specification similar to that used by developed countries (see for example the studies in Henry and Snower (1996)). The equation is modelled as a negative relation with the unemployment rate and a positive relationship with the real wage, lagged labor supply, and the working age population. The working age population (WAP) is assumed to be exogenous. The rationale behind this formulation is that potential employees will determine whether or not to enter the labor market based on the probability of employment, the wages they can get if employed, and other social and demographic influences exogenous to the model.

Equation (2) is a wage setting equation which is assumed to be jointly determined by the bargaining process between the unions and employers (see, for instance, Layard, Nickell and Jackman (1991) and Downes and McClean(1982)). This process is posited to be negatively affected by the unemployment rate, and positively related to the productivity of labor, the minimum wage, and past real wages. The minimum wage (WMIN) is postulated to be exogenously determined.

Equation (3) is the labor demand (or employment) equation and follows the right-to-manage literature (see Booth (1995)). Therefore, it suggests that once wages have been determined by the bargaining process, employers are at liberty to set employment at a level that will maximise profits. Hence, employment depends negatively on the wages paid by employers, and positively on past levels of employment and output ( $Y$ ). Output is assumed to be exogenously determined. This may be a strong assumption but the authors plan to do two things in the future: (1) formulate and estimate a production function; and (2), estimate the model as a system

#### **4. Econometric Methodology, Data and Results**

Since the emergence of the unit-root cointegration literature, the common practice in empirical economics has been to test for the existence of long-run relations using cointegration techniques (given that the application of unit root tests has identified the underlying variables as integrated of order 1 ( $I(1)$ ), and subsequently estimate the short-run dynamics and adjustment mechanism towards equilibrium through an error correction model.

Despite the popularity of the above methodology, the estimation of the labor market presented here is based on the autoregressive distributed lag (ARDL) modelling approach to cointegration analysis, proposed by Pesaran and Shin (1997). The reasons for adopting the ARDL modelling approach is four-fold: first, since the ARDL approach is applicable irrespective of whether the regressors are  $I(0)$  or  $I(1)$ , the pretesting problems that surround

the cointegration analysis do not arise; second, the estimated coefficients can be given a straight-forward economic interpretation, for example, the coefficients of the lagged employment terms in the labor demand equation may be interpreted in terms of the employment adjustment effect; third, this approach performs better in small samples than the full modified OLS approach of Phillips and Hansen (1990); and fourth, it is possible to incorporate both a priori information readily on signs of individual parameters and to allow differing lag lengths to be estimated for individual variables.

The ARDL approach involves running the following general regression:

$$y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^p \phi_i y_{t-i} + \beta' x_t + \sum_{i=1}^{q-1} \beta_i^* \Delta x_{t-i} + v_t$$

$$\Delta x_t = P_1 \Delta x_{t-1} + P_2 \Delta x_{t-2} + \dots + P_s \Delta x_{t-s} + \varepsilon_t$$

where  $x_t$  is the  $k$ -dimensional  $I(1)$  variables that are not cointegrated among themselves,  $v_t$  and  $\varepsilon_t$  are serially uncorrelated disturbances with zero means and constant variance-covariances, and  $P_i$  are  $k \times k$  coefficient matrices such that the vector autoregressive process  $\Delta x_t$  is stable.

It is also assumed that the roots of  $1 - \sum_{i=1}^p \phi_i z^i = 0$  all fall outside the unit circle and there exists

a stable unique long run relationship between  $x_t$  and  $y_t$ . Given this structure, Pesaran and Shin (1997) have shown that the OLS estimators of the short run parameters are  $T^{1/2}$  - consistent with the asymptotically singular covariance matrix, and the ARDL based estimators of the long



run coefficients are super consistent, and valid inferences can be made using standard normal asymptotic theory.

#### **4.1 Data**

The observations used in this study were collected on a quarterly basis from 1980 to 1996. Data were for the most part directly obtainable from the Annual Statistical Digest and the Economic and Financial Statistics published by the Central Bank of Barbados. Output (Y) data, for which official quarterly information was not available for most of the period, the series developed by Lewis (1997) was used. In addition, the wages series was spliced, with 1980 being employed as the base year. Since the series was only available on an annual basis, it was divided by four and smoothed using the Holt -Winters technique to give an estimate of quarterly wages. Due to a lack of data, the total adult population was utilised as a proxy for the working age population for the period under review. The minimum wage for adults that is, those over 18 years, was employed in the study. In a manner similar to that of Franks (1996) the wages paid by the employer was proxied by the sum of the real wage and social security taxes.

#### **4.2 Results**

The variables were first tested for stationarity to ensure that no variables were integrated of an order greater than 1. This was done using the Augmented Dickey-Fuller (ADF) unit root test. This statistic indicated that the variables were all non-stationary in their levels, and

furthermore, that they could all be treated as I(1) variables<sup>4</sup>. Next, an autoregressive distributed lag model of the labor market was estimated using the ARDL methodology discussed above. Recall that Pesaran and Shin (1997) showed that once the appropriate lag structure is chosen, OLS estimators of the short run and long run<sup>5</sup> parameters are consistent. Therefore, the optimal lag structure must be determined. To do this, a search procedure was conducted over eight lags using the Schwarz Bayesian and Akaike Information Criteria, but only those lags that were significant were retained in the final specifications. It should be noted that these equations ( see Tables 13,14 and 15) passed all the standard tests for misspecification, structural stability, normality, heteroscedasticity, and autocorrelation. Given the possibility of endogeneity (especially, through output) and cross-equation correlation the model will be estimated as a system in the future.

### ***Labour Force Equation***

The results obtained from estimation of the labor force equation (Table 13) showed that both the unemployment rate and the real wage were negatively correlated with the labor force, while the total adult population was found to have a positive effect. Further, findings reveal that even though the coefficient of the lagged dependent variable is relatively high, the fact that only one lagged dependent variable is significant indicates that labor force growth does not exhibit any great persistence. This may suggest that entering and exiting the workforce does not involve

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<sup>4</sup> Results are available upon request.

<sup>5</sup> In this approach, the long run coefficients are computed by dividing the short run parameters (in levels), by the sum of the coefficients of the lagged dependent variable.

large adjustment costs. The fact that unemployment enters the equation in lagged form suggests that it takes some time before it discourages workers from seeking employment. Measures to keep the long term unemployed involved in the labor market are therefore of great importance. The negative correlation between the real wage and the labor force comes as somewhat of a surprise as one would have expected the attraction of higher real wages to lead to an increase in participation in the labor force. Franks (1996) suggests that such an outcome is not inconsistent with rational utility maximization as higher wages among primary wage earners may lead secondary household members to participate less through an income effect. Finally, examination of the relationship between the population and the labor force has provided some support for the hypothesis that increases in the population have over the years, been one of the main factors contributing to growth in the labor force.

### *Wage Equation*

Estimation of the wage equation showed that while both the minimum wage and the unemployment rate were found to be inversely related to the real wage, a positive relationship was discovered between productivity and the real wage (see Table 14). Examination of this equation also revealed that real wages exhibited a high level of persistence as indicated by the magnitude of the summed coefficients of the lagged dependent variables (0.95). This may be due in part to the staggered wage setting that currently exists in Barbados, which will tend to make current wages depend on their past values. Another finding from this analysis is that the minimum wage enters the equation with a negative sign. This is not surprising since in general,

minimum wage legislation is not binding in Barbados as wage rates negotiated by the labor unions tend to dictate the wage levels in the economy (Downes (1998)). The negative relationship between unemployment and the real wage may be explained by the hypothesis that higher unemployment will reduce workers demands for wage increases by simultaneously raising the "insiders" fears of unemployment and increasing the competition for jobs from "outsiders."

### *Labour Demand Equation*

Analysis of the labor demand or employment equation shows the existence of a negative correlation between employment and real product wages while real GDP and employment are positively related. Furthermore, the results suggest that there is significant persistence in employment, as the sum of the lagged values of employment in the distributed lag model is relatively high at 0.80. This strong correlation between employment and its past values may be related to considerable hiring and firing costs. The negative relationship between the real product wage and employment was expected as increasing labor costs will often force employers to reduce the number of workers employed. The effect of output on the level of employment was also found to support theory, as in an effort to satisfy increasing demand for output, employers will often increase staff.

## **5. Policy Implications**

The above results reveal certain implications for unemployment policies in Barbados. Firstly, since wages paid by the employer is a significant determinant of unemployment, this implies that a reduction in the social security taxes (which affects the employer wage) should increase the demand and provide greater incentives for the unemployed to seek work. Indeed, according to Downes (1998, pp.4), establishments report that although the administrative work associated with the National Insurance Scheme (NIS) is not very burdensome, the employer's contribution to the NIS is too high. From 1994, the employer's contribution to the NIS has been as high as 9.25% of the maximum insurable earnings of workers. In addition, employers contribute a further 0.59% in the form of a training levy.

Secondly, the finding that it takes the unemployed some time before they are discouraged from seeking employment suggests that training should be provided to ensure that these persons remain actively involved in the labor market. Training allows for upgrading the quality, skills and supply of the labor force. According to Downes (1998, pp.4), private sector companies provide training for their staff especially in the areas of company orientation, technical training, safety and work behavior. Most employees are trained on the job. Employers have found that training programs must not only emphasize technical and cognitive skills but also attitudinal skills.

Thirdly, the strong correlation between employment and its past values (labour demand persistence) usually indicates a rigid level of labour market legislation, particularly high firing costs, which raise the costs of adjusting a firm's level of employment. The obligation to make a severance payment when dismissing individual workers is the most common firing cost. To qualify for severance pay in Barbados, the individual must be working for two years. The rate of benefit is 12.5 days per year for the first nine years. However, an individual who is laid-off after one year of work is entitled to one month's pay. If he or she is laid off after 10 years, then that individual is entitled to 5.8 months.

From the Government's point of view, several training programs are available. For instance, the Technical and Vocational Education and Training Program, the Skills Training Program and the Apprenticeship Program. See Craigwell and Stumpp (1998) for further discussion of these training programs.

Of course, all of these measures (training, social security tax reduction) should be coupled with job creation strategies in order to be fully effective. With the policy of economic diversification, a lot of emphasis for job creation is being placed on the services sector, especially tourism, offshore and government. Several pieces of legislation, schemes and institutions have targeted the development and expansion of these sectors with some success (see Brathwaite (1988), Craigwell and Stumpp (1998) and Warner (1998) for further discussion).

## 6. Conclusion

The equations estimated here represent only a basic model of the Barbadian labor market. Indeed, as data becomes available, additional variables unique to small open economies should be included in further specifications of the model. Nevertheless, there is enough evidence to suggest that some tentative conclusions could be drawn about the Barbadian labor market. One such conclusion is that the wages paid by the employer significantly affect the level of unemployment. The implication here, is that a reduction in social security taxes could increase the demand and therefore provide greater incentive for the unemployed to seek work.

While the result that it takes the unemployed some time before they become discouraged from seeking employment is a positive sign, measures should still be taken to ensure that these persons remain actively involved in the labor market. This suggests that increasing emphasis should be placed on apprenticeship programs and the retraining of unemployed persons, particularly between the 15-24 age group. This paper also reports that there may be a need to reduce the costs attached to hiring persons. These costs seemed to create persistence in the employment adjustment process. These measures must however, be coupled with job creation strategies in order to be fully effective. Although available information indicates that policy makers have reaped some success with these strategies, there is still some room for improvement, particularly within the agriculture and manufacturing sectors. The number of jobs these sectors provide could be increased if financial incentives along with programs

designed to sensitise the public to the importance of manufacturing and agriculture are implemented.

Finally, while the model yields some interesting results about the labor market, future models could be developed that facilitate analysis of the feedback processes among equations.



**Table 1: Unemployment Rates in Selected Countries (1996)**

<b>COUNTRIES</b>	<b>RATE</b>
Bahamas	10.8
Barbados	15.8
Belize	13.8*
Jamaica	16.1
Trinidad & Tobago	16.3
U.K.	7.6
U.S.A.	5.4
Canada	9.8

Source: Central Bank of Barbados

Note : \*- To April 1996

**Table 2: Participation Rates by Sex and Age (%)**

Age	Males		Females		Total	
	1981	1993	1981	1993	1981	1993
15-19	51.8	20.6	33.9	36.4	43.4	41.3
20-24	92.7	61.3	80.3	80.4	86.4	86.0
25-29	95.9	72.3	80.2	87.7	87.7	91.5
30-34	94.9	78.3	80.8	88.0	88.0	91.6
35-44	94.1	82.2	73.4	85.5	83.8	90.0
45-64	89.7	69.9	50.0	57.7	70.0	67.2
65 and Over	27.4	8.7	6.9	5.6	15.0	6.9
Total	77.2	74.1	54.0	59.8	64.7	66.3

Source: Barbados Statistical Service

**Table 3: Employment by Sector ('000 Persons)**

<b>Sector (Gender)</b>	<b>1981</b>	<b>1993</b>	<b>1996</b>
<b>Agriculture</b>	9.4	5.8	6.0
Men	5.6	3.5	3.7
Women	3.8	2.3	2.3
<b>Manufacturing</b>	14.1	10.6	9.7
Men	6.4	5.2	4.3
Women	7.7	5.4	5.4
<b>Construction &amp; Quarrying</b>	6.3	7.3	9.9
Men	6.1	6.8	9.4
Women	0.2	0.5	0.5
<b>Commerce &amp; Tourism</b>	23.4	24.8	28.2
Men	12.6	11.8	13.0
Women	10.8	13.0	15.2
<b>Transport, Communication &amp; Utilities</b>	6.0	6.0	6.2
Men	4.7	4.6	4.4
Women	1.3	1.4	1.8
<b>Finance &amp; Business Services</b>	3.9	5.8	8.3
Men	1.7	2.5	2.3
Women	2.2	3.3	6.0
<b>Government &amp; Other Services</b>	37.1	40.1	46.1
Men	20.3	19.4	23.2
Women	16.8	21.7	22.9
<b>Total</b>	<b>100.2</b>	<b>100.4</b>	<b>114.4</b>

Source: Barbados Statistical Service

**Table 4: Employed Labor Force by Highest Level of Educational Attainment  
( '000 persons)**

<b>Level of Education</b>	<b>1981</b>	<b>1993</b>
Primary	48.2	26.9
Secondary	47.1	61.2
Technical	4.4	11.6
Vocational	0.4	0.6
Other/None	0.1	0.1
Not Stated	-	-

Source: Barbados Statistical Service

**Table 5: Employment Status ('000 persons)**

<b>Employment Status</b>	<b>1991</b>	<b>1993</b>
Employment	11.1	14.0
Self Employed	-	0.9
Employed	-	13.1
Self Employed	23.7	23.5
Government Employee	64.3	62.3
Private Employee	1.1	0.5
Unpaid Family Worker and Apprentice		
<b>Total</b>	<b>100.2</b>	<b>100.4</b>

Source : Barbados Statistical Service

Note : - not available

**Table 6: Unemployed Rate by Sex**

Year	Male	Female	Total
1981	7.4	15.0	10.8
1993	21.3	27.6	24.3
1996	12.3	19.4	15.8

Source: Barbados Statistical Service

**Table 7: Youth Unemployment ('000 persons)**

Year	Under 25	Over 25	Total
1981	7.4	4.8	12.2
1993	12.1	21.2	32.3
1996	8.0	13.5	21.5

Source: Barbados Statistical Service

**Table 8: Youth Unemployment in 1995 in Selected Caribbean Countries  
('000 persons)**

	Bahamas	Barbados	Belize	Jamaica	Trinidad & Tobago
Unemployed Youth	6.5	10.5	3.9	104.8	35.2
Total Unemployed	15.9	26.9	8.9	186.7	89.4
Share	0.41	0.39	0.44	0.56	0.39

Source: ILO, Digest of Caribbean Labor Statistics, Trinidad & Tobago, 1996

**Table 9: Unemployed Labor Force by Age and Sex ('000 persons)**

	15-19 Years		20-24 Years		25-44 Years		45-54 Years		55 Years+Over		All Ages	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1981	1.8	1.9	1.3	2.4	1.1	2.7	-	-	0.4	0.6	4.6	7.6
1993	2.7	2.7	3.4	3.3	6.4	9.3	1.2	1.9	0.8	0.6	14.5	17.8
1996	1.6	1.8	1.8	2.8	3.6	6.7	1.0	1.3	0.5	0.4	8.5	13.0

Source: Barbados Statistical Service

**Table 10: Duration of Unemployed Labor Force by Sex  
(’000 persons)**

Duration	1981	1993
Less than 1 Year	7.5	11.5
Men	3.3	6.7
Women	4.2	4.8
Over 1 Year	2.3	16.2
Men	0.6	6.4
Women	1.7	9.8
Never Worked	2.4	4.6
Men	0.7	1.6
Women	1.7	3.0
Not Stated	-	-
<b>Total</b>	<b>12.2</b>	<b>32.3</b>

Source: Barbados Statistical Service

**Table 11: Incidence of Long-Term Unemployment by Gender (%)**

Year	1981	1993
Men	4.9	20.1
Women	14.0	30.9

Source: Barbados Statistical Service

**Table 12: Average Growth in Unemployment, Wages, Prices and Productivity**

	1980 - 1989	1990 - 1996	1980 - 1996
Wage Inflation	6.4	2.9	3.9
Price Inflation	5.9	3.1	4.7
Real Wage Inflation	0.5	-1.9	-0.6
Productivity Growth	5.9	1.8	4.1
Unemployment	15.8	21.0	17.9
Real GDP Growth	1.7	0	1.0

Source: Central Bank of Barbados

**Table 14: Results of the Wage Bargaining Equation**

Variable	Coefficient	Std. Error	t-Statistic
LW(-1)	0.580874	0.086707	6.699310
LW(-4)	0.264539	0.114038	2.319740
LW(-5)	-0.228649	0.118642	-1.92721
LW(-8)	0.328826	0.082035	4.008351
LnUR	-0.044501	0.012397	-3.589596
DLnUR(-1)	0.025717	0.015188	1.693271
DLnUR(-5)	-0.027329	0.015302	-1.78598
LPROD	0.020068	0.034406	1.853278
DLPROD(-8)	0.056443	0.026166	2.157121
LWMIN	-0.009511	0.005131	-1.85375
@TREND(1980:1)	-0.000714	0.000269	-2.65246
C	0.324891	0.130025	2.498683

R-squared	0.994024
Adjusted R-squared	0.992779
S.E. of regression	0.011002
Sum squared resid	0.005811
Ramsay Resct Test (P-value)	0.733859
White Heteroscedasticity Test (P-value)	0.226537
Chow Test (P value)	0.035649
Breusch Godfrey Autocorrelation (P-value)	0.162854
Normality	0.326892

Implied long run relationship

$$\text{LnW} = -0.1609 \cdot \text{LnWMIN} - 0.7857 \cdot \text{LnUR} + 0.357 \cdot \text{LnPROD} + 0.0125 \cdot \text{trend} + 0.5785$$



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**Table 15: Results of the Labor Demand Equation**

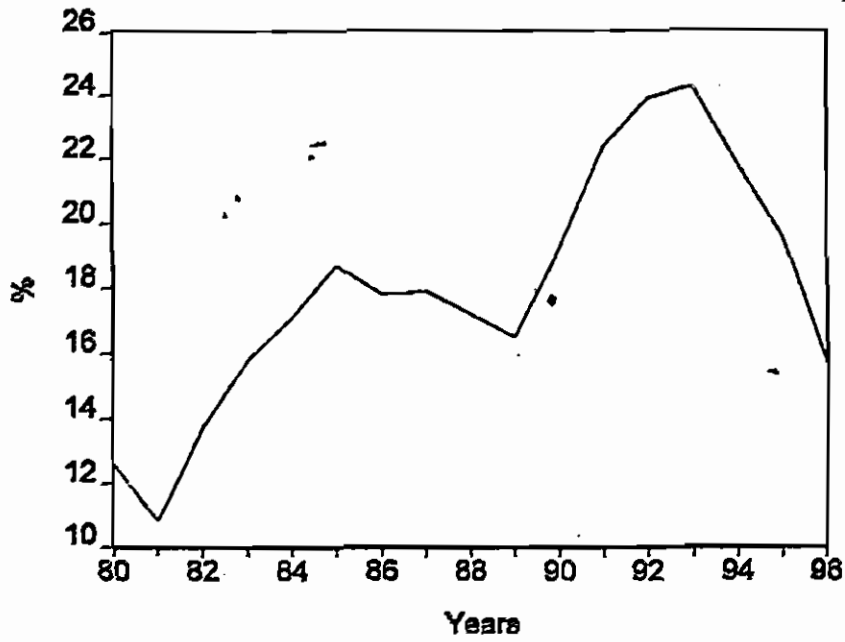
Variable	Coefficient	Std. Error	t-Statistic
LnE(-1)	0.622749	0.149557	4.163956
.LnE(-2)	0.338932	0.182217	1.860049
LnE(-3)	-0.19155	0.172746	-1.908855
LnE(-4)	0.256096	0.17272	1.882726
LnE(-6)	-0.243565	0.132385	-1.839817
LnW	0.134726	0.109896	1.925941
DLnWEMP(-2)	0.049571	0.153306	2.323348
DLnWEMP(-4)	-0.070592	0.153295	-2.460497
DLnWEMP(-5)	-0.278383	0.139237	-1.999341
DLnWEMP(-6)	-0.151365	0.136543	-1.808549
DLnWEMP(-8)	0.039974	0.149347	2.26766
LnY	0.307325	0.106073	2.897300
@TREND(1980:1)	0.000736	0.000413	1.879279
C	0.984572	0.371877	2.647565

R-squared	0.885102
Adjusted R-squared	0.848819
SumSquared Resid	0.028380
S.E. of regression	0.027328
Ramsey Reset Test (P-value)	0.448659
White Heteroscedasticity Test (P-value)	0.903611
Chow Test (P value)	0.025428
Breusch Godfrey Autocorrelation (P-value)	0.592984
Normality	0.548897

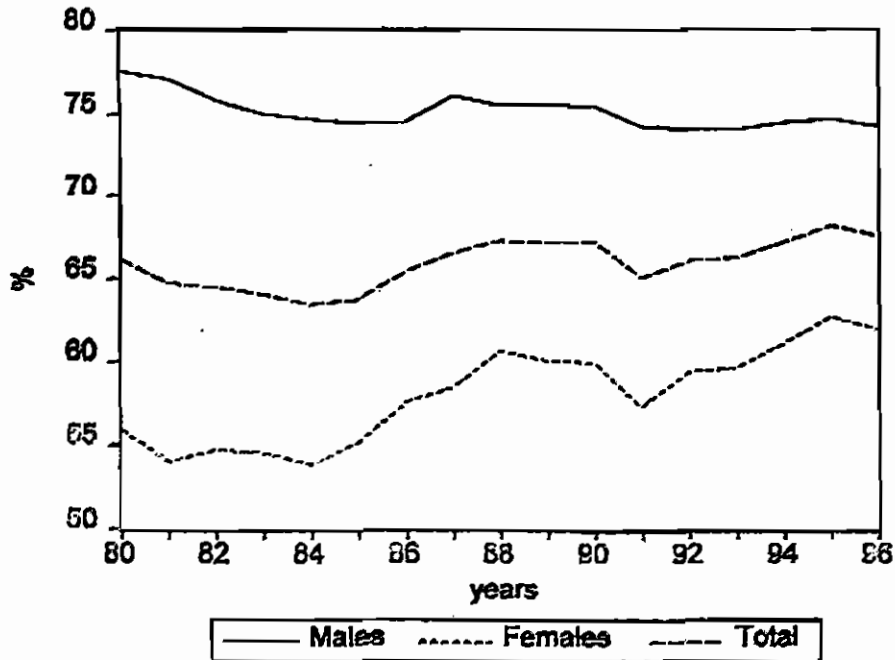
Implied Long-run relationship

$$\text{LnE} = -0.61977 * \text{LnWEMP} + 1.414 * \text{LnW} + 0.03386 * \text{trend} + 4.53013$$

**Chart 1 - The Average Annual Unemployment Rate**

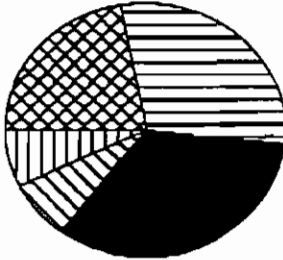


**Chart 2 - Participation Rates**

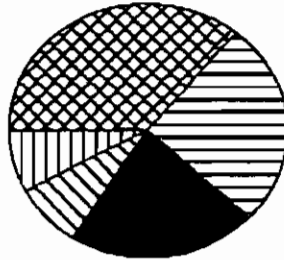


**Chart 3 - Age Profiles of the Unemployed**

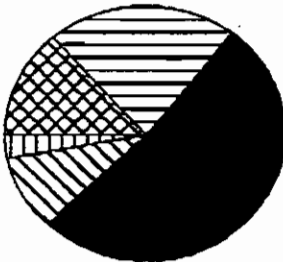
Age Profile of Unemployed Females (1981)



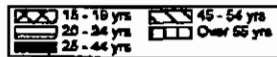
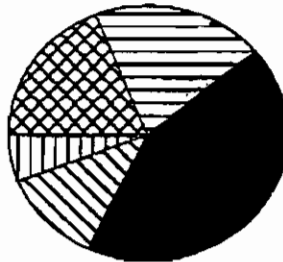
Age Profile of Unemployed Males (1981)



Age Profile of Unemployed Females (1996)

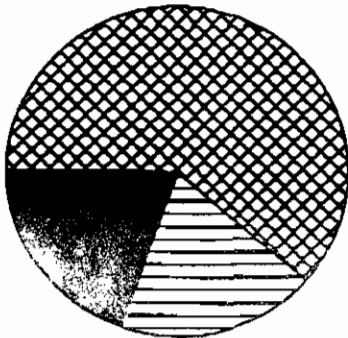


Age Profile of Unemployed Males (1996)

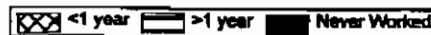
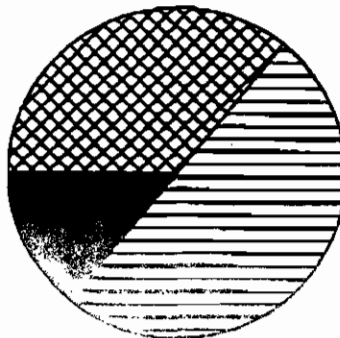


**Chart 4 - Duration of the Unemployed Labour Force**

Duration of Unemployed Labour Force (1981)



Duration of Unemployed Labour Force (1993)



## Appendix: Literature Review of Empirical Labor Market Studies of the Caribbean

Author(s)	Equations	Variables	Estimation Techniques	Data Range and Frequency	Results
Manhertz (1971) Jamaica	Private Sector Labor Demand	GNP and Trend. All other variables assumed to be exogenous	OLS	Annual data from 1959 to 1966.	GNP significant and positive. Evidence of serial correlation.
Brewster (1972) Trinidad and Tobago.	Change in the demand for labor.	Consumption expenditure ( $C_t$ ), wages ( $W_t$ ), domestic output ( $O_t$ ), (GDP-Exports), capital formation ( $K_t$ ), labor productivity ( $P_t$ ), export wage gap ( $E_t$ ), import coefficient ( $I_t$ ), revenue coefficient ( $R_t$ ), profit tax coefficient ( $P_t$ ), exports ( $X_t$ ).	OLS	Annual data from 1951 to 1968.	$C_t$ and $O_t$ exerted a positive influence on employment while $W_t$ and $P_t$ were negatively related to employment. Problem with simultaneous equation bias, multicollinearity and serial correlation.
Mascoll (1985) Barbados	Labor Supply ( $L^s$ )	Wages ( $W_t$ ) in the current period, and wages lagged once ( $W_{t-1}$ ).	Two Stage Least Squares (TSLS)	Annual data from 1962 to 1980.	Both variables were statistically significant, but the current real wage variable carried an incorrect negative sign. The lagged real wage variable positively affected $L^s$ . Evidence of multicollinearity.
	Labor Demand ( $L^d$ )	$W_t$ , real income ( $Y_t$ ), marginal revenue product ( $B_t$ ).			All explanatory variables with the exception of $B_t$ were significant and carried the correct sign. Both $W_t$ and $B_t$ carried a negative sign while $Y_t$ carried a positive sign. Evidence of serial correlation.

Author(s)	Equations	Variables	Estimation Techniques	Data Range and Frequency	Results
	Wages (W)	$W_{t-1}, L^d, L^s$			All variables are statistically significant. $W_{t-1}$ and $L^d$ positively affected the real wage while $L^s$ was found to have an adverse affect. Coefficients are unusually large.
Boamah (1984) Barbados	Labor Demand	Slack conditions ( $S_t$ ), prices ( $P_t$ ), money wages ( $W_t$ ), output ( $Q_t$ ) and employment lagged once ( $E_{t-1}$ )	OLS	Annual data from 1959 to 1980	$Q$ and $E_{t-1}$ positively affected employment while $S_t$ had a negative impact. $W_t$ was insignificant.
	Wages	Price expectations ( $P_e$ ), the prime lending rate ( $R_d$ ), productivity ( $Q_t/E_t$ ), real weekly earnings ( $EN/RPI$ ), the unemployment rate ( $U$ )			Both $P_t$ and ( $EN/RPI$ ) had a positive impact on wages. $U_p$ ( $Q_t/E_t$ ), ( $EN/RPI$ ) were statistically significant. The labor supply was treated as exogenous.
Leon and Mascoll (1986). (Barbados)	Desired demand for labor	Distributed lag model. Variables used were expected output ( $Oe_t$ ), the real wage ( $W_t$ ), labor productivity ( $P_t$ ).	OLS	Annual data from 1962 to 1980.	$W_p$ , $P_t$ and $Oe_{t-1}$ were negatively related to employment while employment in the previous period positively impacted the desired demand for labor.
Boamah, Holder, Mascoll, Worrell (1984) Barbados	Labor Demand	Real GDP ( $Y_t$ ), real wages ( $W_t$ ), employment lagged once ( $E_{t-1}$ )	OLS	Annual data from 1958 to 1983.	Both $Y_t$ and $E_{t-1}$ were positive, and significantly related to the demand for labor. $W_t$ proved to be insignificant.

Author(s)	Equations	Variables	Estimation Techniques	Data Range and Frequency	Results
	Wages	Marginal productivity of labor ( $MPL_t$ ), expected price deflator ( $Pe_t$ ) and wages lagged once ( $W_{t-1} * (1+Pe_t)$ )			$Pe_t$ was the only variable found to be significant. Possible existence of multicollinearity.
Downes (1987) Barbados	Labor Demand	Real wages ( $W_t$ ), import price index of intermediate goods ( $Pm_t$ ), GDP at factor cost ( $Q_t$ ), employment levy ( $EL_t$ ), import price of capital goods ( $Pk_t$ ), exports ( $X_t$ ), total domestic credit ( $Dc_t$ ), total government expenditure ( $Ge_t$ ), gross fixed capital formation ( $K_t$ ), employment lagged once ( $E_{t-1}$ ), time variable (TECH).	OLS TSLS IV ECM	Annual from 1960 to 1984.	The results obtained from OLS and TSLS estimation were similar, that is, $Q_t$ and $E_{t-1}$ positively affected current employment while $W_t$ was inversely related to employment. $W_t, Q_t$ and $E_{t-1}$ were significant and carried the same signs as with OLS estimation. However, this result varied according to the choice of instrumental variable used. With the ECM, the long run change in employment was found to be positively impacted upon by the change in $Q_t$ , the previous level of output $Q_{t-1}$ , and $EL_t$ . The change in $W_t$ and $E_{t-1}$ were found to exert a negative influence on employment.

Author(s)	Equations	Variables	Estimation Techniques	Data Range and Frequency	Results
Downes and McClean (1982) Barbados	Wage	Export prices $PX_t$ , output $Y_t$ , employment ( $N_t$ ) $PROD_t$ , the aggregate retail price level $P_t$ , import prices, $PM_t$ , interest rates $R_t$ , a vector of tax rates $T_t$ .	OLS	Annual data from 1960 to 1977.	All the explanatory variables were significant and carried the expected signs. There was some evidence of serial correlation. The Cochrane Orcott iterative procedure did not produce results that were significantly different from OLS.

Other quantitative studies of employment carried out by Nicholls (1985) and Charles and St.Cyr (1988, 1989) found that real output was the only significant factor influencing employment at an aggregated level. Theodore (1986), discovered that in addition to output, employment in the previous period was also positively related to the current level of employment during 1956 to 1985. Theodore also noticed that the ratio of current to capital government expenditure exerted a negative influence on employment during the same period. Bourne and Nicholls (1989) and Henry, Hilaire and Nicholls (1989) in their macroeconometric models of the Trinidadian economy also supported the view that employment was output driven. Bourne (1988) finds little evidence to support a long run relationship between wages and employment in Trinidad and Tobago and Jamaica. However, some support is found for the output driven employment in both countries.

In conclusion, quantitative research on employment determination in the Caribbean shows that output changes is a key variable. To a lesser extent, the lagged employment variable also plays a role in explaining employment in the region. The impact of the real wage variable on employment is somewhat mixed.



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