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Labor Market Regulation and Employment In the Caribbean

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1. Introduction

One of the major economic challenges facing the Caribbean is the generation of employment opportunities to reduce the high levels of unemployment experienced primarily among the young and female segments of the workforce. Although several reasons have been suggested for the high levels of unemployment in the region, little attempt has been made to rigorously assess the underlying causes of unemployment. An analysis of unemployment requires an examination of both the supply and demand sides of the labor market.

This research project focuses on the demand side of the labor market by examining the impact which labor market regulations have had on employment creation in the English-speaking Caribbean countries of Barbados, Jamaica and Trinidad and Tobago. Although a recent IADB report on labor market reform in Latin America and the Caribbean indicates that the English-speaking Caribbean countries have a lower level of labor market inflexibility than Latin American countries, the regulatory environment in both the labor and commodity markets has had some adverse impact on employment creation in the region (IADB, 1996). Results from a study of the operations of the labor market in the Caribbean Group for Cooperation in Economic Development (CGCED) suggest that these regulatory measures do have some effect on the operation of businesses in the region (see Abt Associates, 1998).

Labor market regulation generally refers to the range of economic, social and judicial measures and mechanisms that affect labor market outcomes and behavior. Such regulation emerges from the legislative machinery of the government, case or common law and the collective bargaining process between labor unions and employers. Labor market regulatory measures cover such areas as:

- i. the establishment and protection of workers' rights
- ii. the protection of the vulnerable
- iii. the establishment of minimum compensation for work
- iv. the assurance of decent working conditions
- v. the provision of income security (see Table 1).

Regulatory measures may be *direct* (i.e., via the legislative machinery or government intervention) or *indirect* (i.e., via the voluntaristic collective bargaining process or custom and tradition). While such measures protect workers from exploitation and poor working conditions, they represent additional costs to employers. The challenge for policy makers is to design a regulatory system which minimizes the additional labor (i.e., adjustment) costs to employers while protecting the socioeconomic welfare of workers in the labor market. By minimizing such labor costs, employers would be in a better position to hire more workers given other favorable economic conditions. It should be noted that labor market regulation represents only one variable which affects the employment of persons in the labor market.

The main objectives of this research project are to:

- i. document the range of labor market regulations existing in the three English-speaking members of the IADB;

- ii. identify the costs implications of such regulations;
- iii. empirically determine the impact which such measures have on employment determination, using econometric methods.

This report documents the findings of research undertaken to determine the impact of labor market regulation on employment in the English-speaking Caribbean countries. Given data availability, the empirical section only deals with Barbados, Jamaica and Trinidad and Tobago. The structure of the presentation is given as follows. In section 2, the institutional framework governing the operation of the labor market is outlined. The non-wage cost implications of this framework are examined in section 3. An attempt is made to develop indices of labor market regulation based on the various provisions in labor regulation, and to a lesser extent in collective bargaining agreements. The incorporation of non-wage labor costs of a dynamic nature into labor demand function is examined in section 4. The statistical data used in the estimation process are examined in section 5, while the empirical results are presented in section 6. The possible policy implications of the research are given in a closing section.

2. Institutional Framework

One aspect of the institutional framework governing the operation of the labor market is the judicial or legislative (direct) aspect of labor market regulation. The main areas covered by this form of labor market regulation in the Caribbean include: freedom of association and industrial action in the form of trade union activity, statutory regulation of dispute settlement (via conciliation or arbitration), the enforceability of collective bargaining agreements, the recognition of unions, alternative contracts of employment, national insurance and social security, occupational health and safety, maternity and sick leave, holiday with pay and overtime, termination of employment, redundancy and severance, minimum wages, gender equality, equal remuneration and regulations governing the employment of children. In addition to these legislative measures, labor unions and employers negotiate collective bargaining agreements which contain measures covering hours of work, shift work, the payment of allowances such as uniform, entertainment, laundry and hazard, leave arrangements, manning levels, dismissal rules (LIFO), training of workers and grievance procedures. The nature and extent of these regulations vary from country to country in the region (see Table 2). Labor law in the Caribbean is characterized by a “**mixture of legislation, common law doctrines, custom and policy.**”

The institutional framework governing industrial relations in the region varies from a model of **statutory intervention** as observed in Trinidad and Tobago to a **voluntaristic** model followed in Barbados. The differences in the institutional framework within the region have emerged from the culture of trade unionism and the need to maintain labor and economic stability in order to propel economic development. For example, Jamaica and Trinidad and Tobago are known to have much more militant trade union movements than Barbados and Belize. In Guyana, Trinidad and Tobago and the Bahamas, there are statutory provisions making all collective agreements legally enforceable, while in Barbados there is no such provision. There are no legal provisions for the recognition of a trade union in Barbados, Belize and Guyana. The degree of unionization of labor varies from 13 percent of the labor force in Belize

to 32 percent in Guyana (see Rama, 1995). Although the degree of unionization appears to be low, the labor unions still have significant membership in strategic sectors of the economy (e.g., public sector, ports, public utilities).

However, in all of the countries of the region, the original approach was based on the common law, that is, the “voluntaristic” model, which is still observed in certain countries. This is an important factor in attempting to explain the relative lack of movement in labor law regulatory indices. The common law, unlike the civil law systems of Latin America, is based on case law and is characterized by *ad hoc* formulation of legal rules and regulations. In contrast, in the civil law systems, law is characterized by legal legislation and the code, which are deliberate forms of legal policy making. This has had ramifications for labor law regulation in common law countries as the defining characteristic in common law is non-intervention by government. Labor regulation is therefore dependent on market forces and the strength of the bargaining parties. Legislation is usually relatively late in coming and, even where it occurs, it is often distorted by case law.

Key concepts such as redundancy, the recognition of unions, the obligation to pay wages, holidays with pay, etc. were left to the courts to determine. This explains why before the relative late-coming of legislation in the region, mainly in the late 1960s, the economic value of these key concepts stood at zero as the common law had made no provision for them.

In this study we focus on three main areas of labor market regulation in the Caribbean, namely, national insurance payments, severance payments and minimum wages.

National insurance and social security benefits are provided in all countries. Benefits cover such areas as medical care, sickness, unemployment, old age/pension/retirement, employment injury, maternity, invalidity and survival. Although there are differences in the range of benefits provided, all the countries satisfy the minimum standards set by the ILO. Both employers and employees contribute to the national insurance and social security schemes, which can be considered as payroll taxes. The contribution rates for employees and employers to social insurance schemes are given in Table 3. The payment of such contributions by employers can represent a significant part of their labor costs, and several employers have been delinquent in their payments to the national insurance scheme. In Barbados, several employers find such contributions relatively high and become delinquent with respect to their payments into the national insurance fund.

The most contentious area of labor law in the region relates to the termination of workers and calculation of associated “firing costs” to employers (see Antoine, 1998, for a full discussion). Employment is usually governed by a mixture of contract and law. Pure contract law principles which do not usually consider the peculiar relationship of the worker to his employment may also govern the labor law environment. For example, at common law, termination is generally regarded as an essentially contractual concept. This means that A contracts to work for B and if he does not perform for any reason, such as poor performance, strike or even serious illness, he has breached the fundamental term of the contract, and may be lawfully dismissed. “*Summary dismissal*” is termination without notice for such actions as misconduct and breaches of confidentiality. The common law presumption of “dismissal at will” still operates in the region with regard to the termination of employment. At common law,

a contract of employment can be terminated at will provided “*reasonable notice*” is given. If there is no notice, the terminated employee gets payment in *lieu* of notice (e.g., one week’s wage or month’s salary). “*Wrongful dismissal*” occurs where there is no evidence for termination **without** notice (i.e., a contractual breach). The issue of notice is therefore fundamental to the concept of the lawful termination of employment at common law.

Although industrial courts and tribunals place some degree of constraint on the freedom of employers to dismiss at will, Caribbean governments are considering the formal introduction of ‘unfair dismissal’ which means that the employer must demonstrate that there is good reason for dismissing an employee. This clearly has implications for the future hiring and firing decisions of employers. Trinidad and Tobago, through its Industrial Court, specifies the concept of **unfair industrial relations practice**, while Jamaica has provision for “**justifiable dismissal.**” In both cases, reasons for dismissal must be given. In Barbados, where an employee has been dismissed without notice, the concept of “*just cause*” has been employed to determine if the dismissal is wrongful (see Antoine, 1992; Cumberbatch, 1995a, b). Damages for such dismissal are paid via provisions in the severance payment legislation. It should be noted that workers taking strike action in Belize, Barbados, Guyana and Jamaica can be dismissed. Good industrial relations practice, however, reduces the occurrence of such cases, since firms seek to maintain a reputation for being good employers in order to attract high-quality workers who can expect some degree of job security.

In terms of payment for involuntary termination of employment, labor law provides for severance pay (i.e., compensation for termination of employment for whatever reason) and redundancy pay (i.e., compensation for termination due to the existence of economic or technological difficulties). (See Table 4). The “redundancy pay” concept is more widely used in the region. Redundancy or severance pay is treated as payment for past service, hence low tenured workers are severed first on cost minimizing grounds. Employers in some countries are responsible for paying severance to employees when they are terminated and then recovering part of the payment from a Severance Payment Fund (e.g., Barbados). In Barbados, the Severance Payments Fund is administered by the National Insurance Board. Employers must make severance fund contributions on behalf of their employees based on their insurable earnings. Employers are required to pay employees their severance and then claim a rebate which is determined by the Minister responsible for the Fund’s administration. In cases where the employers are unable to make payments to employees, the Fund makes the payments to the employees and then seeks to recover the amount from the employers. The severance payments system is not experience-rated, hence employers do not pay a reduced contribution to the Fund if they have a long history of non-severance. In Jamaica and Trinidad and Tobago, there is no Fund, so that the employer pays the employee the full cost of termination without a refund.

The countries under study in this project have enacted minimum wage legislation in the form of either a national minimum wage (e.g., Jamaica) or specific minimum wages for selected occupations (e.g., Barbados). In Jamaica, a national minimum wage was introduced in 1975 as part of the Government’s poverty alleviation program, and in recognition that several workers in the non-unionized sectors were lowly paid. The most recent increase in the national minimum wage took place in July 1996 when it was set at J \$800 per 40 hour week. Barbados, Belize, Guyana and Trinidad and Tobago have minimum wages to cover selected workers (e.g., shop

assistants, domestic workers and agricultural workers). These rates are updated on an irregular basis.

Antoine (1998) also discusses other aspects of labor law in the region, namely, sick leave with pay, holiday with pay, temporary employees, the protection of wages, truck acts and other benefits, the employment of child labor, gender equality and equal remuneration. These regulatory measures form the general background against which firms have to operate in the labor market. Little change has taken place in these legislative measures over the years so that firms have adjusted to their existence.

In summary, the institutional framework governing the operation of the labor market in the Caribbean consists of a set of legislative measures, common law provisions (case law), customs and traditions. This range of regulations reflect the existence of two types of models of industrial relations and dispute regulation in the region, namely, statutory intervention and voluntarism. Trade unions are particularly active in the labor market and are recognized in the various labor laws. The State maintains an oversight on the operations of the labor market in the region in the form of legislative provisions and the operation of labor departments. While individual regulatory measures may affect companies (e.g., employers) differently, the overall framework within which companies can hire and fire workers provides the basis on which employment decision-making is made. Changes in labor legislation have not been undertaken regularly.

The change in employment depends on the hiring and firing process. Let L_0 and L_t represent the initial and current levels of employment (i.e., number of persons employed), then we have the relationship:

$$L_t = L_0 + H(\Theta) - F(\Theta) - (R) \quad (1)$$

where $H(\Theta)$ represents the hiring function and $F(\Theta)$ is the firing function. R represents the number of voluntary resignations and retirement. Mandatory retirement laws will affect the R variable. The discrete change in employment over the time period is given by:

$$\hat{L}_t = L_t - L_0 = H(\Theta) - F(\Theta) - R \quad (2)$$

The change in employment therefore depends on the factors which affect the hiring and firing processes. Regulatory measures can either impose additional costs of hiring and firing (e.g., severance, national insurance contributions and other payroll taxes) or condition the processes (i.e., no discrimination in the hiring process, no child labor, LIFO or inverse seniority in the firing process). Understanding the factors which affect the H and F functions becomes important in determining changes in employment over time.

3. Non-wage Labor Cost Indices

Labor market regulations give rise to a set of labor costs which employers must take into consideration. Labor costs can be classified into (direct) wage costs and (indirect) non-wage costs. **Direct** wages and salaries relate to remuneration for work performed and include pay for normal time worked, premium pay for overtime and public holiday work, premium pay for shift work and night work, incentive or bonus pay and cost-of-living allowances. **Indirect** or non-wage labor costs consist of payment for days not worked (paid holidays and compensation for holidays not taken), social welfare costs (contributions to social welfare and family allowances paid by the firm), statutory social welfare costs (e.g., contributions to national insurance and social security schemes), customary contractual or voluntary costs (e.g., supplementary retirement and provident schemes, supplementary redundancy insurance scheme), benefits in kind (e.g., housing, payment of utility bills), vocational training and special taxes and subsidies (e.g., employment tax).

In addition to giving rise to these wage and non-wage labor costs, labor market regulations (LMR) also **condition the environment** within which companies must operate in the labor market. For example, legislation governing gender equality and equal remuneration and the recognition of a trade union may not affect labor costs **directly** but may affect the decision to hire and fire workers. The existence of the gamut of legislative measures therefore gives rise to the nature and structure of adjustment costs and makes the labor input a quasi-fixed factor in the production process.

The wide range of regulatory measures makes it difficult to properly analyze their effects on employment and other labor market variables. In some cases, many of the regulations hardly change over a long period and therefore have no inter-temporal analytical significance. In other cases, some regulatory measures are changed on a regular basis and therefore provide a ‘natural experiment’ for empirical analysis. Differences in regulation across countries also provide a basis for empirical analysis. In order to manage the range of regulatory measures, analysts have attempted to develop indices of labor market regulation (see Downes, 1998, for a full discussion). Two basic approaches have been employed by labor economists. First, important regulatory measures are identified and specific indices are developed for each measure (e.g., severance pay, minimum wage—i.e., Kaitz index—national insurance contribution or payroll taxes). Secondly, composite indices are constructed using either the specific indices or the natural units of the regulatory measures. These composite indices tend to be unweighted and do not reflect the relative importance of the different measures in the employment decision. The technical solution to this problem is the use of principal components or factor analysis for both qualitative and quantitative variables.

Authors have referred to LMR by different names. For example, Rama (1995) refers to LMR as an index of “labor market rigidity,” while Marquez and Pagés-Serra (1998) refer to them as an index of “employment protection.” Loayza and Palacios (1997) have used a similar procedure to obtain an indicator of labor market reform.

In Rama’s (1995) study of 31 Latin American and Caribbean countries, the range of his “index of labor market rigidity” was 0.182 (Belize) to 0.654 (Brazil). The indices for the

English-speaking Caribbean are given in Table 5. Although missing values for some of the variables can affect the overall value of the index, the values of the index of labor market rigidity in the English-speaking Caribbean indicate that Barbados has the highest degree of labor rigidity in the sub-region, while Belize has the lowest.

Marquez and Pagés-Serra’s (1998) index of employment protection for the six countries in this study also shows how levels of protection compared with Latin America. The range of their index goes from 1 (little protection, e.g., USA) to 35.5 (high degree of protection, e.g., Bolivia and Nicaragua). Four of the six countries in this study record values less than 10 (see Table 6). Loayza and Palacios’ (1997) study of labor market liberalization in Latin America and the Caribbean also comes to the conclusion of low levels of labor market distortion compared with Latin America. They state that with a “common law tradition, the English-speaking countries of the Caribbean, especially the Bahamas, Belize and Guyana, are the least rigid in the region, particularly in regard to monetary compensation for dismissal, constraints on temporary contracts and the rate of payroll taxes” (p. 17).

Although these composite indices provide some indication of the degree of labor market rigidity, distortion or protection afforded by various regulatory measures, they do not provide an indication of how specific measures affect employment. As indicated earlier, specific indices can be constructed to determine the impact of LMR on other labor market variables.

In this study, specific indices are used to examine the effects of labor regulations on employment in the Caribbean. In the case of minimum wage legislation, a Kaitz-type index (KE) is used for Jamaica, which has a national minimum wage. The index is given by:

$$KE = \frac{\text{Minimum Wage Index}}{\text{Average Compensation Index}} = \frac{MW}{AC} \quad (3)$$

where the coverage ratio is unity (see Brown, Gilroy and Kohen, 1982, p. 499). The traditional Kaitz index is the ratio of the nominal legal minimum wage to average hourly earnings weighted by coverage. For Jamaica, average compensation is used as a proxy for average earnings. In the case of Trinidad and Tobago, where the minimum wage legislation covers a selected number of workers, an “effective minimum wage index” is used. This index is given as the ratio of the minimum wage index for those covered by the legislation to the average earning index. Data on the degree of coverage are unavailable

Simple unweighted indices are used to measure the impact of national insurance contributions made by employers and employees in Barbados (because of the unavailability of data for weighting purposes). These contributions cover payments for severance pay, national insurance and special levies. The overall contribution rates are converted to index number form using 1980 as a base. Simple unweighted indices are also employed to capture the effect of the payment of wage-related contributions to the national insurance scheme in Jamaica. In the case of Trinidad and Tobago, a dummy variable is used to capture changes in the NIS contributions, which started in 1971, and changes in 1980 and 1982.

Severance payment legislation has not changed significantly over the study period. The severance payments scheme in Trinidad and Tobago started in 1985 and has not changed since that year. In the case of Barbados, the scheme started in 1978 and some amendments were made in 1991. The scheme in Jamaica began in 1974 and slight amendments were made in 1986 and 1988. With the exception of Barbados, where rates of contribution were changed, the amendments have been administrative.

In this study, therefore, the analysis of the effects of labor market regulations on employment will focus on minimum wage legislation, national insurance contributions and severance payments.

4. Dynamic Labor Demand Functions

The employment of a person by a company involves various costs: (direct) wage costs and (indirect) non-wage costs. Direct wages and salaries relate to remuneration for work performed and include payment for normal time worked, overtime and holiday work, shift and night work, incentive pay and family allowances. While the payment for some of these items is determined by legislation (e.g., holiday with pay legislation), the quantum of the payment is determined by the collective bargaining process, where unions are dominant.

Non-wage labor costs are generally considered as **adjustment costs** and consist largely of **hiring costs** (i.e., the costs incurred by the employer in recruiting employees) and **firing costs** (i.e., the costs of terminating the employment of workers in an enterprise). These non-wage labor costs consist of the costs of hiring and training new employees, legally required social insurance payments, severance payments, negotiated benefits and other payments. The existence of these non-wage labor costs makes labor a **quasi-fixed factor of production**. An important implication of these costs is that an enterprise has a choice between hiring more (or fewer) workers and employing existing workers for longer (or shorter) hours as production needs change. Once a set of workers has been hired, many of these non-labor costs become fixed employment costs which do not vary with the number of hours worked as in the case of wage labor costs. Higher adjustment costs reduce the degree of new employment an enterprise will undertake and increase labor hoarding within the enterprise.

The existence of non-wage labor costs has implications for the specification of labor demand (employment) functions and the employer's choice between the number of workers and the number of hours worked per employee. There are also implications for the incidence of lay-offs by "skill level" since differences in such turnover costs by skill level can result in firms being more reluctant to lay off "skilled" than "unskilled" in response to a decline in demand for goods and services (i.e., skilled labor is hoarded).

The impact of labor market regulations on employment, as reflected in wage and non-wage labor costs, has been approached from two directions:

- i. The estimation of dynamic labor (employment) adjustment models whereby the role of labor market regulation is **implicitly** captured in an adjustment cost function (see, for example, Hamermesh, 1993, and Hamermesh and Pfann, 1996).

- ii. The estimation of labor (employment) demand functions **explicitly** using specific or composite indices of labor market regulation as explanatory variables (see, for example, Lazear, 1990, and Erickson and Mitchell, 1995).

Dynamic labor demand functions can be motivated via the existence of adjustment costs or the role of expectations. These two factors suggest that there are several specifications of the dynamic labor demand function depending on the nature of adjustment costs and expectations. For example, labor adjustment costs may be symmetric or asymmetric with respect to the hiring or firing of employees or linear or non-linear (e.g., quadratic) with respect to the rate of increase in hiring or firing costs. Expectations can also take various forms—adaptive or rational.

In addition to adjustment costs and expectations, alternative labor demand models can be specified according to the assumptions made about the production technology used by the firm, the vintage of the capital stock, the structure of commodity and labor markets and the institutional framework governing labor market behavior (e.g., the existence of trade unions and their bargaining power). Recent literature on the economics of collective bargaining and trade union behavior indicates several models which govern the negotiations process. The two main models are the labor demand model and the efficient bargain model. There are two variants of the labor demand model: first, the monopoly union model where the wage rate is set unilaterally by the union and the firm determines the appropriate level of labor demanded (i.e., employment), and secondly, the right-to-manage model whereby the firm determines the demand for labor after the wage rate is determined by the bargaining process. In the efficiency bargain model, the union and the employer bargain over both the wage rate and the level of employment (see Sapsford and Tzannatos, 1993 for an overview). The choice of a particular formulation has implications for the specification and estimation of wage and employment function. Attempts have been made to develop dynamic wage and employment bargaining models in the context of adjustment costs (see Lockwood and Manning, 1989 and Modesto, 1994). The specification of a dynamic labor demand function must therefore reflect the institutional features of the labor market and the behavior of firms in both the product and labor markets.

The standard formulation of the dynamic labor demand model emerges from the solution of an inter-temporal constrained optimization problem. Assume that the representative firm has a level of employment at the beginning of a time period, L_0 , and is faced with a cost of adjusting the level of employment over time while seeking to maximize profit or minimize costs. The cost of adjustment may be due to legislative, technological or institutional factors. If the level of employment at some time period, T , is given as L_T , then the problem facing the firm is selecting the **speed** of adjustment to L_T faced with an adjustment cost function and also the **level** of employment L_T .

The optimization problem can be solved by using the calculus of variation whereby the firm seeks to find the optimal path of employment over time (see Intriligator, 1971). If we assume that adjustment costs are quadratic and symmetric, that is, firing costs are equal to hiring costs for all changes in employment, then we can generate one form of the dynamic labor demand function (based on minimizing the intertemporal costs of production subject to a

production function constraint; see Downes and Mamingi, 1997) given as:

$$L_t^d = L_t^d(W_t/m_t, q_t^*, D(L_t)) \quad (4)$$

where the optimal demand for labor is a function of the price of labor relative to the rental price of capital (W_t/m_t), planned or expected output (q_t^*) and a distributed lag function of labor demand, $D(L_t)$. The specific form of equation (4) depends on the specification of the production function. As indicated earlier, alternative assumptions about firm behavior (e.g., profit maximization), the adjustment costs function (e.g., non-quadratic and non-symmetric), institutional arrangements (e.g., right-to-manage bargaining model) and production technology can generate different dynamic labor demand functions.

One of the limitations of using equation (4) to determine the impact of labor market regulations on employment is that **all** sources of adjustment costs are subsumed in the $D(L_t)$ variable. One solution to this problem is to examine the nature and characteristics of labor market regulation and infer a cost function that reflects the specific nature of the regulatory measures. For example, we can identify regulatory measures related to the wage rate (e.g., payroll taxes) and non-wage regulatory measures (e.g., no child labor, right to join a trade union, no sex discrimination). The dynamic labor demand function can now be specified as:

$$L_t^d = L_t^d(W_t^a/m_t, q_t^*, D(L_t)^a) \quad (5)$$

where w_t^a is a regulatory-adjusted wage rate and $D(L_t)^a$ is a regulatory-adjusted lag formation. If indices are specified for these regulatory adjusted measures, then a log-linear specification of equation (5) can be given as:

$$\ln L_t^d = \mathbf{a}_0 + \mathbf{a}_1 \ln(W_t/m_t) + \mathbf{a}_3 \ln REG(W_t) + \mathbf{a}_3 \ln REG(NW_t) + \mathbf{a}_4 \ln q_t + \mathbf{a}_5 \ln L_{t-1} \quad (6)$$

where $REG(W)$ and $REG(NW)$ are regulatory indices associated with the wage rate (W) and non-wage (NW) factors. This formulation assumes that the speed of adjustment is determined by the non-wage regulatory measures ($REG(NW)$). Equation (6) indicates that the demand for labor depends on the basic wage rate relative to the price of capital services, wage-related regulatory measures (e.g., payroll taxes), non-wage regulatory measures which are the main factors which make labor a quasi-fixed factor, planned output and previous level labor demand (which is a proxy for factors other than labor market regulations which affect the adjustment process). In a truly dynamic context, we would expect some interaction between these explanatory variables.

As stated before, composite regulatory measures are not particularly useful for specific policy analysis (i.e., should government reduce the minimum wage or cut severance pay to boost employment). In order to handle this issue, we need to examine the regulatory environment of a country to determine the main regulations which are likely to affect employment over time (see Zank, 1996). In time series analysis, significant variation in regulatory measures can have an impact on employment determination. Across countries, significant variation can also have an impact on employment generation across these countries and explain differences in relative employment growth. Lazear (1990) approached the study of the impact of labor market regulation on employment by specifying the important measures which determine employment

across a set of developed countries. An expanded version of his model can be given as:

$$L_t^d = L^d(W_t / m_t, q_t^*, r_1, r_2, \dots, r_k) \quad (7)$$

where r_i ($i = 1, \dots, k$) are alternate regulatory measures (e.g., severance payment, NIS payments). Once we have enough degrees of freedom, we can estimate the impact of these different measures on employment. To the extent that there are still residual adjustment costs, a lagged function of L_t can be incorporated into equation (7), that is,

$$L_t^d = L^d(W_t / m_t, q_t^*, r_1, r_2, \dots, r_k, D^*(L)) \quad (8)$$

$D^*(L)$ reflects “residual adjustment costs.”

The latter approach is more useful for policy analysis than the earlier specifications of the dynamic labor demand functions in that specific labor regulations can be highlighted. While some of the labor market regulatory variables can affect the basic wage rate (e.g., payroll taxes), the focus in this study is on the effects of the regulatory measures on labor demand. The possible endogeneity of the wage rate in the labor demand equation can be handled by an appropriate choice of instrumental variables.

5. Statistical Data

One of the major problems associated with labor market analysis in the Caribbean is the unavailability of data on many labor market variables. The authors of a recent study of workers and labor markets in the Caribbean lamented the unavailability of data to undertake a detailed analysis of the labor market (Abt Associates, 1998). Some countries in the region have undertaken periodic labor force surveys to assess the performance of the labor market in terms of employment, unemployment and labor force participation. Many of these countries rely, however, on population census data which are collected on a decennial basis in order to get a comprehensive picture of important labor market features.

Ideally, a specially designed survey would be needed to provide data to undertake a proper analysis of the impact of labor market regulation on employment at the different levels of aggregation.

The absence of an ideal situation means that we must use the available information from different sources. Such a situation makes the results of the exercise somewhat tentative since the databases may not be congruent. A typical situation in the Caribbean relates to the data available on wages and employment. Wage rate data are usually collected from the administrative records of the Labor Department and based on collective bargaining agreements while employment data are collected from labor force (continuous household) surveys.

In terms of the database used in this study, only annual data are available for **real GDP** for all the countries. Data at the aggregate level are used in this study, although annual sectoral level data for real GDP (constant price GDP) are available. The data series for real GDP are as follows: Barbados and Trinidad and Tobago (1970 to 1996) and Jamaica (1975 to 1996).

Wage rate and average earnings data are available for only three countries on a continuous basis: Barbados, Jamaica, and Trinidad and Tobago. In the case of Barbados, the Central Bank has constructed a wage rate index using data from collective bargaining agreements lodged in the Labor Department. This annual Wages Index is based on selected areas of economic activity and is available for the period 1970 to 1996.

In the case of Jamaica, the Statistical Institute of Jamaica conducts a quarterly Employment and Earnings survey of “large” establishments (i.e., employing of 10 or more persons). Data are available on both a quarterly and annual basis for the average earnings of workers in “large” establishments for the periods 1976 to 1979 and 1986 to 1996. Because of this large gap in the establishment survey data, researchers have had to use the ratio of employees’ compensation in the national income accounts to total employees as a proxy for average annual compensation in Jamaica.

The Central Statistical Office in Trinidad and Tobago publishes an index of average weekly earnings. This index was started in 1971 and re-based in 1977 with a wider coverage of employees in sugar, manufacturing, oil refining and electricity. Data are collected from surveys conducted biannually.

Employment data are collected on a quarterly basis from labor force surveys in the Bahamas, Barbados, Belize, Jamaica and Trinidad and Tobago. No ongoing survey exists in Guyana. Annual data on employment (and unemployment) in the Bahamas are available for 1973, 1975, 1977, 1979, 1986, 1988-1989 and 1991-1996. No quarterly estimates exist for the Bahamas. Barbados has conducted a quarterly Continuous Household Sample Survey to collect information on employment and other labor force data since 1975. In the case of Belize, a “one-off” labor force survey was conducted in 1983/84, but since 1993 labor force data have been collected on an annual basis. Employment (and unemployment) data are available on a biannual basis (April and October) only for 1993 and 1994. Labor force surveys have been undertaken in Jamaica on a continuous basis since 1968. Between 1968 and 1987, six-monthly labor force surveys were conducted (April and October). Since 1988, quarterly data on the labor force have been collected. Labor force surveys began in 1963 in Trinidad and Tobago on a biannual basis (January-June and July-December) but there were no surveys in 1972 and 1976.

An assessment of basic data series for the six Caribbean countries covered in this study indicates that annual data are available for Barbados, Jamaica and Trinidad and Tobago over the period 1970-96.

The absence of wage/earnings data and a continuous employment series for the Bahamas, Belize and Guyana means that they are excluded from the empirical aspect of this study. Given the low level of distortion caused by labor market regulation in these countries, their exclusion would not affect the results of the study (see Loayza and Palacios, 1997).

In terms of labor market regulations, we have sought to identify the main regulatory measures which are likely to affect employment in the three countries (Barbados, Jamaica and Trinidad and Tobago). In several instances, there has been little change in labor market regulations in these countries. Indeed, a recent survey of companies in Barbados, Belize, Jamaica and Trinidad and Tobago indicated that labor market regulation was not an important

labor market issue affecting their operations. There was some concern expressed in Barbados and Trinidad and Tobago about the high level of employer contributions to the social security fund (see Abt Associates, 1998, p. 26). The Severance Pay Act was also a concern to Barbadian employers. In this study, we have therefore focused on the impact of minimum wage legislation in Jamaica and Trinidad and Tobago and social security payments and severance payments in the three countries. Data are available on the national minimum wage introduced in Jamaica in 1975, while a minimum wage index covering selected occupations is available for Trinidad and Tobago. Barbados' minimum wage legislation only covers three categories of workers (shop assistants, domestics and agricultural workers) who generally tend to receive more than the minimum wage.

Payroll taxes in the form of national insurance contributions are available for Barbados since 1967. The contribution rates for regular employees and employers are available along with the range of taxes paid. The employer is responsible for the partial payment of national insurance, non-contributory old age pension, employment injury, severance pay and unemployment insurance. Special levies introduced since 1981 are shared by both employers and employees. The limits of insurance earnings have been adjusted periodically to ensure that the National Insurance Fund maintains an equality between income and expenditure. Changes were made in 1974, 1978, 1982, 1984, 1987 and 1991. Unweighted indices of the rates for the different contributors (employers and employees) are used in this study. For Jamaica, data are available for the maximum wage-related contributions to the national insurance scheme for the period 1966 to 1996. In the case of Trinidad and Tobago, the contribution rates have not changed since the introduction of the national insurance scheme in 1971. The maximum insurable earnings were however increased in 1980 and 1983. Severance payment legislation was introduced in Jamaica in 1974 and in Trinidad and Tobago in 1985. No changes have been made with respect to the payment of employees since these periods. A Severance Payment scheme was introduced in Barbados in 1973. The contribution rate payable by employees into the severance payment fund was raised from 0.25 percent to 1 percent of insurable earnings in April 1991. The maximum insurable earnings were also raised from \$2,600 to \$3,100 in October 1991.

In summary, the impact of minimum wage on employment is assessed for Jamaica and Trinidad and Tobago and payroll taxes (national insurance contributions) and severance payments for all three countries using annual data. Little change has taken place in other labor market regulations over the study period (1970-96) in these countries.

6. Empirical Results

In this section an empirical examination of the impact of selected labor market regulations on employment is undertaken using variants of equations (7) or (8). While annual data are used for the three countries (Barbados, Jamaica, and Trinidad and Tobago), the period of investigation varies from country to country according to the availability of data. In the cases of Barbados and Trinidad and Tobago, the period of investigation goes from 1970 to 1996, while for Jamaica it is from 1975 to 1996 due to the absence of a national minimum wage prior to 1975. The variables used in the exercise also vary from country to country according to the data availability. They are as follows: total number of persons employed (L), average earnings index

(Trinidad and Tobago), average compensation index (Jamaica) and average wage index (Barbados) (W), gross domestic product at factor cost at 1990 prices (GDP), real wage rate or earnings/compensation (RW) defined as W divided by the retail or consumer price index (P), minimum wage index (mw), the contribution of employers to the national insurance scheme (NISCOR), severance payment schemes (SEV), effective minimum wage (EMV) is given as the minimum wage index divided by an average earnings index (Trinidad and Tobago), and the Kaitz index is defined as the ratio of the minimum wage index to an average compensation index (Jamaica). (See Appendix 1 for a discussion of the labor regulation variables).

It is worth pointing out two major problems were encountered in this study. First, the exercise is hampered by the shortness of time series which, in general, can result in the low power of test statistics as well as the invalidation of asymptotic tests. Second, as outlined above, the data used do not always capture adequately the concepts used in the theoretical analysis.

The estimation procedure proceeds as follows:

- i. Investigate the temporal properties of the series using the augmented Dickey-Fuller (*ADF*) unit root test;
- ii. Check for the existence of meaningful long-run economic relationships via the Johansen test for cointegration;
- iii. Estimate, if cointegration holds, a long-run relationship between employment and a set of variables using the Phillips-Loretan non-linear error correction model;
- iv. Use diagnostic criteria to evaluate the estimated model;

A comparison is made between the actual levels of employment and the projected levels of employment with regulations kept at certain levels and without regulations.

All results are derived from the Eviews computer program. The stationarity/non-stationarity of the series is determined with the *ADF* t test. The following equation is used to derive the *ADF* t test:

$$\Delta y_t = c + \mathbf{r} y_{t-1} + \sum_{i=1}^m \mathbf{I}_i \Delta y_{t-i} + e_t \quad (9)$$

where y_t is the variable of interest (any variable explained in the note to Table 7), Δ stands for the first difference, c is a constant term, \mathbf{r} and \mathbf{I}_i are parameters, and e_t is a white noise series. The null hypothesis of $\mathbf{r} = 0$ (unit root) against the alternative hypothesis $\mathbf{r} < 0$ (stationarity) is tested using the $t_{\hat{\mathbf{r}}}$ statistic, that is, the *ADF* t -statistic that follows a Dickey-Fuller (DF) distribution. The t -statistic values are compared with the critical values to decide on stationarity or non-stationarity of variables. When $\mathbf{r} = 0$, nonstationarity (unit root) is accepted with a drift c ; that is, y_t is nonstationary with a trend for $c \neq 0$; otherwise it is stationary around a constant mean but has no trend. The *ADF* t values for variables in levels (y_t) as well as for variables in first differences (Δy_t) are reported in Table 7. The comparison of these values with the critical values (see note to Table 7) indicates the variables in levels are all non-stationary at

the 5% level of significance. The series defined in first differences are stationary following the comparison of the statistics of interest with the corresponding critical values. Note that the first difference of *gdp* for Trinidad and Tobago as well as that of severance payments in Jamaica seems non-stationary. We examine further these two differenced series using the Phillips-Perron Z_t test, a more powerful test than the ADF test, which also follows a DF distribution. The Phillips-Perron Z_t test uses a non-parametric correction to approximate autocorrelation in the error term of the DF regression (the ADF regression without lagged left-hand side variables) unlike the ADF test which resorts to the lagged left-hand side variables to reach the same objective. The calculated values of the Phillips-Perron Z_t are -2.716 and -4.856 for the first differences of *gdp* (for Trinidad and Tobago) and *sev* (for Jamaica), respectively. These values are greater than the critical values in absolute value; that is, the differenced series in question are stationary. Overall, these results (non-stationarity in levels and stationarity in first differences) taken together indicate that the variables in levels are all integrated of order one.

Since the variables are non-stationary, regressions involving these variables are only valid if they produce stationary linear combination(s); that is, they are cointegrated. Several tests for cointegration are available. The Johansen likelihood ratio (LR) test for cointegration is used here (see Maddala and Kim, 1998, chap. 6). Although the LR test is a large sample test, it is preferred over the Engle-Granger cointegration test since it can reveal the presence of more than one cointegrating relationship when dealing with more than two variables.

Given a cointegrating relationship between the variables of interest, we need to use robust methods to obtain unbiased and efficient estimates at least asymptotically. In this study, we adopt the Phillips-Loretan non-linear error correction model (see Phillips and Loretan, 1991). The basic idea behind this procedure is to obtain the long-run (static) estimates of the parameters of an equation by incorporating one or several lagged error (**equilibrium**) correction mechanisms, current first-differenced explanatory variables as well as their lags and leads. Basically the following equation is:

$$l_t = c + X_t \mathbf{b} + \Gamma(B) (l_t - c - X_t \mathbf{b}) + \sum_{i=0}^{\infty} \mathbf{a}_i \Delta X_{t-i} + \sum_{i=1}^{\infty} \mathbf{c}_i \Delta X_{t+i} + u_t \quad (10)$$

where l_t stands for the logarithm of the number of persons employed, X_t is a matrix of explanatory variables (i.e., real wage, real gross domestic product, severance, minimum wage, and contribution to national insurance), $\Delta X_t = X_t - X_{t-1}$, u_t is a well-behaved error term, $\mathbf{b} = (\mathbf{b}_1, \mathbf{b}_2, \dots)'$ is a vector of parameters associated with explanatory variables, \mathbf{a} and \mathbf{c} are also vectors of parameters and $\Gamma(B) = \sum_{j=1}^{\infty} \mathbf{g}_j B^j$ with B as the backward shift operator.

The non-linear error correction model (10) achieves full efficiency “in the limit by working to estimate (and eliminate) the effects of long-run feedback between the errors on the long-run equilibrium relationship and the errors that drive the regressors” (Phillips and Loretan, 1992, p.426). In this connection, the leads of ΔX_t have an important role to play as their inclusion allows to obtain errors that form a martingale difference sequence with respect to the errors that drive the long-run equilibrium and the errors that drive the explanatory variables.

This is useful for estimator efficiency, unbiasedness and for inference (see Phillips and Loretan, 1992, p.426 for advantages of this method over other cointegration techniques). Maddala and Kim (1998) also corroborate Phillips and Loretan's views on the usefulness of the presence of lags and leads in the estimation of a cointegration equation, precisely when there is a unique cointegrating vector.

In reality Equation (10) cannot directly be used as it stands; there is a need for truncation to make it operational. Given the small sample size, one lag and one lead of ΔX_t and $\Gamma(B) = \mathbf{g}_1 B$ are used. Thus, Equation (10) now reads:

$$l_t = c + X_t \mathbf{b} + \mathbf{g}_1 (l_{t-1} - c - X_{t-1} \mathbf{b}) + \sum_{i=0}^1 \mathbf{a}_i \Delta X_{t-i} + \mathbf{d} \Delta X_{t+1} + u_t \quad (11)$$

Equation (11) states that employment is affected by three components: the long-run relationship with explanatory variables through the parameter $\mathbf{b} = (\mathbf{b}_1, \mathbf{b}_2, \dots)'$, the short-run relationships with explanatory variables through the parameters \mathbf{a}_i and \mathbf{d} and the lagged equilibrium correction mechanism, $(l_{t-1} - c - X_{t-1} \mathbf{b})$, through the parameter \mathbf{g}_1 . The equilibrium correction mechanism, that is, the correction for the deviation from the steady state equilibrium, may be justified on two grounds. It represents not only an adjustment to the past due to technological and institutional rigidities but also an equilibrium error resulting from agents' expectations or forecasts of changes in employment. The latter stems from the possibility that agents may have more information about the employment variable they are trying to forecast than is contained in the history of the variable alone (see Campbell and Shiller, 1988, p.507).

Economizing on the number of degrees of freedom, differenced variables in lag or lead forms are progressively eliminated if they do not contribute to the overall fit. From the final model we obtain the forecasts of employment with regulations, with regulations kept at certain levels and without regulations. Cointegration and forecasts results are reported on a country by country basis.

6.1 Barbados

The following variables in levels are of interest here: logarithm of number of employees (l), logarithm of real wage index (wr), logarithm of real GDP (gdp), logarithm of contribution to NIS ($niscor$) and severance payments variable (sev). Other details concerning these variables are provided in the appendix.

The Johansen Likelihood ratio (LR) test in Table 8 reveals the presence of one cointegrated vector among the set of variables mentioned above at the 5% as well as at the 1% level of significance. The LR value for no cointegration (79.687) is greater than the critical value (68.52) at the 5% level of significance while the LR value for at most one cointegrated relationship (45.405) is less than the critical value (47.21).

A parsimonious form of Equation (11) with the variables indicated above is used to estimate the long-run parameters. For reasons of space and also because the focus is on the

long-run parameters, the coefficients of the lags and the leads of differenced variables are not reported here. Table 9, which contains the results of the preferred model, indicates that the estimates have the expected signs. Moreover there is no autocorrelation of errors as the LM test in its F version with a p-value of 0.35 indicates at the 5% level of significance. As far as impacts of variables are concerned, only *gdp* has a significant effect on labor demand, at least in the long run. Indeed, a one percent increase in the real GDP brings about a **1.22%** increase in employment. Changes in the real wage, contributions to NIS, and severance payments have a negative but insignificant effect on employment.

A simulation exercise indicates that, had the levels of the payroll tax (*niscor*) and severance payments remained at their 1970 levels or had regulations not existed, the levels of employment could have been generally higher than the actual levels as indicated by Figure 1. Statistically, however, there are no differences in the levels of employment among the three scenarios since the actual level of employment is always included in the 95% confidence interval (projected employment level ± 2 standard errors).

6.2 Jamaica

The variables of interest are: logarithm of number of employees (*l*), logarithm of the Kaitz index (*kaitz*), logarithm of real GDP (*gdp*), logarithm of contribution to NIS (*niscor*) and severance payments variable (*sev*).

The Johansen Likelihood ratio (LR) test in Table 10 reveals the presence of one cointegrated vector among the set of variables mentioned above at the 5% (and 1%) level of significance. While the LR value for no cointegration (**81.738**) is greater than the critical value (**59.46**) at the 5% level of significance, the LR value for at most one cointegrated relationship (**39.473**) is less than the critical value (**39.89**).

The regulatory variables being examined here are the minimum wage (*mw*) through the Kaitz index, the maximum wage-related contribution to the NIS and the severance payments schemes. The Phillips-Loretan non-linear regression results from Equation (11) amended approach are presented in Table 11. As the p-value of the associated LM test shows, there is no autocorrelation of errors. Real GDP is positively associated with employment. A one percent increase in real GDP brings about a **0.56** percent increase in employment. Regulations, be it minimum wage through the Kaitz index, severance payments or contribution to national insurance, do not have a significant negative impact on employment at the 5% level of significance.

Figure 2 simulates levels of employment under two scenarios of regulations: without regulations and regulations kept at their 1975 levels. Concerning the first scenario (without regulations), the results indicate that projected levels of employment could have been lower than actual levels of employment had we used no regulations (see *jlabo1*). The 95% confidence interval on the actual labor level reveals that the decrease in labor resulting from the non-use of regulations is significant.

In the second scenario, levels of employment could have been sometimes lower sometimes higher than actual levels of employment had we kept regulations (minimum wage, contribution to NIS and severance payments) at their 1975 levels. Statistically, however, the differences between actual levels of employment and projected levels of employment are not significant at the 5% level of significance. Summing up, while the model is good for estimation purposes, it is less performing in terms of forecasting.

6.3. Trinidad and Tobago

The variables of interest are: logarithm of number of employees (l), logarithm of effective minimum wage index (emv), logarithm of real GDP (gdp), contribution to NIS in dummy variable ($niscor$), and severance schemes captured by a dummy variable (sev). $Niscor$ and sev are quantified as explained in the appendix.

The Johansen Likelihood ratio (LR) test in Table 12 reveals the presence of two cointegrated vectors among the set of variables mentioned above at the 5% level of significance. However, if we use a 1% level of significance then the number of cointegrating vectors is reduced to one. Given the nature of the enquiry we focus on one cointegrating relationship that comprises all variables of interest.

Table 13 contains the estimation results of a variant of Equation (11). The results indicate that there is no autocorrelation of errors as indicated by the size of p-value (0.089) of the LM test in its F version. As for Barbados and Jamaica, gdp has a significant impact on labor demand at least in the long run. A 1% increase in real GDP brings about a 0.27% increase in employment levels. However, regulations be it minimum wage, or contribution to NIS or severance payments do not explain employment levels in Trinidad and Tobago.

A simulation exercise indicates that if no regulations existed or the levels of payroll tax ($niscor$), minimum wage and severance payments remained at their 1970 values, employment could have reached higher levels than actually indicated (see Figure 3). Using the 95% confidence interval on the forecasted value, these rates seem significant contrary to the spirit of the model. This basically means while the model is useful for estimation purposes, it is not so for forecasting purposes.

The empirical analysis of the impact of labor regulations on employment in Barbados, Jamaica as well as in Trinidad and Tobago indicates that minimum wage, contributions to NIS (payroll taxes) and severance payments do not have an impact on the level of employment. To a large degree, these different results are by and large explained by a lack of significant change in labor market regulation over the period of the study. The key factor driving employment in the three countries is output growth.

Despite the reservation put forward at the beginning of this section (shortness of samples, particularly for Jamaica, reliance on large sample tests, and poor quality data), there are three reasons that point to some reliability of results. First, the econometric results in this study corroborate to a large extent the results of a survey of employers in five Caribbean countries (see Abt Associates, 1998). The study indicates that “most companies reported that legislation was

not an important labor market issue affecting their company”(p.26). The low values on the various indices of labor market rigidity, employment protection or labor market distortion also suggest that labor market regulation is not a major factor in employment determination in the region. The key to employment generation lies in output growth. Second, the results derived from annual data are by and large concordant with those with quarterly data (not reported here) generated from annual data. Yet, with large sample sizes, quarterly data results do not suffer from the problem of “reliance on asymptotic tests.” Third, and more importantly, a simple before-after plot investigation of the effects of interventions in raw data also corroborates the major conclusion of this exercise; that is, output is the key determinant of labor demand in the Caribbean. Indeed, Figures 4, 5, 6 and 7 indicate that regulations do not have the expected negative impacts on labor. Labor and GDP do, however, move together. This association can unveil causality in the regression context.

7. Conclusion

Employment creation has been a major economic challenge in the Caribbean. The existence of a range of regulatory measures has been identified by some commentators as a source of labor market rigidity in the region. This research project has examined the range of direct and indirect labor market regulations in the region. Although several regulations exist in the countries under study, the overall level of labor market distortion caused by these regulations has been small compared with Latin American countries. Furthermore, the adoption of the voluntaristic model of industrial relations by a number of countries has meant that there has been little change in the labor laws in the region over time. For example, the severance payment acts in Trinidad and Tobago and Jamaica have not changed significantly since their introduction. The econometric analysis of the impact of selected regulations (that is, the minimum wage, contributions to the NIS and severance payments) on employment indicates that these measures have had little statistical significance. Output growth has been identified as a key factor in generating employment in the region.

This study was limited by the small sample size in particular for Jamaica. One solution might have been to pool data. However, pooling the data from the three countries is not advisable here for at least two reasons. First, there is a lack of homogeneity in the measurements or definitions of variables in some instances: for example, wage is defined as average earnings in Trinidad and Tobago, average compensation in Jamaica and average wage rate in Barbados; contributions to the NIS are unweighted index of rates in Barbados, unweighted simple index of the maximum wage related payment in Jamaica, and a dummy variable in Trinidad and Tobago. Consequently, interpreting the results from a pooled model becomes very hazardous. Second, a good or relevant panel data implies that the “country” dimension is much larger than the time dimension. This is not the case with our data. Another solution is to generate quarterly data from annual data to enlarge the sample size. The problem is that while data aggregation rests on a sound theoretical framework, data disaggregation when only aggregated data exist, on the contrary, reposes generally on a dubious theoretical ground. Hence, given the nonexistence of quarterly data and the pooling problems advocated above, the way out is to enlarge the data span by collecting more annual data to obtain reliable estimates.

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Appendix 1

1 Statistical Measurement of Labor Market Regulations

Barbados:

Severance Payments:	1970-1977	0	(scheme introduced in 1973)
(dummy variable)	1978-1990	1	(scheme changed in 1978)
	1991-1996	2	(change in the scheme in 1991)

National Insurance Payments: Simple Unweighted Index of the Rates of
Contribution by Employees and Employers
(1970-1996)

Jamaica:

Severance Payments:	1975-1985	1	(scheme introduced in 1974)
(dummy variable)	1986-1987	2	(change in scheme in 1986)
	1988-1996	3	(change in scheme in 1988)

National Insurance Payments: Simple Unweighted Index of the Maximum Wage-
Related Payments (1975-1996)

National Minimum Wage: Simple Unweighted Index of the Minimum Wage
(started in 1975-1996)

Kaitz Index: Ratio of the National Minimum Index to the Average Compensation Index
(1975-1996)

Trinidad and Tobago:	Severance Payments:	1970-1985	0	(no scheme)
		1986-1996	1	(introduced in 1971)

National Insurance Payments	1970	0	(no scheme)
	1971-1979	1	(introduced in 1971)
	1980-1982	2	(changed in 1980)
	1983-1996	3	(changed in 1983)

Minimum Wage Index: Simple Unweighted Index of Selected Minimum Wage
Rates
(1970-1976)

Source of Minimum Wage data: Central Bank: *Handbook of Economic Statistics*, 1989, 1996.

2. Statistical Measurement of Wages/Earnings

Barbados: Wage Rate Index (1970-96) – A Laspeyres Index which is the arithmetic mean of wages and salaries indices for hourly-paid skilled laborers in selected sectors using a 40 hour week as the basis of calculation. Weights are based on the percentage of total employment provided by each sector.

(Source: Central Bank of Barbados: *Annual Statistical Digest*, 1998)

Jamaica: Average Compensation Index (1975-96) – The ratio of total employees compensation in the national accounts to total number of persons employed is used as a measure of average annual compensation. The dollar values are converted to simple unweighted index number form using 1985 as the base year.

Trinidad and Tobago: Average Weekly Earnings Index (1976-96) – covers average weekly earnings of employees in the manufacturing, oil, sugar and electricity sectors.

(Source: Central Bank of Trinidad and Tobago: *Handbook of Key Economic Statistics* 1989, 1996)

In all cases the real values were obtained by deflating by the retail price index.

3. Statistical Measurement of GDP and Employment

GDP at constant prices were obtained from the national accounts of the three countries, while employment data were obtained from labor force surveys. In the case of Barbados, estimates of employment for the period 1970-74 were obtained from Downes, A. and McClean, W. (1988): “The Estimation of Missing Values of Employment in Barbados”, CSO (T&T) *Research Papers*, No. 13, pp. 115-36.

Table 1: Labor Market Regulation Measures

Type of Intervention	Guarantees and Policies
Establishment and protection of workers' rights	right to associate and organize, right to bargain collect in industrial action, right to contest dismissals, job protection, conciliation and arbitration to resolve conflict.
Protection for the vulnerable	minimum working age to avoid child labor, equality of employment opportunities, anti-discrimination policies (age, disability, special provision for women (such as maternity pay)), restriction on temporary contracts with respect to paternity leave, occupational licensing, immigration law
Establishment of minimum compensation for work	minimum wages, minimum non-wage benefits, overtime payments, night work.
Assurance of decent working conditions	minimum occupational health and safety conditions, maximum work with break periods, holiday with pay.
Provisions of income security	social security provisions (disability, lay-off, old age, sickness and severance pay, wage and price controls, pension reform), advance notice with pay, unemployment insurance, termination

Adapted from World Bank: *World Development Report 1995: Workers in an Integrated World*, Oxford University Press, 1995.

Table 2: Characteristics of Labor Market Regulation the English-Speaking Caribbean in

	Bahamas	Barbados	Belize	Guyana	Jamaica
Period of Prior Notice	half to one month	Negotiable	half to one month	half month	2 to 12 weeks
Payment for Dismissal with Just Cause	0	0	0	0	0
Payment for Dismissal without Just Cause	negotiable collectively	21/2 weeks for service between 1 and 10 years; 3 weeks for service between 10 and 20 years; 31/2 weeks for more than 20 years	1 week's pay per year of service after 5 years of service	negotiable collectively	
Payment for Dismissal for Economic Reason	negotiable collectively	21/2 weeks for service between 1 and 10 years; 3 weeks for service between 10 and 20 years; 31/2 weeks for more than 20 years	1 week's pay per year of service after 5 years of service	negotiable collectively	
Limit to Payment for Dismissal	No	Maximum limit to monthly salary	maximum of 42 weeks	no	
Compensation for Termination by Worker	None	None	for 10 years of service, 1/4 times the number of years of service	none	none
Unemployment Insurance	No	Yes	No	no	no
Probationary Period	3 months to 1 year	Negotiable	2 weeks	none	3 months
Duration of Temporary Contracts	without restrictions	Without restrictions	without restrictions	without restrictions	without restrictions
Maximum Workday (hrs/wk)	48	40	45	48	
Charges for Added Hours	50	50	50	50	
Charges for Night Work	nothing if ordinary workday	Nothing	nothing if ordinary work day	nothing if ordinary work day	
Charges for Work on Holidays (%)	100 for Sundays; 150 for holidays	100	nothing if ordinary work day	100	

Table 3: Contribution Rates to Social Insurance Schemes (1991)

Country	Contribution Rates %		
	Employer	Employee	Self-Employed
Bahamas	5.4	1.7-3.4	6.8-8.8
Barbados	4.9-6.8	4.65-6.55	8
Guyana	7.2	4.8	10.5
Jamaica	2.5	2.5	5.0
Trinidad and Tobago	5.6	2.8	n.a.

Source: A. La Foucade: *A Review of the Evaluation and Performance of Social Security Schemes in the English-Speaking Caribbean*, 1995, p. 32-33

Table 4: Severance Pay in Caribbean Countries in the 1990s

Country	Qualifying Service	Rate of Benefit
Antigua and Barbuda	1 year	12 days per year latest basic wage
Barbados	2 years	12.5 days per year for first 9 years
Belize	5 years	5 days per year with 42 weeks maximum
Dominica	3 years	5 days for first 3 years + 10 days per year for 3 to 5 years 45 days for next 5 years + 10 days per year for 6 to 10 years 95 days for over 10 years + 15 days per year for over 10 years Maximum is 52 weeks
Jamaica	2 years	10 days per year for first 5 years 15 days per year for first 2 years
St Kitts and Nevis	1 year	10 days per year for first 4 years 15 days per year for 5 to 10 years 20 days per year for over 10 years Maximum is 52 weeks
St Lucia	2 years	10 days per year 5 days per year for first 2 years 10 days per year for 3 to 7 years 15 days per year for over 7 years weekly wage limited to EC \$100
St Vincent and the Grenadines	2 years	10 days per year up to 52 weeks
Trinidad and Tobago	1 years	10 days per year for first 5 years 15 days for over 5 years

Source: Baker, J.L. 1997. *Poverty Reduction and Human Development in the Caribbean*

Table 5: Labor Market Policies and Institutions in the Caribbean

Country	ILO Conventions Ratified	Annual Leave with Pay (days)	Maternity Leave (days)	Social Security Contributions (wage %)	Government Employment (Lab Force %)	Minimum Wage (Avg Wage %)	Severance Pay (Monthly wages)	Unions (Lab %)
Antigua and Barbuda	15	12	55	10.6	-	49.6	-	24
Barbados	35	15	84	12.0	23	-	-	31
Belize	27	6	50	7.0	-	-	-	13
Dominica	20	10	50	8.9	-	0.0	-	25
Grenada	25	-	50	8.0	-	0.0	-	47
Guyana	-	12	59	12.5	-	-	-	32
Jamaica	25	10	56	5.0	7	21.9	-	24
St Kitts and Nevis	-	-	64	10.5	-	-	-	34
St Lucia	25	-	57	10.0	-	-	-	20
St Vincent and the Grenadines	-	-	55	7.8	-	-	-	12
Trinidad and Tobago	13	14	55	8.4	-	30.8	-	28

Source: Rama (1995)

Table 6: Employment Protection Index for the Caribbean

Country	Definition of Just cause	Tenure-Related Severance Payment			Probationary Period	Severance at 20 years	Re-insta
		1	3	10			
Bahamas	6.5	7	4.5	2.5	13.5	1	14
Barbados	6.5	14.5	7	4	35	2	14
Belize	6.5	7	4.5	11	33	3	14
Guyana	27	14.5	13	19	35	12	14
Jamaica	6.5	7	15.5	8	13.5	-	14
Trinidad and Tobago	6.5	27	22	23	29.5	16	14

Source: Márquez and Pagés (1998)

Table 7: Augmented Dickey-Fuller Unit Root Test Results

		<i>l</i>	<i>Wr</i>	<i>gdp</i>	<i>Niscor</i>	<i>emv</i> or <i>kaitz</i>	<i>Sev</i>
Barbados 1970-1996	Level	-1.130	-2.970	-1.044	-1.079		-0.766
	1 st difference	-3.242	-4.008	-2.860	-3.150		-3.317
Jamaica 1975-1996	Level	-0.954	-1.692	-1.144	-2.533	-1.793	-1.080
	1 st difference	-2.833	-3.440	-2.316	-2.922	-3.762	-1.732
Trinidad and Tobago 1970-1996	Level	-1.429	-1.365	-1.365	-1.104	-0.892	-0.826
	1 st difference	-2.085	-3.757	-1.893	-3.633	-4.517	-3.317

Notes: *l* represents the logarithm of total employment; *wr* stands for the logarithm of real wage (ratio of nominal wage/earning/compensation index to consumer (retail) price index); *gdp* stands for the logarithm of gross domestic product (GDP) at factor cost at 1990 prices; *niscor* is total employer contribution to national insurance; it is the logarithm of an unweighted simple index of the maximum wage related payment for Jamaica, the logarithm of an unweighted index of rates (for employers and employees) for Barbados and a count data variable (with a value of zero in 1970, a value of one in 1971-1979, a value of two in 180-1982, and a value of three in 1983-1996) for Trinidad and Tobago; *emv* (effective minimum wage) is the logarithm of minimum wage index divided by average earnings index for Trinidad and Tobago and *kaitz* index is defined as *emv* for Jamaica; *sev* represents severance payments; it is a count data variable capturing the change in regimes; for Barbados, it takes on zero prior to 1978, one in 1978-1990 and two in 1991-1996; for Jamaica, it takes on one in 1974-1985, two in 1986-1987, and three in 1988-1996; for Trinidad and Tobago, it is a dummy variable with zero prior to 1985 and one in 1985-1996.

The numbers in the tables represent the *ADF t* test values derived from Equation (9) in levels (y_t) or in first difference (Δy_t). For regressions in levels with the number of lags $m=2$ for Barbados and Trinidad and Tobago (except for *wr* for Barbados), the critical values are : -3.734, -2.991 and -2.635 at the 1%, 5%, and 10% level of significance, respectively. For $m=2$ for Jamaica, the critical values are: -3.830, -3.029, and -2.655 at the 1%, 5% and 10% level of significance, respectively. For $m=1$ for the Barbados *wr*, the critical values are: -3.720, -2.985, and -2.632 at the 1%, 5% and 10% level of significance, respectively. For regressions in first differences with $m=1$ (or $m=0$ for Δwr for Barbados) and no constant term, the critical values are -2.67, -1.95 and -1.62 at the 1%, 5% and 10% levels of significance, respectively.

Table 8: Johansen Cointegration Test: Barbados

Test assumption: linear deterministic trend in the data			
Series: l wr gdp niscor sev			
Lags interval: 1 to 1			
Sample: 1970-1996			
Likelihood Ratio	5% c.v.	1% c.v.	Hypothesized No. of CE(s)
79.687	68.52	76.07	None* **
45.405	47.21	54.46	At most one

Note: variables are defined as in Table 7. c.v. means critical values. Hypothesized No. of CE(s) stands for the number of cointegrating equation(s). (*) and (**) denotes rejection of the hypothesis at 5% and 1% significance level, respectively.

Table 9: Long-run Estimates from a variant of Eq.(11) using the Phillips-Loretan NLS: Barbados, 1970-1996.

C	wr	Gdp	niscor	Sev
-3.382	-0.167	1.223	-0.029	-0.045
(-1.391)	(-1.365)	(2.974)	(-0.387)	(-1.703)
$R^2 = 0.967$	$\bar{R}^2 = 0.937$	$LM(F - stat) = 1.162 \quad p = 0.352$		

Note: variables are defined as in Table 7. Short-run estimates are not reported here. (...) are t-statistics. NLS stands for non linear least squares. LM test is the Breusch-Godfrey test for serial correlation using the F-test version because of the small sample size. P-value is the p-value associated to the LM test.

Table 10: Johansen Cointegration Test: Jamaica

Test assumption: no deterministic trend in the data			
Series: l kaitz gdp niscor sev			
Lags interval: 1 to 1			
Sample: 1975 1996			
Likelihood Ratio	5 % c.v.	1% c.v.	Hypothesized No. of CE(s)
81.738	59.46	66.52	None* **
39.472	39.89	45.58	At most one

Note: variables are defined as in Table 7; also see note to Table 8.

Table 11: Long-run Estimates from a variant of Eq.(11) using the Phillips-Loretan NLS: Jamaica, 1975-1996.

C	kaitz	Gdp	niscor	sev
2.185 (1.277)	-0.091 (-0.904)	0.557 (2.337)	0.036 (1.125)	0.029 (0.969)
$R^2 = 0.985$	$\bar{R}^2 = 0.964$	$LM(F - stat) = 1.897 \quad p = 0.211$		

Note: variables are defined as in Table 7. Short-run estimates are not reported here. (...) are t-statistics. LM test is the Breusch-Godfrey test for serial correlation using the F-stat version because of the small sample size. P-value is the p-value associated with the LM test.

Table 12: Johansen Cointegration Test: Trinidad and Tobago

Test assumption: no deterministic trend in the data			
Series: l emv gdp niscor sev			
Lags interval: 1 to 1			
Sample: 1970 1996			
Likelihood Ratio	5 % c.v.	1% c.v.	Hypothesized N0. Of CE(s)
107.046	76.07	84.45	None* **
59.165	53.12	60.16	At most one*
33.969	34.71	41.07	At most two

Note: variables are defined as in Table 7; also see note to Table 8.

Table 13: Long-run Estimates from a variant of Eq.(11) using the Phillips-Loretan NLS: Trinidad and Tobago, 1970-1996.

C	emv	Gdp	Niscor	sev
3.793 (2.537)	0.025 (0.197)	0.269 (2.081)	-0.020 (-0.982)	-0.033 (-1.125)
$R^2 = 0.923$	$\bar{R}^2 = 0.890$	$LM(F - stat) = 0.194 \quad p = 0.826$		

Note: variables are defined as in Table 7. Short-run estimates are not reported here. (...) are t-statistics. LM test is the Breusch-Godfrey test for serial correlation using the F-statistic version because of the small sample size. P-value is the p-value associated with the LM test.

Figure 1
 Employment Levels in Barbados in 1,000
 Blabor: actual employment levels
 Blabo1:projected employment levels without regulations
 Blabo2:projected employment levels with niscor and sev kept at their 1970 levels

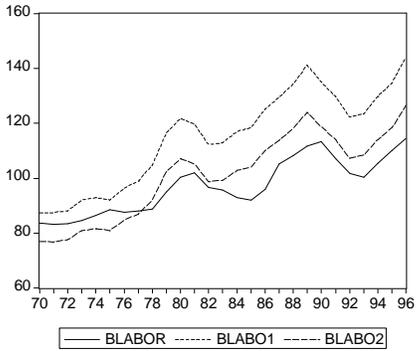


Figure 2
 Employment Levels in Jamaica in 1,000
 Jlabor:actual employment levels
 jlabo1:projected employment levels with no regulations
 jlabo2:projected employment levels with mw,niscor and sev kept at their 1975 levels



Figure 3
 Employment Levels in Trinidad and Tobago in 1,000
 Tlabor:actual employment levels
 Tlabo1:projected employment levels with no regulations
 Tlabo2:projected employment levels with mw, niscor and sev kept at their 1970 levels

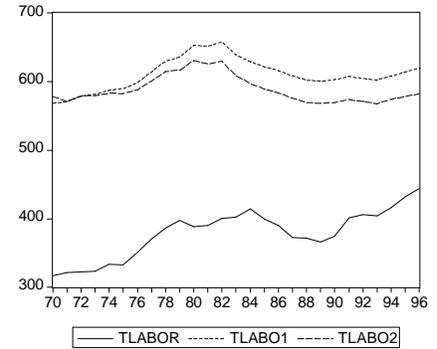


Figure 4
 Regulations [insurance(binsurance) and severance] and Their Impacts on Employment (ilabor), Real GDP (ibgdp) and Real Wage(iwager) in Barbados,1970-1995
 Variables are in index form with 1975 as a base.

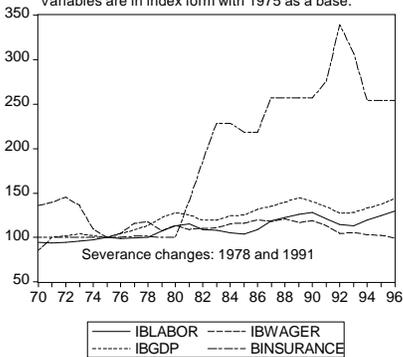


Figure 5
 Regulations[severance, minimum wage (ijminwage, see Figure 6) and insurance (ijnis, see Figure 6)] and Their Impacts on Employment (ijlabor), Real GDP (ijgdp) and Real Wage (ijwager) in Jamaica, 1975-1996
 Variables are index form with 1975 as a base

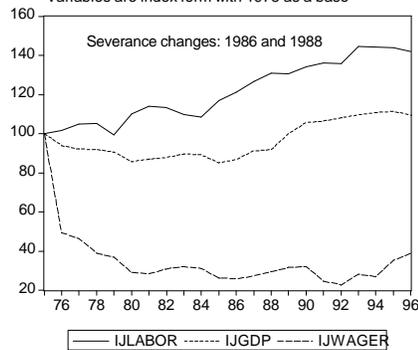


Figure 6
 Insurance (ijnis) and Minimum Wage (ijminwage) in Jamaica, 1975-1996 in index form with 1975 as a base

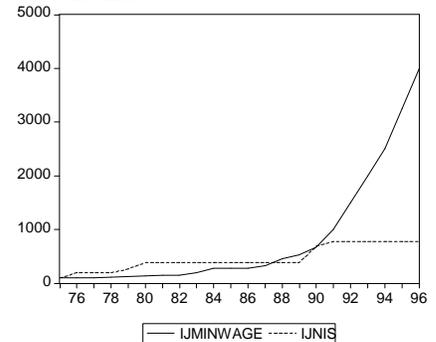


Figure 7
 Regulations [minimum wage(itminwage), insurance and severance] and Their Impacts on Employment (itlabor), Real GDP (itgdp) and Real Wage (itwager) in Trinidad and Tobago, 1970-1995
 Variables are in index form with 1975 as a base.

