

Inter-American Development Bank
Banco Interamericano de Desarrollo

Office of the Chief Economist
Working paper #381
August 1998

*AN ECONOMIC ANALYSIS
OF UNEMPLOYMENT
IN TRINIDAD AND TOBAGO*

Andrew S Downes PhD

April 1998

Revised August 1998

*Prepared for presentation at a seminar on 'Labour Market: Between Solidarity and Loyalty'
Sponsored by the Inter-American Development Bank, Montevideo, Uruguay,
May 19-20, 1998*

**AN ECONOMIC ANALYSIS OF UNEMPLOYMENT
IN TRINIDAD AND TOBAGO**

By

Andrew S Downes PhD

*Professor and Director
Institute of Social and Economic Research
University of the West Indies
Cave Hill Campus
BARBADOS, WEST INDIES*

Tel No: (246) 417-4476
Fax No: (246) 424-7291
email: iserch@caribsurf.com
or
asdownes@uwichill.edu.bb

April 1998

Revised August 1998

1 **Introduction**

Unemployment is regarded as one of the most challenging economic problems facing the governments of the Caribbean. Although there are variations in the measurement of unemployment, official estimates obtained from labor force surveys indicate that, in 1995, the unemployment rate ranged from 7.8% in Antigua/Barbuda to 19.7% in Barbados (see Table 1). The data also show that unemployment is particularly high among the young cohorts of the labor force (15-25 years), and especially among young females. It is generally believed that much of this open unemployment is due to **structural** factors such as the nature of the educational system and its interface with the needs of the labor market (i.e., the mismatch problem), technical change and the use of capital-intensive techniques of production, permanent shifts in the demand for goods and services especially in export markets, the skill mix of the labor force and available job opportunities and, to a lesser extent, **cyclical** factors such as the insufficiency of aggregate local and foreign demand for goods and services. **Institutional** factors such as the activities of labor unions and labor market regulations have also been raised as possible contributing factors to high levels of unemployment. There has also been an increase in the number of 'discouraged workers' who are not employed and are not actively looking for work, even though they would like to work. Such high rates of 'open' and 'disguised' unemployment represent a serious waste of the human resources of the region and constitute a high cost to society (i.e., a high social cost).

Although there have been several commentaries and descriptions of the unemployment situation in the region [see Harewood (1978), McIntyre (1975), Downes and Henry (1994)], there has been little systematic economic analysis of the unemployment situation in the region. Farrell (1980), for example, identifies a number of factors which are likely to affect the nature and rate of unemployment in the region. His analysis, however, fails to go to the next step of

applying econometric techniques to determine the relative significance and magnitude of the factors affecting unemployment in the region. Indeed, there is little econometric analysis of the determinants of unemployment in the region [see, for example, Clarke (1992), IMF (1997)]. Labor market researchers have been traditionally hampered by the lack of data on key labor market variables. However, sufficient unemployment and employment data now exist for preliminary work on the factors influencing unemployment in the region to be undertaken.

This paper focuses on the case of unemployment in Trinidad and Tobago which has a tradition of collecting satisfactory labor market data which can be used for statistical analysis. For example, labor force surveys have been undertaken continuously since 1963, while earnings data are available from 1971. Over and above the availability of data, Trinidad and Tobago provides a useful case study of unemployment primarily because of a persistently high rate of unemployment during a lengthy period of economic expansion.

The organization of the paper is as follows: in section 2, a brief overview of the Trinidad and Tobago economy is provided while the 'stylized features' of unemployment are given in section 3. In section 4, alternative explanations of unemployment in a 'small, developing economy' such as Trinidad and Tobago are presented. These explanations provide the basis for the estimation of a simple model of unemployment for Trinidad and Tobago in section 5. The results of estimating the model over the period 1970-1996 are also presented in this section. Suggestions for tackling the unemployment problem in Trinidad and Tobago are made in section 6. The final section summarizes the main issues and suggestions raised in the paper.

2 *The Macro-economy of Trinidad and Tobago: 1970-1996*

Trinidad and Tobago is a small country by any measure. It has a land area of 5128 square kilometers, a population in 1995 of 1.26 million and a per capita GNP of US \$4234 in 1995. Like several other Caribbean countries, at the beginning of this century, it depended heavily on the agricultural sector (mainly sugar and cocoa) to propel economic growth, and generate employment and foreign exchange. With the decline of the agricultural sector, the petroleum industry became the major source of economic activity. Indeed, Trinidad and Tobago has been described as having an 'open petroleum economy' [Seers, 1964]. Oil was discovered in 1857 and by the nineteen fifties, major oil companies such as British Petroleum, Shell and Texaco were engaged in large scale oil refining [Auty and Gelb, 1986, p. 1162].

An assessment of the importance of the petroleum sector can be obtained from the sectoral distribution of the gross domestic product (GDP) over the period 1970 to 1995 [see Table 2]. In 1970, the petroleum sector (i.e., exploration and production, refining, petrochemicals, service contracting, distribution and asphalt production) accounted for 22.1% of total domestic production. With the increase in oil prices in 1973, the share of the petroleum sector in current price GDP increased to 48% in 1975. While the second oil price shock in 1979 was not as great as that of 1973, the contribution of the petroleum sector remained at over 40% in 1980. The end of the oil price bonanza brought the contribution of the petroleum sector back to under 30% in the late nineteen eighties and in the nineties. The movement of oil prices over the 1970-96 period resulted in two significant periods in the economic life of Trinidad and Tobago: the **boom** period, 1974-1982 (i.e., high/rising oil prices) and the **bust** period, 1983-1989 (i.e., low/falling oil prices).

The contribution of the agricultural sector (especially sugar) declined from 6.0% in 1970 to 3.4% in 1995. The contribution of the manufacturing sector declined during the seventies, but recovered in the eighties and remained steady during the nineties. There has been an increase in the share of the services sector, especially distribution and financial services since 1980. The services sector accounted for over 50% of GDP in 1995 (see Table 2).

Economic growth defined in terms of increases in constant price GDP at factor cost can be described in the following episodes:

- ! 1967-75 ÷ steady growth of 2.97% per annum,
- ! 1976-80 ÷ rapid growth (boom) of 7.58% per annum,
- ! 1981-82 ÷ decelerated growth of 4.59% per annum,
- ! 1983-89 ÷ decline in output (bust) of 4.84% per annum,
- ! 1990-91 ÷ recovery with a growth of 2.08% per annum,
- ! 1992-93 ÷ slump in output of 1.56% per annum,
- ! 1994-96 ÷ recovery with steady growth of 2.97% per annum.

The main turning points of these growth episodes are associated with changes in oil prices (1973, 1979 and 1986) [see Figure 1].

As expected, changes in economic production affected the standard of living of the population of the country. In 1970, real GDP per capita was TT \$13,068 (US \$6534), while in 1980, it stood at TT \$18,841 (US \$7850). With the decline in economic activity since 1980, real GDP per capita moved from TT \$13,293 (US \$3,127) in 1990 to TT \$13,502 (US \$2,250) in 1996. The fall in US dollar denominated per capita real GDP was due to the depreciation of the Trinidad and Tobago dollar since 1986.

After experiencing very modest rates of inflation in the sixties and the beginning of the seventies, Trinidad and Tobago experienced relatively high double digit inflation rates during the period, 1973-84. The average annual rate of inflation during this period was 14.4 percent. Econometric analysis undertaken by Downes et al (1993) and Worrell and Scantlebury (1997) point to the role of increases in import prices and the money supply as the main determinants of inflation in Trinidad and Tobago. While the inflation rate has moderated somewhat since 1984, it still remained relatively high with an average annual rate of 7.9% over the period, 1985-95. Attempts were made by the government to bring the inflation rate under control, and it did decline from 11% in 1993 to 3.6% in 1996.

The fiscal position of the country has been influenced significantly by the fortunes of the petroleum sector. While the government realized an overall deficit between 1970 and 1973, the oil price increases in 1973 and 1979 allowed the government to achieve an overall fiscal surplus during the period, 1974-77, and again in 1979.

The tax revenue obtained from the petroleum sector allowed the Government to achieve a substantial surplus on the current account between 1974 and 1982. A significant portion of government savings (i.e., surplus on the current account) was used to undertake major public capital works projects. For example, total government capital expenditure as a share of GDP increased from 5% in 1973 to 19.4% in 1981. The slump in oil prices in the mid-eighties brought the fiscal position under serious pressure. The overall fiscal deficit increased sharply from TT \$3.6 million in 1981 to TT \$2771.6 million in 1982. The overall deficit however declined from TT \$2460.1 million in 1983 to TT \$6.3 million in 1994.

The Balance of Payments (BOP) position of the country has also been influenced by the fortunes of the petroleum sector. Over the periods 1974-78 and 1980-81, the country was able to realize significant surpluses on the current account. The overall balance of payments was also positively affected by foreign capital inflows, primarily in the petroleum and related industries. The decline in oil prices in the eighties however adversely affected both the capital and current accounts. Substantial deficits were recorded in the BOP during the eighties and the early nineties.

Over the 1970-96 period, the economic authorities had to grapple with the problems of 'boom' and 'bust' in economic activity, the 'rise and fall' in oil prices, growing fiscal and BOP deficits and high rates of inflation. As discussed in the next section, the effects of these changes in economic activity have been increasing unemployment and poverty and a falling standard of living. At the macroeconomic level, the Government has had to undertake structural adjustment (stabilization and structural reform) policies in order to arrest any further decline in economic activity and hence a further decline in the socioeconomic welfare of the population.

Trinidad and Tobago undertook an adjustment program without IMF assistance up to late 1988 following the fall in oil prices in 1982. Between 1982 and 1986, the Government sought to control its expenditure and introduced a multi-sectoral development plan aimed at reducing the dependence of the economy on the petroleum industry. The collapse in oil prices in 1986 brought further economic problems - shortage of foreign exchange, increased fiscal deficit and debt accumulation. In 1987, the government introduced a series of measures to combat the economic problems, namely, the suspension of the cost of living allowance (COLA) and merit increases for public officers, cuts in transfers and subsidies, sale of unprofitable state

enterprises, modification of the direct taxation structure and the introduction of user charges (Ramsaran, 1993).

With the bunching of foreign payments beyond the foreign exchange earning capacity of the country and a high and unserviceable fiscal deficit, Trinidad and Tobago sought IMF assistance in 1988. Since the country had devalued its currency in 1986 prior to going to the IMF (i.e., from US \$1 = TT \$2.40 to US \$1 = TT \$3.60) and again in 1988 (from US \$1 = TT \$3.60 to US \$1 = TT \$4.25), it was not required to change its exchange rate when the Government signed the agreement with the IMF in 1989. The IMF adjustment program included **fiscal policy** measures (wage and salary freezes, a 10% cut in public sector wages and salaries, reductions of transfers, tax reform and the introduction of a value added tax (VAT), higher user charges and limits on the financing of the public sector deficit by the banking system), **price policy** measures (the removal of a number of items under price control and the removal of or reduction in subsidies), **monetary policy** measures (limits on Central Bank advances to commercial banks, increases in the discount rate, etc.), and **Balance of Payments (BOP)** policy measures (the removal of items on the negative list, increases in tariffs and limits on accumulated external debt). An external contingency mechanism was designed primarily to provide additional financing in the event that external developments derailed the adjustment program.

After a period of negative rates of economic growth, the economy of Trinidad and Tobago recovered slightly in 1990 and 1991 with growth rates of 1.45% and 2.0%, respectively. The Government decided to renew the 1989 standby arrangement with the IMF in order to restore sustainable economic conditions by reducing the public sector absorption of credit, improving domestic savings and investment, containing inflation and reducing external debt servicing. The 1990 agreement with the IMF included access to the Fund's compensatory and

contingency facility. The agreement involved the continuation of tight monetary and fiscal policies and the implementation of structural reforms. There was an agreement in 1991 between the government and the labour unions to freeze wages and salaries as part of the stabilization program to bring inflation under control and preserve existing jobs. A structural adjustment loan was obtained from the World Bank to assist with the reform program. The Government maintained its tight fiscal position despite the reinstatement of a 10 percent pay cut for public sector workers and the implementation of selected capital works programs. Monetary policy was the main instrument used to stabilize the economy and achieve external balance.

There was a slump in economic activity in 1992 and 1993 as export revenue declined. External debt servicing increased significantly between 1991 (US \$425 m) and 1994 (US \$673.7 m). There was also a significant outflow of private sector capital between 1993 and 1994. The Government's response to the crisis was to float the currency in April 1993 (i.e., a managed float). The currency depreciated from TT \$1 = US \$0.24 to TT \$1 = US \$0.17 (US \$1 = TT \$4.25 to US \$1 = TT \$5.75). The change in the exchange rate brought a rise in the inflation rate and a fall in real wages. The foreign reserve position however improved as exports began to rise.

Since 1993, there has been moderate growth in the economy of Trinidad and Tobago. The Government has intensified its economic diversification program in order to reduce the dependence on the petroleum sector and has encouraged the inflow of foreign direct investment. Relatively tight monetary and fiscal policies still remain, with the exchange rate moving to US \$1 = TT \$6.30 in 1997. External shocks such as changes in oil prices and recession in main export markets have had a significant impact on the course and level of economic activity in Trinidad and Tobago. The performance of the economy is still largely dependent on the fortunes of the oil and gas sector.

3 *The Nature of Unemployment: Some Stylized Features*

Unemployment in Trinidad and Tobago has been a historical problem. Ramesar (1977) notes that the “existence of chronic unemployment or underemployment, that is, the long term presence of a labor surplus, was officially acknowledged by the time of the First World War” in 1914 (p. 22). The agricultural sector (especially sugar and cocoa) was the main absorber of labor up to the Second World War. With the emancipation of slavery in 1838 several ex-slaves moved from the plantations into petty trades, commercial activity and domestic services. The plantations soon found themselves short of labor and resorted to the importation of indentured servants from India during the period 1844 to 1917. The decline in the fortunes of the sugar industry however resulted in high rates of unemployment. Furthermore, many persons developed a negative attitude to agricultural work and preferred to wait for higher paying non-agricultural jobs. During the period of renewed demand for agricultural labor (due to improved conditions in the sugar industry, boom in cocoa prices or export opportunities) there was a shortage of labor in the agricultural sector. This situation coexisted with high levels of unemployment especially in the urban areas. Although many persons found work on public works projects, it was clear that the non-agricultural sector was only able to absorb a small proportion of the available labor force.

The low labor absorptive capacity of several segments of the non-agricultural sector is typified by the petroleum industry which is highly capital-intensive. The decline of the agricultural sector coincided with the rise of the petroleum sector as a main source of output growth. By the early seventies “petroleum extracting and refinery accounted for almost three-quarters of exports, one-fifth of government revenue and 20% of GDP” [Auty and Gelb, 1986,

p. 1162]. While the petroleum sector contributed significantly to output, export and government revenue, its contribution to employment was relatively small.

An analysis of the sectoral distribution of employment over the period, 1970-1995, indicates that while the agricultural sector accounted for 23% of the employed labor force in 1970, the petroleum and related sectors accounted for 4.9 percent. In 1995, the contribution of the agricultural sector to total employment was 10.6%, while the petroleum and related sectors contributed 3.8% [see Table 3]. With the decline of the agricultural sector as the main employer of labor, the wholesale and retail (distribution), manufacturing and commodity/personal/social (primarily government) sectors became the main sources of employment in Trinidad and Tobago. Efforts at economic diversification have resulted in the creation of jobs in the services sector, with most of the employed engaged in private sector (including self-employment) activities.

Employment (i.e., persons with jobs) increased from 317,100 persons in 1970 to 442,200 persons in 1996, that is, an average annual growth rate of 1.3 percent. The labor force grew from 363,600 persons to 530,400 over the 1970-96 period (i.e., an average annual growth rate of 1.5 percent. While there was a general upward trend in the movement of the labor force over the period, employment growth was more variable. Employment increased steadily from 317,100 persons in 1970 to 397,200 persons in 1979 and then dropped to 388,100 persons in 1980. There was a recovery in employment growth between 1981 and 1984 when employment rose from 389,900 to 414,600 persons. The steady growth in employment was therefore associated with the 'boom' period in Trinidad and Tobago. The period 1985 to 1990, saw a drop in the level of employment from 399,500 to 374,100 persons. Since 1990, there has been a steady rise in the level of employment.

The steady rate of growth of the labor force and the variable movement in employment accounted for the pattern of unemployment over the 1970-96 period [see Figure 2]. The overall unemployment rate increased from 12.8% in 1970 to 15.0% in 1975 (i.e., from 46,500 persons to 58,800 persons unemployed). During the 'boom' period in the late seventies and early eighties, the unemployment rate averaged 11.4 percent (1978-1984). With the decline in economic activity in the eighties and nineties, the official unemployment rate rose from 15.7% in 1985 to an average of 22.0% over the 1987-89 period. The rate has however declined gradually since 1989, reaching a level of 16.2% in 1996. The first stylized feature of unemployment in Trinidad and Tobago is its relatively high level. Farrell (1981) has however indicated that the unemployment rate may even be higher due to an underestimation of the youth unemployment rate.

While there have been more unemployed men than women, the unemployment rate among women has been much higher than that among men. Over the 1970-1996 period, the average rate of unemployment among men was 13.6% while it was 19.7% among women. The growth of unemployment among women is partly related to the growth in their participation rate over the period.

An analysis of the age structure of the unemployed shows a very high incidence of youth unemployment (15-24 years). This feature is common to all Caribbean countries. Unemployment among school leavers (15-19 years) is particularly severe, with females being the ones more affected. Between 1970 and 1984, the unemployment rate among school leavers varied between 22.6 and 36.9 percent, while the rate for the 20-24 years age group varied between 13.9 and 25.8 percent. During the 'bust' period, the unemployment rate for

early school leavers (15-19) was over 45 percent and that for older youth (20-24) was over 35 percent. The unemployment rate declines in the higher age categories.

Unemployment has traditionally been very low for persons employed in professional, managerial, legislative and technical occupations. The data however show that this broad class of occupations is not immune to a prolong decline in economic activity [see Table 4]. The occupations which have been significantly affected by unemployment were clerical, service workers, craft and related workers and especially those in elementary occupations (e.g., laborers).

The compulsory nature of schooling up to secondary level (i.e., above 11 years) means that a very small proportion of the unemployed would have little or no education [see Table 5]. The data indicate that unemployment is a problem among persons with secondary level education but without academic certification or training. Unemployment among university graduates is very low and reflects the low level of unemployment in the professional, managerial and technical occupation categories. Furthermore, the high level of unemployment among persons with secondary level education suggests a serious waste of resources as a result of a dysfunctional education system (i.e., the source of the mismatch problem).

While the unemployment rate in the capital city, Port-of-Spain, has been generally lower than the national average, the rate has been significantly higher in the second main town of San Fernando where most of the petroleum-related activity takes place. The southern counties of Victoria and St Patrick have experienced higher rates of unemployment than the national average. To a large extent, unemployment is concentrated in the urban and highly industrialized areas of Trinidad and Tobago.

The 'unemployed' in Trinidad and Tobago is defined to include "all persons who looked for work during the **3-month period** preceding the enumeration and who at the time of enumeration did not have a job but still wanted work" [CSO, 1995, p. 191]. This wider definition is used because it is felt that in a developing country such as Trinidad and Tobago, where jobs are scarce and where there is no well-developed labor market information system, the internationally recommended '**reference week** before the enumeration date' is too short. Using the expanded definition, the data indicate that during the nineties, over 25 percent of the unemployed were in this state for more than one year. Such a prolonged duration of unemployment not only acts as a disincentive to job search (i.e., discouraged worker) but also results in a depreciation of acquired skills (i.e., unemployability). Over 35 percent of the unemployed were in this state for less than three months during the nineties. These duration rates affected those who were employed in construction, distribution and hotels and social and community services. Many of these persons were previously employed in 'elementary occupations'. There is evidence of a high and growing level of 'discouraged workers' in Trinidad and Tobago [see Grover *et al*, 1998].

The unemployed are mostly young persons who are not 'heads of households'. The 'sharing mechanism' within households therefore helps to sustain the young unemployed during long periods of unemployment. In addition, some of the unemployed during long periods of unemployment undertake temporary and short term jobs in the informal labor market while they waited for more permanent jobs in the formal market (e.g., petty trading, gardening, cleaning, car washing, etc.). It is estimated that approximately 17 percent of all workers with jobs work in the informal sector as 'own account workers'.

In summary, the unemployed in Trinidad and Tobago are mostly young males who are 'educated' but uncertified and unskilled. The unemployment rate is however much higher for females than for males. Unemployment is concentrated in the urban and industrialized towns. There is a high rate of long-term unemployed, that is, those who have been employed for more than one year.

4 ***Explaining Unemployment in Trinidad and Tobago***

It is generally believed that much of the 'open' unemployment observed in Trinidad and Tobago is due to **structural** factors such as the nature of the educational system and its interface with the labor market (i.e., the mismatch problem), technological change, permanent shifts in the demand for goods and services and the skill content of the labor force. **Cyclical** factors such as the fluctuations in aggregate local and foreign demand for goods and services and **institutional** factors such as the presence of strong labor unions and labor legislation also determine the underlying changes in the unemployment rate.

In addition to open unemployment, there is evidence of a high level of 'disguised unemployment' in the form of 'discouraged workers' who are not in employment and not actively looking for work, even though they would like to work. This category is excluded from the labor force statistics, but it is estimated that in 1995, over 30 percent of all unemployed persons were 'discouraged workers' [see Grover *et al*, 1998]. The high rates of 'open' and 'disguised' unemployment in Trinidad and Tobago represent a serious waste of human resources and therefore becomes a problem which requires thorough examination.

Early analysis of the unemployment situation in Trinidad and Tobago pointed to the role of a 'wage gap' [Farrell, 1980]. The wage gap model of unemployment has its roots in the work of Lewis (1958) and Tidrick (1975) and indicates that, as the 'high wage' (e.g., petroleum) sector grows relative to the 'low wage' sector (e.g., agriculture), the former draws labor from the latter, thus leading to increased 'open' unemployment as the 'high wage' sector is unable to absorb the available supply due to its high capital to labor ratios. Labor queues up for jobs in the 'high wage' sector (that is, wait unemployment) as the unemployed have a high reservation wage rate [see Hilaire, 1992]. Farrell (1980) found empirical support for the 'wage

gap' model of unemployment in Trinidad and Tobago over the period 1965-1972, but there was no evidence for the gap over the 1972-79 period, which was the boom period in Trinidad and Tobago. Henry (1990) later found empirical support for a 'wage gap' explanation of unemployment over the period 1966-85. She used the differential between the agricultural and non-agricultural wage rates to represent the wage gap.

Farrell (1980) also found little aggregate demand influence on unemployment using exports as an indicator of aggregate demand. Bourne (1993) however reports a significant effect of output growth on unemployment.

A recent analysis of unemployment in Trinidad and Tobago indicates that the "present unemployment level appears to be almost exclusively structural" [IMF, 1997, p.17]. This IMF study argues that rising real wages between 1980 and 1986 was the main contributor to high unemployment during this period. The public sector played a leading role in the episode of increasing real wages. This was buttressed by the actions of the strong labor union movement. Since 1986, real wages have been falling while unemployment has remained high (i.e., a possible 'wage-curve' relationship). One explanation for the high level of unemployment since 1986 is the low degree of capital accumulation [IMF, 1997, p. 26].

The above empirical studies of unemployment in Trinidad and Tobago therefore point to the following influences:

- ! the existence of a 'wage-gap' (either petroleum-sugar or agricultural-non-agricultural);
- ! rising real wage propelled by the public sector and the labor union movement;
- ! growth of the economy;
- ! the degree of net capital investment.

Grover *et al* (1998) have highlighted four reasons for the high level of unemployment in Trinidad and Tobago, namely:

- i. The relatively high capital intensity of the energy sector which has a low ability to generate relatively few direct jobs;
- ii. The 'stickiness' of wages at levels higher than labour productivity;
- iii. The lack of information on vacancies which frustrates the job search and encourages withdrawal from the labour market;
- iv. The education and training system has inadequately prepared the youth for the world of work' (i.e., youth have few skills, are inexperienced and display a poor attitude to work).

The range of labour market regulations also conditions the environment for hiring and firing workers [see Antoine, 1993]. **Direct** labour market regulation is embodied in various labour laws, while **indirect** labour market regulation is reflected in the provisions in collective bargaining agreements between employers and labour unions. The main labour laws in Trinidad and Tobago are the Industrial Relations Act 1972 (which replaced the Industrial Stabilization Act 1965), the Retrenchment and Severance Benefits Act 1985, the Shop (Hours of Opening and Employment) Ordinance (amended 1984), the National Insurance Act 1971 and the Minimum Wages Act 1976. These regulations determine the conditions under which employees can strike, how industrial disputes should be settled within the Industrial Court, the quantum of severance pay which redundant or retrenched workers should be paid, the benefits to be given to workers for employment injury, sickness, mandatory retirement and the minimum wage that certain categories of workers should be paid. These direct legislative measures along with the indirect measures embodied in collective bargaining agreements generate non-wage labour costs to employers and determine how many persons they will employ over time.

In effect, they represent 'adjustment costs' which makes the labour input a quasi-fixed factor of production. Labour market regulation indices calculated for Trinidad and Tobago indicate that the degree of regulation is relatively high compared with other Caribbean and Latin American countries [see Downes *et al*, 1998, for a summary].

These factors reflect the traditional explanations of open unemployment, namely, wage and/or price rigidity and inadequate aggregate demand (and hence low rates of production). The high rate of youth unemployment however suggests that a mismatch variable should be considered in explaining aggregate unemployment. Institutional factors associated with labour market regulations and trade union activity also influence the nature and level of unemployment in Trinidad and Tobago.

A simple model can be specified to explain variations in unemployment in Trinidad and Tobago. Define the number of unemployed, U, as :

$$U = LF - E \tag{1}$$

where LF is the labour force and E the number of persons employed. Dividing equation (1) by LF gives:

$$(U/LF) = 1 - (E/LF) \tag{2}$$

The above equation defines the unemployment rate, $U/LF \times 100\%$, which depends on factors which affect the employment rate, $E/LF \times 100\%$. Factors affecting the employment rate are largely determined by labour demand factors such as:

- (i) relative input prices (wage rate to user cost of capital, wage rate to raw material costs, etc.) - RP;
- (ii) output levels (as generated by sales demand and inventory levels) - q;

- (iii) technical change (automation, innovation, etc) - tech;
- (iv) labour market regulations governing the hiring and firing processes (e.g., severance payments, unemployment insurance, national insurance payments and other non-wage labour costs) - LMR.

The unemployment equation is given as:

$$UR = UR(RP, q, tech, LMR, ?) \quad \mathbf{3}$$

± - + + ±

where UR is the unemployment rate and ? is a set of other factors such as the skill/experience base of the labour force. The signs beneath the variables represent the effect of the variable on unemployment, where '+' indicates a positive effect and '-' represents a negative effect. The '±' sign for RP and ? reflect the indeterminacy of the effect since both variables can have negative or positive effects on unemployment.

5 *An Econometric Analysis of Unemployment*

An econometric analysis of unemployment in Trinidad and Tobago involves the specification of an empirical model reflecting the factors which are likely to affect the unemployment data generating process and the application of statistical techniques to estimate and test the adequacy of the model. More specifically, the econometric procedure involves:

- (i) specification of the empirical model of unemployment (i.e., identify the variables which are likely to generate the unemployment data process) using received economic theory and the specific features of the history of unemployment in the country;
- (ii) checking the temporal properties of the variables in the model via unit root tests in order to determine the order of integration of the variables. Statistical estimation requires the stationarity of either a set of variables or each variable in the regression equation (e.g., Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) tests).
- (iii) determination of a meaningful long-run equilibrium relationship among the variables, that is, determine if the variables in the equation are cointegrated (e.g., Engle-Granger's single equation or Johansen's multi-equation methods).
- (iv) estimation of the dynamic (short-run) regression equation for the model (i.e., the error correction model estimated by OLS, Instrumental Variables, etc.)
- (v) application of a series of diagnostic tests to determine the sturdiness of the empirical model.

The empirical specification of an unemployment model for Trinidad and Tobago is largely based on equation (3). Adjustments are made to account for the unavailability of data for some variables as well as for the use of proxies to capture the effects of qualitative variables.

In terms of the relative price variable, data on the user cost (i.e., implicit rental price) of capital are unavailable. The input price variables used in the unemployment equation are real average earnings (RAW) and the real loan rate of commercial banks (RLR). The real average earnings variable is defined as the average earnings index divided by the retail price index and is used to reflect the real cost of labour. The real commercial bank loan rate is the difference between the average loan rate of commercial banks and the rate of inflation as measured by changes in the retail price index. The real interest rate is the relevant borrowing cost for making investment and hence employment decisions. It has been argued that the real interest rate is an important factor behind structural unemployment in a Phelps-type model [see Marsden, 1998]. As Marsden (1998) notes, a “permanent increase in the real interest rate adversely affects investment in customers, workers and fixed capital and hence increases mark-ups, which in turn permanently lower the demand for labour” (p 851). The output variable is real or constant price gross domestic product (RGDP), the ϵ variable captures specific events affecting the unemployment rate over the estimation period, 1971-1996, (e.g., shocks, introduction of specific legislation). The basic empirical model used in this study is given as:

$$UR = UR(RAW, RGDP, RLR, \epsilon) \quad 4$$

More generalized models of unemployment incorporating several other variables are given in Junankar and Marsden (1996). The simple model used in this study can be specified in log linear form as:

$$u_t = a_0 + a_1 \text{raw}_t + a_2 \text{rgdp}_t + a_3 \text{RLR}_t + a_4 \epsilon_t + u_t \dots \quad 5$$

where the lower case letters u_t , raw_t , rgdp_t represent the natural log of the variable. The expected sign of the coefficients are $a_1 > 0$, $a_2 < 0$, $a_3 > 0$ and a_4 is dependent on the nature of the shock. Equation 5 can be interpreted as a long-run equilibrium equation.

There are several ways in which the dynamic short-run model can be specified. One formulation of the unrestricted error correction model (UECM) which represents short-run dynamic change is given as:

$$du_t = \beta_0 + \beta_1 draw_t + \beta_2 drgdp_t + \beta_3 dRLR_t + d_1 u_{t-1} + d_2 raw_{t-1} + d_3 rgdp_{t-1} + d_4 RLR_{t-1} + d_5 ? + e_t \quad \mathbf{6}$$

Other specifications are given in Inder (1993) and Banerjee *et al* (1993) and Pesaran and Shin (1997).

Equations **5** and **6** are the main specifications used in this study although an alternative formation of equation **6** is given in the Appendix. Equation 6 incorporates both long-run and short-run information. These equations are estimated using annual data for the period 1971 to 1996.

Following the econometric procedure outlined above, the variables used in this analysis were checked for stationarity using both the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests for the existence of a unit root in the series. The results indicate that the unemployment rate (u), real gross domestic product (rgdp) and the real loan rate (RLR) are non-stationarity in their level form and must be differenced once to achieve stationarity (i.e., they are integrated of order 1, I(1), by both tests). The real average earnings variable (raw) however appears to be I(2) by both test procedures or marginally I(1) by the Phillips-Perron test [see Table 6].

The Johansen test for cointegration was used to determine if the four variables, u_t , raw_t , $rgdp_t$ and RLR_t form a long-run equilibrium equation. The likelihood ratio test indicates that at least **one** cointegrating equation exists at the 5 percent level of significance. This is interpreted

at the long-run equilibrium unemployment equation rate for Trinidad and Tobago [see Table 7]. The long-run unemployment rate equation is given by the Johansen estimation procedure as:

$$u_t = 14.525 + 0.750 \text{ raw}_t - 1.558 \text{ rgdp}_t + 0.031 \text{ RLR}_t \quad 7$$

(3.713) (-6.412) (5.167)

where the numbers in the brackets represent the t-statistics. The value of the log likelihood for this function is 134.68.

Given that one long-run equilibrium equation exists, the dynamic short-run equation was estimated by both ordinary least squares (OLS) and instrumental variables (IV). The unrestricted error correction model (UECM), Equation 6, was estimated following the procedure suggested by Inder (1993). The OLS result is given as:

$$\begin{aligned} du_t = & 5.40 - 0.96\text{draw}_{t-1} - 1.09\text{drgdp}_{t-1} + 0.002\text{dRLR}_{t-1} - 0.49u_{t-1} + 0.024\text{raw}_{t-1} \\ & (4.30) \quad (-2.27) \quad (-3.84) \quad (0.577) \quad (-5.39) \quad (2.40) \\ & - 0.53\text{rgdp}_{t-1} + 0.01\text{RLR}_{t-1} + 0.12D \quad 8 \\ & (-3.88) \quad (2.64) \quad (3.68) \end{aligned}$$

where the numbers in brackets are t-statistics.

adj R² = 0.80 SER = 0.04 F = 12.86
 DW = 2.66 Breusch-Godfrey SC (F) test = 1.45 (SC - serial correlation)
 ARCH (F) test = 1.48 Ramsey's RESET (F) test = 1.28
 Bera-Jarque (Normality) test = 0.176 ADF = -3.38, PP = -6.39

The D variable is a dummy variable set at 1 for 1981, 1987 and 1992 and 0 otherwise to capture significant 'shocks' to the unemployment rate. An omitted variable test (F test) was

used to determine if the D variable belongs to the unemployment rate equation. The value of the F statistic was 13.53 (with the log likelihood ratio being 12.43). The results indicate that the D variable significantly improves the regression equation results. The 'shocks' can be attributed to the fall in oil prices (1981); the stabilization program (1987) and the slump in 1992.

The diagnostic tests for the dynamic (short-run) regression equation indicate that 80 percent of the variation in the unemployment rate is explained by the set of explanatory variables [see Figure 3]. There is no serial correlation in the residual as shown by the value of the Durbin-Watson and Breusch-Godfrey test statistics. The residuals are both normally distributed (i.e., Bera-Jarque statistic) and stationary (ADF and PP test statistics). The Ramsey RESET test indicates no mis-specification in the unrestricted error correction model. The results further reinforce the result that, u, raw, rgdp and RLR are cointegrated. The IV estimation of the equation produced the same basic results as OLS estimation (see Appendix).

The results can be interpreted as follows:

- # In both the long and short runs, changes in real gross domestic product (rgdp) and real average earnings (raw) have a statistically significant impact on changes in the unemployment rate. While increases in real GDP reduce the unemployment rate in both the short and long terms but reduce it in the short-run; increases in real average earnings increase the unemployment rate, rate in the long-run,. One explanation for the short-run response relates to a faster response on the supply side of the labour market than the demand side. In the short-run, increases in real average earnings may not bring about any significant change in the demand for labour due to contractual arrangements or the high costs of firing employees. On the supply side, the increase in real average earnings has both income and substitution effects. The supply of labour

would fall (thus reducing the unemployment rate) if the income effect outweighs the substitution effect. This might be the case in an oil economy subject to a positive shock which increases real average earnings significantly in the short run. This can be considered as a 'wage bubble' experienced during the 1980s.

Increases in the real average commercial bank loan rate result in an increase in the unemployment rate in the long-run. By making long-run expansion capital more expensive, employment expansion is constrained. The results show that although increases in the loan rate have a positive impact on unemployment in the short-run, it is not statistically significant.

The 'shock' effects represented by the D variable increased the unemployment rate significantly during the 1973-96 period.

The existence of a unit root in the unemployment series suggests the existence of 'persistence' in the unemployment rate whereby past unemployment affects the 'natural rate of unemployment'. The main implication of this result is that high unemployment, if left unchecked, may persist and become a serious economic (and social) problem in Trinidad and Tobago in the long-run. Using Equation 8, a one percent change in the previous period unemployment rate can lead to a 0.51 percent change in the current unemployment rate. The so-called 'hysteresis theory' indicates that the equilibrium or natural rate of unemployment depends on the history of the actual unemployment rate. A recession has potential permanent effects if it changes the attitudes and characteristics of the long-term unemployed. For example, the duration theory of hysteresis states that long durations of unemployment, as observed in Trinidad and Tobago, can impair the human capital of the unemployed, hence reducing their employability. Long-term unemployment may also reduce the effective supply of labour as workers give up their job search. A recession that lasts for a long period induces a

rise in long-term unemployment and hence the natural rate of unemployment. A recent IMF study (1997) notes the persistence of unemployment long after the terms-of-trade shock thus indicating that the equilibrium in Trinidad and Tobago labour market has undergone a structural change. Equilibrium unemployment rose strongly during the recession of the 1980s, and has remained high thereafter (IMF, 1997, pp 16-17).

6 ***POLICY IMPLICATIONS***

The econometric results for unemployment in Trinidad and Tobago over the period 1971-1996 suggest that economic growth is a necessary condition for reducing the rate of unemployment. While the short-run elasticity of unemployment with respect to real gross domestic product is -1.05, the long-run elasticity is slightly higher at -1.56 (by the Johansen procedure). Policy measures which enhance economic growth would include investment in physical and human capital, export promotion and general business development (e.g., small business development). The nature of the growth process however has to be engineered to reduce the main segment of the unemployed, namely, the unemployed youth. The government's approach to the unemployment problem in Trinidad and Tobago has been largely indirect. Although increases in government expenditure (both current and capital) provide jobs and hence lower the unemployment rate, expansion in the private sector is the key to a lower and sustainable level of unemployment in Trinidad and Tobago. For example, the tourism sector (i.e., an export service) has been largely under-developed in Trinidad, although Tobago is a popular tourist destination. Expansion has taken place in 'downstream' petroleum industries which do not create much **direct** employment.

In addition to various fiscal incentives offered to the private sector to enhance employment, the government has established several programs to tackle the unemployment problem. The unemployment relief program (URP) provides temporary employment (1-2 months) in infrastructural and community-based projects. The Youth Training and Employment Program Partnership (YTEPP) provides training, supervised work experience and promotion of self-employment for unemployed persons between the ages of 18 and 25 years for a 3-month period three times a year. These government programs are all aimed at tackling the youth unemployment problem. But as indicated, they are primarily **short-term** measures.

Given that they are largely financed by the Government, they are not sustainable in the long-run.

In addition to measures to enhance economic growth and thus lower the unemployment rate, attempts should be made to restrain the increase in wages in the long-run. The IMF (1997) report pointed to the strong influence of wage increases on unemployment in the 1970s and 1980s. Although this influence has waned, the government, unions and the private sector should seek to link wage increases much more integrally to productivity increases. As the country becomes more liberalized, international competitiveness must be achieved by keeping real wage increases in line with productivity increases thus keeping the real unit cost of labour at internationally competitive levels.

The Government must also maintain a stable macroeconomic environment within which local and foreign private sector companies can operate. In effect, it must keep its fiscal deficit at a manageable level and ensure that its exchange rate policy does not engender speculation and uncertainty. Pursuing credible economic policies to expand the economy and reducing the degree of uncertainty make for a stable macroeconomic environment.

7 CONCLUSION

The economic analysis of unemployment in Trinidad and Tobago undertaken in this paper indicates that it is a serious problem among the young cohorts of the labour force. Unemployment is particularly severe among young females. Changes in economic activity over time have had a significant impact on unemployment in the country. Econometric analysis points to the dominant role which economic growth plays in reducing unemployment. Increases in real wages and real loan rates also impact adversely on the unemployment rate, especially in the long-run. Although it must be borne in mind that Trinidad and Tobago uses a broad definition of unemployment which partly accounts for its relatively high rates, the underlying economic fundamentals are critical to reducing unemployment (i.e., economic growth, wage restraint, lower real interest rates). Although the Government has sought to alleviate the youth unemployment problem via training and placement programs, a greater effort is needed to expand the economy in order to alleviate the unemployment problem. This would prevent unemployment from becoming a major socio-economic problem in the long-run.

References

- Antoine R. (1993). *The Harmonization of Labour law in the CARICOM Region* (Faculty of law, University of the West Indies, Cave Hill Campus, Barbados).
- Auty R. and A. Gelb (1986). "Oil windfalls in a small parliamentary democracy: Their impact on Trinidad and Tobago". *World Development*, Vol. 14, No. 9, September, pp. 1161-1175.
- Banerjee A. et al (1993). *Cointegration, error correction and the econometric analysis of non-stationarity data*. (Oxford, Oxford University Press).
- Bourne C. (1993). "The contemporary employment and unemployment situation in Trinidad and Tobago" in A. McIntyre (ed.): *Building National Consensus on Social Policy: Trinidad and Tobago*. (Washington, D.C. Inter-American Development Bank), pp. 21-30.
- Central Statistical Office (1995). *Continuous sample survey of population: Labor Force*. (Port of Spain, Trinidad and Tobago).
- Clarke C.M. (1992). "Unemployment Theory in the LDCs: A Test of the Generalized Segmentation Hypothesis". *Social and Economic Studies*, Vol. 41, No. 4, December, pp. 25-51.
- Downes A.S., A Scantlebury and K Worrell (1993). "Macroeconomic adjustment and the inflation experience of selected Caribbean countries". *Money Affairs*, Vol. 6, July, pp. 45-61.
- Downes A. S. and R. Henry (1994). "Labor market issues in Caribbean monetary union" in T Farrell and D Worrell (eds). *Caribbean Monetary Integration* (Port of Spain, Caribbean Information Systems and Services Ltd), pp. 144-172.
- Downes A.S., N. Mamingi and R. Antoine (1998). *Labour market regulation and employment in the Caribbean* (a report prepared for the IADB, ISER, University of the West Indies, Cave Hill, June).

- Farrell T. W.(1980). "Wage distortions and unemployment in Trinidad and Tobago: A test of the Lewis-Tidrick wage gap hypothesis" (Research Paper, Central Bank of Trinidad and Tobago, Port of Spain, November).
- Farrell T. M. A. (1978). "The unemployment crisis in Trinidad and Tobago: Its dimensions and some projections to 1985". *Social and Economic Studies*, Vol. 27, No. 2, June, pp. 117-152.
- Farrell T. M. A. (1980a). "The measurement of unemployment and the labor force in Trinidad and Tobago: Are the official figures wrong? *Social and Economic Studies*, Vol. 29, Nos. 2 and 3, June/September, pp. 35-51.
- Farrell T. M. A. (1980b). "The root of unemployment". *Social and Economic Studies*, Vol. 29, No. 4, December, pp. 95-111.
- Grover N. *et al* (1998). *Trinidad and Tobago labour market study - Final Report* (Abt Associated. Report prepared for the IADB, Washington, DC).
- Harewood J. (1978). "Unemployment and related problems in the Caribbean". In *Occasional Papers: Human Resources*, No. 2, (ISER, UWI, St Augustine, Trinidad and Tobago), pp. 1-67.
- Henry A. J. (1990). "The wage-gap theory of unemployment and wages: Application to Trinidad and Tobago" (Research Paper, Research Department, Central Bank of Trinidad and Tobago, Port of Spain, October).
- Hilaire A. (1992). "The effects of Trinidad and Tobago's oil boom on relative prices, wages and labour Flows". *Social and Economic Studies*. Vol. 41, No. 2, June, pp. 45-82.
- Inder B. (1993). "Estimating long-run relationships in economics: A comparison of different approaches". *Journal of Econometrics*, vol 57, nos 1-3, May-June, pp53-68.
- International Monetary Fund (1997). *Trinidad and Tobago: Selected Issues* (Staff Country Report, No 97/41, Washington, D.C., May).

- Junankar P.N. and J.B. Madsen (1996). "Unemployment in the OECD: Models and mysteries". *Discussion Papers in Economics and Econometrics*, No. 9648 (Department of Economics, University of Southampton, UK).
- Lewis W. A. (1958). "Employment policy in an underdeveloped area". *Social and Economic Studies*, Vol. 7, No. 3, September, pp 42-54.
- Madsen J.B. (1998) . "General equilibrium macroeconomic models of unemployment: Can they explain the unemployment path in the OECD?" *Economic Journal*, vol 108, May, pp 850-867.
- McIntyre A. (1975). "Reflections on the problem of unemployment in the Commonwealth Caribbean" in A Singham (ed) *The Commonwealth Caribbean into the Seventies* (Montreal, Centre for Developing Area Studies, McGill University), pp. 1-15.
- Pesaran M.H. and Y. Shin (1997). "An autoregressive distributed lag modelling approach to cointegration analysis". (Department of Applied Economics, University of Cambridge, England).
- Ramesar S. (1977). "The historical origins of the unemployment problem in Trinidad. *Caribbean Issues*, Vol. 3, Nos 2 and 3, pp.5-34.
- Ramsaran R. (1993). "Growth and adjustment in a petroleum-based economy: Some aspects of Trinidad and Tobago's experience since the 1970s". *Social and Economic Studies*. Vol. 42, No. 4, December, pp. 217-240.
- Seers D (1964). "The mechanism of an open petroleum economy", *Social and Economic Studies*, Vol. 13, No. 2, June, pp 233-242.
- Song F M and Y Wu (1997). "Hysteresis in unemployment: Evidence from 48 US states". *Economic Enquiry*, Vol. 35, April, pp. 235-243.
- Tidrick G (1975). "Wage spillover and unemployment in a wage gap economy: The Jamaican case". *Economic Development and Cultural Change*, Vol. 23, No. 2, pp. 308-324.

World Bank (1995). *Trinidad and Tobago: Poverty and unemployment in an oil-based economy* (Report No. 14382-TR), Latin American and Caribbean Region, World Bank).

Worrell K and A Scantlebury (1997). "Money and inflation in a developing country: The case of Trinidad and Tobago 1965-1993. *Savings and Development*, Vol. 21, No. 2, pp. 231-246.

Tables

Table 1
Estimates of Unemployment in the Caribbean
1990-95
(%)

Country	1990	1991	1992	1993	1994	1995
Anguilla	-	-	7.2	-	-	-
Antigua/Barbuda	6.8	7.6	7.8	6.7	6.7	7.8
Bahamas	-	12.3	14.8	13.1	13.3	11.1
Barbados	15.0	17.3	23.0	24.3	21.8	19.7
Belize	-	-	-	9.8	11.1	12.5
Dominica	14.9	-	-	-	-	-
Grenada	-	13.7	-	16.5	29.1	-
Guyana	-	-	11.7	-	-	-
Jamaica	15.3	15.4	15.7	16.3	15.4	16.2
Montserrat	1.0	6.0	9.0	10.0	8.3	-
St Kitts/Nevis	-	-	-	-	-	-
St Lucia	20.1	-	-	16.8	19.2	15.9
St Vincent	-	19.8	-	-	-	-
Trinidad/Tobago	20.1	18.5	19.6	19.8	18.4	17.2

Sources: Caribbean Development Bank: Annual Reports
Social and Economic Indicators, 1996

Table 2

Sectoral Distribution of GDP in Trinidad and Tobago, 1970-1995

(%)

Sector	1970	1975	1980	1985	1990	1995^P
Agriculture	6.0	4.2	3.2	2.2	2.5	3.4
Petroleum	22.1	48.0	42.9	28.4	29.6	25.0
Manufacturing	9.2	6.2	5.9	7.4	8.6	7.9
Electricity and Water	2.0	1.1	1.3	1.1	1.2	1.5
Construction and Quarrying	5.8	5.1	10.9	11.4	8.0	9.8
Distribution and Restaurants	16.0	8.2	7.0	10.6	12.6	11.9
Government	8.4	7.7	7.5	15.4	10.7	14.7
Other Services	30.5	19.5	21.3	23.5	26.8	25.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Central Statistical Office: The National Income of Trinidad and Tobago (various issues)

Table 3

Sectoral Distribution of Employment in Trinidad and Tobago 1970-1995
(%)

Sector	1970	1975	1980	1985	1990¹	1995¹
Agriculture and Forestry	23	14	10	11	12.1	10.7
Manufacturing, Mining, Quarrying	21	21	16	15	14.4	14.1
Construction, Electricity, Water, Gas	14	14	21	19	12.6	11.5
Distribution, Restaurants, Hotels	15	19	20	24	16.7	18.7
Transport and Communication	6	8	8	7	7.3	7.1
Services	21	24	24	25	36.2	38.0
Total	100	100	100	100	100.0	100.0

Note: ¹The classification in 1990 and 1995 is more disaggregated than in previous years. For 1990, the petroleum industry accounted for 4.4 percent of total employment, while in 1995 it accounted for 3.7 percent.

Source: CSO: Continuous Sample Survey of Population (Labour Force, various issues)

Table 4

Unemployment Rate by Occupational Classification and Sex, 1990

(%)

Occupation	1990		
	Both	Male	Female
Legislative, Senior Officials, Managers	2.3	2.4	1.9
Professionals	5.3	2.6	9.1
Technicians and Associated Professionals	11.5	7.8	14.3
Clerical	18.1	14.7	19.5
Service Workers	26.7	15.7	41.7
Agricultural and Related Workers	4.2	4.6	1.5
Craft and Related Workers	21.4	20.4	27.1
Plant Machine Operators and Assemblers	10.9	10.6	15.3
Elementary Occupations	29.4	29.5	29.1
Overall	20.0		

Source: CSO: Continuous Sample Survey of Population

Table 5

Unemployment Rates by Sex and Educational Status, 1990

(%)

Level of Education	Male	Female	Both
No education and training	7.0	2.1	5.0
Primary education	13.6	21.6	15.9
Primary education with training	19.0	29.7	21.7
Secondary education with no subjects	24.3	30.5	26.1
Secondary education with training but no subjects	23.2	29.3	25.2
Secondary education with less than five subjects	20.5	33.8	25.6
Secondary with less than five subjects plus training	22.9	26.7	24.9
Secondary education with five or more subjects	13.7	16.0	14.9
Secondary with five or more subjects plus training	7.8	16.3	12.7
University education but no degree	13.3	8.4	10.9
University education (with degree, diploma, certificate)	2.9	4.0	3.4

Source: CSO: Continuous Sample Survey of Population

Table 6

Unit Root Tests

Variable*/Year	Augmented Dickey-Fuller (ADF)			Phillips-Perron (PP)	
u (1963-1996)	-2.25	(C, 2)*	-2.96**	-1.87	(-2.95)**
du (1964-1996)	-2.63	(1)	-1.95	-3.61	(-1.95)
raw (1971-1996)	-2.91	(C, 2)	-3.00	-1.28	(-2.99)
draw (1972-1996)	-1.56	(1)	-1.96	-1.83	(-1.96) ^o
d ² raw (1973-1996)	-3.10	(1)	-1.96	-4.49	(-1.96)
rgdp (1966-1996)	-2.09	(C, 1)	-2.96	-1.91	(-2.96)
drgdp (1967-1996)	-2.01	(2)	-1.95	-2.11	(-1.95)
RLR (1968-1996)	-1.78	(C, 1)	-2.98	-1.73	(-2.97)
dRLR (1969-1996)	-4.76	(1)	-1.96	-5.81	(-1.95)

Notes: * indicates that the estimated equation contained a constant, c, and either 1 or 2 lags to remove serial correlation in the residuals.

** These are the critical values at the 5% level of significance.

+ The log values of the variables are used in these texts.

^o The 10% level of significance is -1.62 for the Phillips-Perron test.

d Indicates change in the variable

The Eviews computer program was used for these tests.

Table 7

Johansen Test for Cointegration

Variables:	u, raw, rgdp, RLR
Period:	1971-1996
Assumptions:	<ul style="list-style-type: none">• linear deterministic trend in the data• intercept term used but no trend in the cointegrating equation

Eigenvalue	Likelihood Ratio	5% Level of Significance	Number of Cointegrating Equations
0.719	58.768	47.21	None
0.470	28.300	29.68	At most 1
0.399	13.056	15.41	At most 2
0.033	0.819	3.76	At most 3

Likelihood Ratio test indicates that at least **ONE** cointegrating equation exists at the 5% level of significance.

Figure 1

Growth of Real GDP in Trinidad and Tobago 1967-1996
(Base: 1984)

Figure 2

The Unemployment Rate in Trinidad and Tobago 1963-1996

Figure 3

Actual and Fitted Values of Changes in the Unemployment Rate
(Equation 8)

APPENDIX

1 Instrumental Variable Estimation of Change in Unemployment Rate Equation

$$\begin{aligned}
 du_t = & 5.40 - 0.96draw_{t-1} - 1.09drgdp_{t-1} + 0.002dRLR_{t-1} - 0.49u_{t-1} \\
 & (4.30) \quad (-2.28) \quad \quad \quad (-3.84) \quad \quad \quad (0.58) \quad \quad \quad (-5.39) \\
 & + 0.23raw_{t-1} - 0.53rgdp_{t-1} + 0.01RLR_{t-1} + 0.12D \\
 & (2.40) \quad \quad (-3.88) \quad \quad \quad (2.64) \quad \quad \quad (3.68)
 \end{aligned}$$

Adj R² = 0.80; SER = 0.04; Jarque-Bera Normality test = 0.176
 Breusch-Godfrey Serial Correlation F test = 1.45;
 Ramsey RESET F test = 0.18.

Instrumental Set (constant term, u_{t-1}, raw_{t-2}, rgdp_{t-2}, RLR_{t-2}, du_{t-1}, draw_{t-1}, drgdp_{t-1}, dRLR_{t-1}, D)

2 Alternative Specification of Dynamic Equation for the Unemployment Rate

a. Ordinary least Squares (OLS)

$$\begin{aligned}
 u_t = & 4.89 + 0.18raw_{t-1} - 0.46rgdp_{t-1} + 0.01RLR_{t-1} + 0.53u_{t-1} \\
 & (3.49) \quad (1.58) \quad \quad \quad (-2.86) \quad \quad \quad (2.35) \quad \quad \quad (5.63) \\
 & - 0.92draw_{t-1} - 0.98drgdp_{t-1} + 0.003dRLR_{t-1} + 0.13du_{t-1} + 0.12D \\
 & (-2.12) \quad \quad (-3.12) \quad \quad \quad (0.69) \quad \quad \quad (0.84) \quad \quad \quad (3.74)
 \end{aligned}$$

Adj R² = 0.97; F = 82.82; SER = 0.05; DW = 2.89;
 Breusch-Godfrey SC (F) test = 2.63; Bera-Jarque Normality test = 0.23;
 ARCH F test = 0.29; Ramsey RESET (F) test = 0.59;
 ADF (no constant) = -3.02; PP (no constant) = -7.19.

a. Instrumental Variables (IV)

$$u_t = 4.89 + 0.18raw_{t-1} - 0.46rgdp_{t-1} + 0.01RLR_{t-1} + 0.53u_{t-1}$$

(3.49) (1.58) (-2.86) (2.35) (5.63)

- 0.92draw_{t-1} - 0.98drgdp_{t-1} + 0.003dRLR_{t-1} + 0.13du_{t-1} + 0.12D
(-2.12) (-3.12) (+0.69) (0.84) (3.74)

Adj R² = 0.97; SER = 0.05; F = 82.8

Instrumental Set (constant, rgdp_{t-2}, raw_{t-2}, RLR_{t-1}, u_{t-2}, drgdp_{t-1},
draw_{t-1}, dRLR_{t-1}, du_{t-1}, D)