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Unemployment Persistence and Capital Shortage: The Case of Trinidad and Tobago

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Abstract

This paper examines the link between capital stock and unemployment persistence. An overlapping-generations model with endogenous labor supply and imperfect competition is presented. It is used to interpret the unusual persistence of unemployment in Trinidad and Tobago during the last twenty years. Although real wages are 60 percent lower today than in the mid-1980s, unemployment continues to be very high. The paper argues that an important part of the explanation lies in the decline of capital stock in this country after years of very low savings and investment. Policies to address this capital shortage are discussed.

JEL Classification Numbers: E22, E24

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Contents

Summary

Unemployment rose sharply in Trinidad and Tobago after the oil price decline of the early 1980s. This increase in unemployment was often blamed on excessive real wages paid despite a weakening terms of trade. Although real wages subsequently declined by 60 percent, unemployment continued to be very high. After reviewing some additional stylized facts, the paper develops an overlapping-generations model with endogenous labor supply and imperfect competition on the goods market. The central transmission mechanism rests on capital decumulation and clearly reproduces the pattern observed in Trinidad and Tobago, where an increase in unemployment was accompanied first by rising, then falling, real wages. The paper examines the capital stock of Trinidad and Tobago empirically, confirming its contraction during the period of high unemployment. It also highlights the crucial role played by domestic savings. Finally, the paper discusses three alternative policy strategies to address the capital shortage problem and presents some successful international practices for dealing with persistent unemployment.

1. Some Stylized Facts

The economy of Trinidad and Tobago is very dependent on energy exports. Oil and oil-derived products made up 30 percent of GDP and more than 90 percent of exports over the last 20 years. Historically, fluctuations in the petroleum sector have always been the main driving force for fluctuations in the rest of the economy, including the labor market. Figure 1 illustrates the extent to which the real price of oil determines the terms of trade for Trinidad and Tobago.

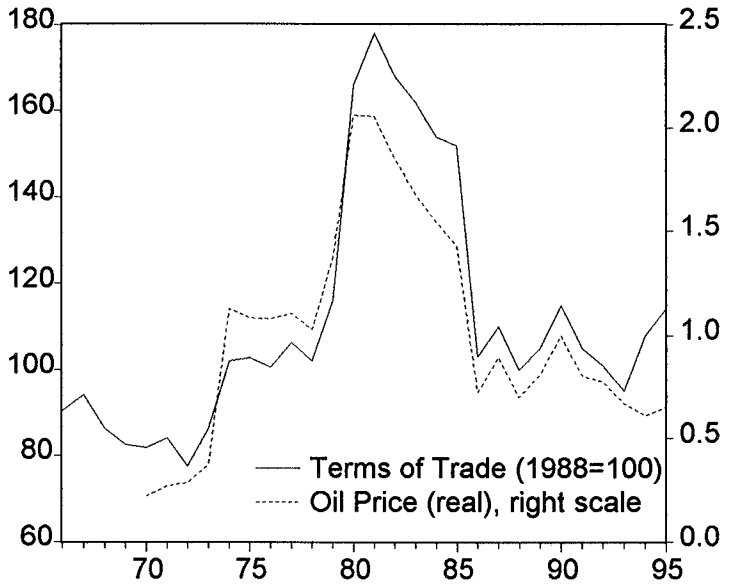

Figure 1. Terms of trade of Trinidad and Tobago and the real price of oil (1990=1).

At the height of the oil boom, as the OPEC cartel was able to increase the price of petroleum sharply, terms of trade more than doubled for Trinidad and Tobago, causing a brief period of unprecedented affluence and wealth. The country had large budget and current account surpluses, and real per capita GDP increased from US$ 4200 to US$ 6200 within the decade between 1973 and 1982.

However, the base for this prosperity was precarious and evaporated quickly as the oil price declined in the early 1980s. The terms of trade worsened, and the economy slid into a deep and protracted recession, which lasted until 1993. Over this period, GDP per capita fell by 35 percent and the unemployment rate climbed from 10 to more than 22 percent (figure 2).

In Trinidad and Tobago, like in many other Caribbean countries, unemployment has traditionally been high, averaging 10 percent even during the oil boom years. However, the situation in the late 1980s, with almost a quarter of the labor force out of work, was much worse.

Certainly, some increase in unemployment had to be expected after the large terms-of-trade shock which the country had suffered in the mid-1980s. But the *persistence* of unemployment was surprising. The jobless ratio remained high for more than a decade after this event and even today shows little signs of reverting back to former levels. The macroeconomic upturn that started in recent years has so far failed to transmit strong impulses to the labor market. After several years of growth, the unemployment rate has decreased only to 16.5 percent in 1996.

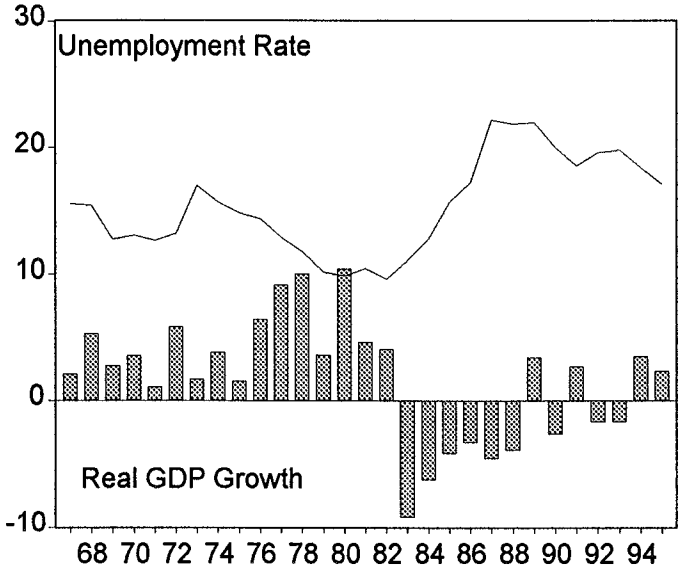

Figure 2. In the 1980s, Trinidad and Tobago went through a protracted recession.

What is the nature of the Trinidadian unemployment? Similar experiences in Europe suggest that long recessions can lead to structural changes in the labor market and persistenly increase equilibrium unemployment. The distinction between equilibrium (or structural) and cyclical unemployment is important from a policy point of view. Cyclical unemployment can be addressed with expansionary demand policies, whereas equilibrium unemployment cannot. Expansionary demand policies in the presence of equilibrium unemployment would only result in higher inflation.

A useful concept to measure equilibrium unemployment is the NAIRU (Non-Accelerating Inflation Rate of Unemployment). Figure 3 shows an estimate of the NAIRU for Trinidad and Tobago.[2] As can be seen, equilibrium unemployment has risen strongly during the recession of

[2] The NAIRU was estimated following the method of Fallon and Verry (1988). Their approach consists in regressing the unemployment rate on the change in wage inflation and a vector of structural variables, and then calculating an unemployment rate consistent with

(continued...)

the 1980s and has remained high thereafter. In the late 1980s, there was a temporary increase in the cyclical component, but the present unemployment level is almost exclusively structural.

Figure 3. The present unemployment is mainly an equilibrium phenomenon.

This observation suggests that the equilibrium on the labor market deserves closer attention. A key variable in this context is the real wage. Figure 4 plots its historical evolution. It shows a remarkable "wage bubble" during the 1980s, the very time of the recession. Real wages started to rise around 1980, shortly after the second hike in oil prices. The steep upward trend continued during the first years of the recession, and real wages reached a peak in 1986. From then on, real wages fell sharply, and reverted to roughly their 1978 level. The change in income experienced by a Trinidadian worker was very large: the purchasing power of wages increased by 60 percent between 1980 and 1986, and decreased by the same amount thereafter.

The public sector played a leading role in propagating high real wages. At the beginning of the 1980s, oil revenues boosted government finances and politically favored a redistribution of the windfall gains. Large wage increases were granted to public sector workers. With official

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[2](...continued)
constant inflation. In our example, the structural vector includes the terms of trade, the capital stock, real investment, the ratio of tax revenues to GDP and a strike variable accounting for union militancy.

encouragement, these increases were spread to the rest of the economy by the action of militant labor unions.[3]

As noted, real wages kept their rising momentum during the first years of the downturn. It proved difficult to adjust to more austere living standards as the terms of trade deteriorated. The perception was widespread that the recession would be temporary, thereby questioning the need for belt-tightening. Also, extensive COLA clauses had been added to wage contracts. Since these contracts usually covered a period of three years, adjusting real wages was made institutionally difficult as well.

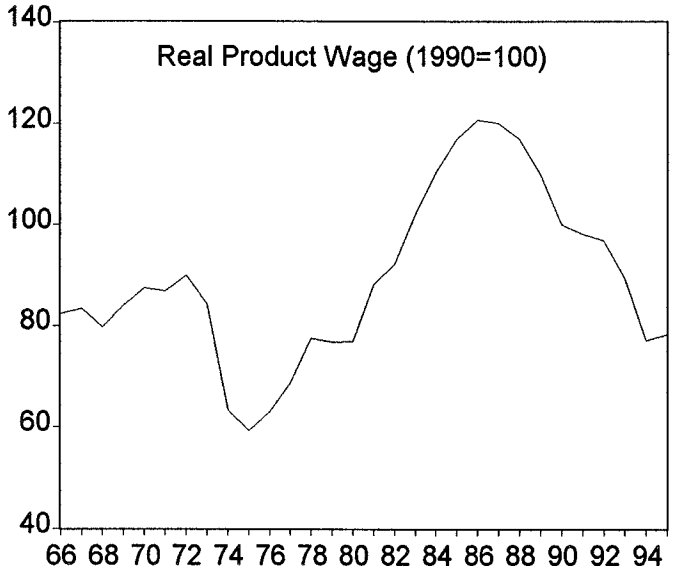

Figure 4. Real wages experienced a boom during the 1980s.

The rapid increase in real wages was not matched by an equally fast increase in productivity. Figure 5 shows that unit labor costs nearly doubled between 1980 and 1986. During some of these years, real wages outstripped productivity growth by as much as 20 percentage points. This evolution did not only lead to huge budget deficits (oil revenues dwindled at the same time as wages increased most sharply), but also to an enormous cost pressure on domestic firms. Both the large budget deficits and lower profits reduced drastically national savings. As can be seen in figure 5, national savings fell by 75 percent in real terms between 1981 and 1988.

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[3] For an analysis of the economic and political redistribution during the Trinidadian oil boom see Auty and Gelb (1986). Hilaire (1992) gives an in-depth treatment of wage policies during that period.

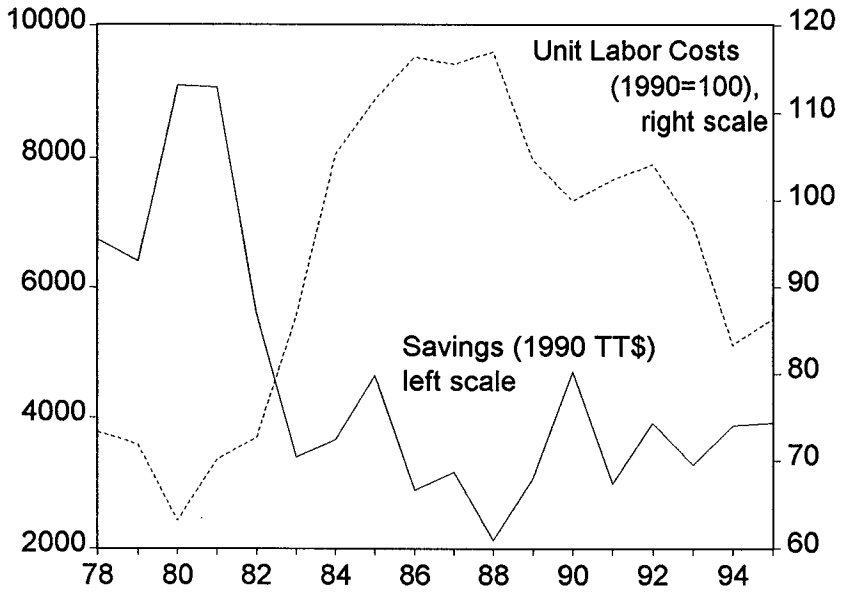

Figure 5. Rising unit labor costs led to a sharp reduction in savings.

Figure 6 shows that the sharp drop in national savings led to a similar decline in the amount of investment. In real terms, investment decreased by two thirds from 1981 to 1988.[4] Since the decline in savings preceded the decline in investment, temporary current account deficits appeared in the early 1980s.

The decline in investment fed back onto the labor market: The reduction of investment to a mere 1/3 of its previous level most likely lowered the capital stock. Less capital, in turn, lowers the productivity of labor and reduces labor demand.

In brief, an excessive increase in real wages during the early 1980s seems to have reduced employment via two channels: First, it squeezed the budget and profits of firms, leading to cost pressure and immediate lay-offs. Second, by lowering national savings and investment, it reduced the capital stock and the demand for labor over an extended period of time.

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[4] The observation that national savings and investment are highly correlated is pervasive and commonly referred to as the "Feldstein-Horioka Puzzle". It is sometimes taken as evidence for an incomplete integration of international capital markets (for a discussion see e.g. Obstfeld and Rogoff, 1996). Figure 6 suggests that Trinidad and Tobago could be described as an almost closed economy in terms of capital mobility, a fact that will be accounted for in the next section.

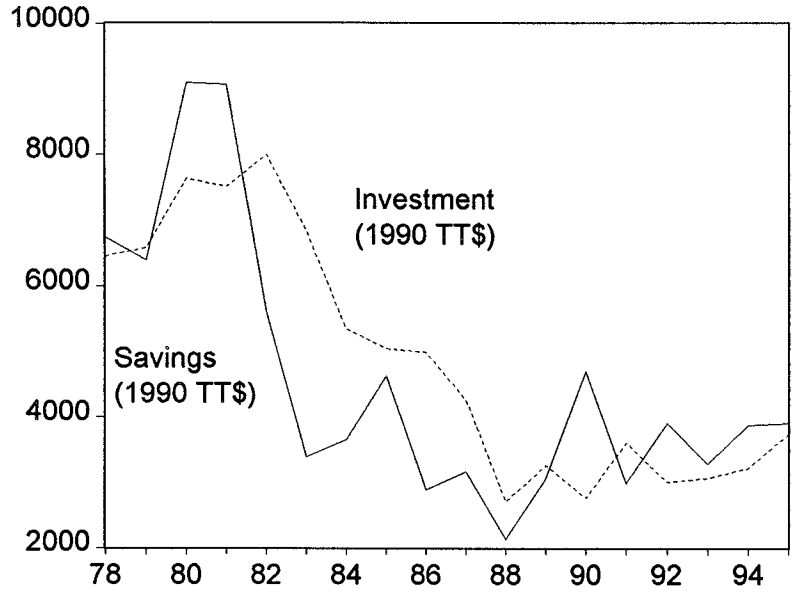

Figure 6. The reduction in savings was mirrored by an equally sharp reduction in investment.

2. The Analytical Framework

This section develops an analytical model that tries to account for the stylized facts mentioned above, and will be used in section 4 to examine alternative policy scenarios. Since unemployment in Trinidad and Tobago is mainly an equilibrium problem, a dynamic optimizing framework is adopted, with overlapping generations of households.[5] The model is deliberately kept in specific terms for the sake of transparency and economic intuition. It assumes monopolistic competition on the goods market, to account for the market power enjoyed by producers in the small Trinidadian economy. Figure 6 shows that savings and investment were highly correlated during the period under investigation. This suggests that as a first crude approximation, Trinidad and Tobago can be modeled as an economy with very low mobility of international capital (see footnote 4). In fact, we shall simplify further by assuming zero capital mobility.

Households

Households are assumed to live for two periods, termed "youth" and "old age", as in Diamond's (1965) original overlapping-generations structure. Households work in their youth, then retire and consume their savings during old age. We simplify slightly from Diamond's original model

[5] See Braumann (1996) for a discussion of this and related models.

by assuming that there is no consumption during youth.[6] A typical household has the following utility function:

$$U = C_{t+1} - \frac{N_t^{1+\beta}}{1+\beta}\,\tau \qquad \textbf{(1)}$$

Consumption C increases utility and labor N reduces it. Labor is assumed to be a continuous choice variable. The preference parameter τ measures the weight attached to labor in the utility function. In a more complete model, unions and a tradable goods sector would have been included. However, the literature shows that an increase in union militancy or a deterioration of the terms of trade has effects equivalent to an increase in τ.[7] To keep matters simple, we will use equation (1) but sometimes treat τ as a proxy for unions and terms of trade.

Since the young do not consume, they invest all their labor income and are compensated with a real interest rate r_{t+1}. After retirement, they consume their savings. The *inter*temporal budget constraint for households is:

$$C_{t+1} = w_t\, N_t\, (1+r_{t+1}) \qquad \textbf{(2)}$$

where w_t is the real wage. Households maximize their utility function (1) subject to the budget constraint (2). The first order condition yields

$$\tau\, N_t^{\beta} = w_t\, (1+r_{t+1}) \qquad \textbf{(3)}$$

This is a standard upward sloping labor supply schedule with τ as a shift parameter. Equation (3) is also a simple example of intertemporal labor substitution. A higher real interest rate makes current leisure more expensive and induces people to work harder.

Since Trinidad and Tobago is a small country, the notion of perfectly competitive goods markets would be unrealistic. Instead, it will be assumed that goods are differentiated and households discriminate between different brands or varieties. This allows firms to charge prices above marginal costs and behave like monopolistic competitors. An easy way to introduce monopolistic competition into the model is to assume that consumption C in the utility function is a CES-index of b differentiated products:

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[6] As in Reichlin (1986).

[7] See e.g. Burda (1988), Carlin and Soskice (1991).

$$C = \left(\sum_{i=1}^{b} c_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{4}$$

The number b of differentiated products will be determined endogenously by allowing free entry into the goods market. This formulation of imperfect competition goes back to Dixit and Stiglitz (1977) and has become a standard tool of macroeconomics following a paper by Blanchard and Kiyotaki (1987).[8] In a second stage of optimization, the household maximizes the subutility function (4) subject to its *intra*temporal budget constraint

$$p\ Y = \sum_{i=1}^{b} p_i\ c_i \tag{5}$$

where p is the general price level, Y is income available for consumption, and p_i is the price of an individual differentiated product. Together with the definition of the price index p,

$$p = \left[\frac{1}{b} \left(p_1^{1-\sigma} + p_2^{1-\sigma} + \ldots + p_b^{1-\sigma} \right) \right] \tag{6}$$

maximization leads to the demand function for a single, differentiated product

$$c_i = \frac{Y}{b} \left(\frac{p}{p_i} \right)^{\sigma} \tag{7}$$

This function is an isoelastic curve with price elasticity $-\sigma$.

Firms

A monopolistically competitive firm i combines labor N and capital K to produce the output of its brand c_i. Firms use a Cobb-Douglas technology:

$$c_i = A\ K_i^{\alpha}\ N_i^{1-\alpha} \tag{8}$$

where A is a technological constant.

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[8] Excellent surveys of macroeconomics with imperfect competition can be found in Silvestre (1993) and Dixon, Rankin (1994).

Product differentiation means that the firms have some power to influence the price of their product. The demand function a firm faces is not infinitely elastic. Using a generalized version of equation (7),

$$p_i = p_i\,(c_i) \qquad \frac{\partial p_i}{\partial c_i} < 0 \tag{9}$$

the profit function of a single firm reads:

$$\Pi_i = p_i(c_i)\; c_i(K,\, N) \;-\; WN_i \;-\; (R+\Delta)K_i \;-\; F \tag{10}$$

where uppercase W denotes the nominal wage, R+Δ are nominal interest payments plus depreciation, and F are fixed sunk costs for entering the market. Firms maximize (10) with respect to the input factors N and K. Since the price elasticity of demand η is defined as

$$-\frac{1}{\eta} = \frac{\partial p_i}{\partial c_i}\frac{c_i}{p_i} \tag{11}$$

the first-order conditions become

$$w = \left(1-\frac{1}{\eta}\right)\frac{\partial c_i}{\partial N} \tag{12}$$

$$r+\delta = \left(1-\frac{1}{\eta}\right)\frac{\partial c_i}{\partial K} \tag{13}$$

where lower case w, r and δ denote real quantities. These equations can be interpreted as the labor and capital demand functions of a firm. Under perfect competition, the elasticity of demand η would be infinity, and the term in brackets would be one. In this case, the real wage offered by firms equals the marginal product of labor, and the real interest rate equals the marginal product of capital (net of depreciation). Under imperfect competition, however, the real wage offered by firms is lower than the marginal product of labor, since the firm charges a markup over its marginal costs. The term in brackets, which is the inverse of the monopolistic markup, is smaller than one. Using Dixit-Stiglitz preferences, the elasticity η is equal to the constant σ (equation (7)). The (inverse of) the markup, $\xi = (\sigma-1)/\sigma$, is also constant and does not depend on the

number of firms in the market. Firms are free to enter the market, and will do so until profits are driven down to zero. The zero profit condition determines the equilibrium number of firms b.[9]

General Equilibrium

The goods market is in equilibrium if savings equal investment. Savings consist of the total labor income of the young. Assuming that capital depreciates within one period (i.e. a depreciation rate $\delta = 1$), investment equals next period's capital stock. Thus, in equilibrium,

$$K_{t+1} = I_t = S_t = w_t N_t \qquad \textbf{(14)}$$

Equations (14) and (3) form the dynamical core of the model. Use the Cobb-Douglas function in equations (12) and (13), substitute these into equations (3) and (14) and use equation (14) to eliminate K_{t+1} from (3). This leads to the laws of motion for employment and capital:

$$\xi^{1+\alpha} N_{t+1}^{1-\alpha} = \alpha^{-1}(1-\alpha)^{-\alpha}\tau A^{-1-\alpha} K_t^{-\alpha^2} N_t^{1-\alpha+\alpha^2+\beta} \qquad \textbf{(15)}$$

$$K_{t+1} = (1-\alpha)\,\xi\, A\, K_t^{\alpha} N_t^{1-\alpha} \qquad \textbf{(16)}$$

The dynamical behavior of the model can be analyzed by the means of phase diagrams. A first presentation uses the capital-employment space. To derive the demarcation lines in the K/N space, set $N_t = N_{t+1}$ in equation (15) and $K_t = K_{t+1}$ in equation (16). The result is shown in the upper panel of figure 7, in a logarithmic presentation. Both demarcation lines slope upwards, but the demarcation line for employment is steeper than the one for capital, which has a slope of one. The steady state equilibrium is a saddle point. This property is typical for a simple dynamic general equilibrium model with rational expectations. Under rational expectations (which are implicitly assumed in our model), the agents foresee that any unstable path would finally violate the first-order conditions. Thus, the economy is always on a saddle path.

A second presentation of the model transfers the phase diagram into the real-wage-employment space. This is the familiar environment for analyzing labor market issues and makes

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[9] The number of firms can be computed by setting profits (10) equal zero. In equilibrium, all firms are symmetric, $p_i = p$, and $c_i = Y/b$. Therefore, the number of firms is $b = Y/\sigma f$, where f is real fixed costs. Interestingly, b is *procyclical*, meaning that firms are created in an upturn and destroyed in a downturn.

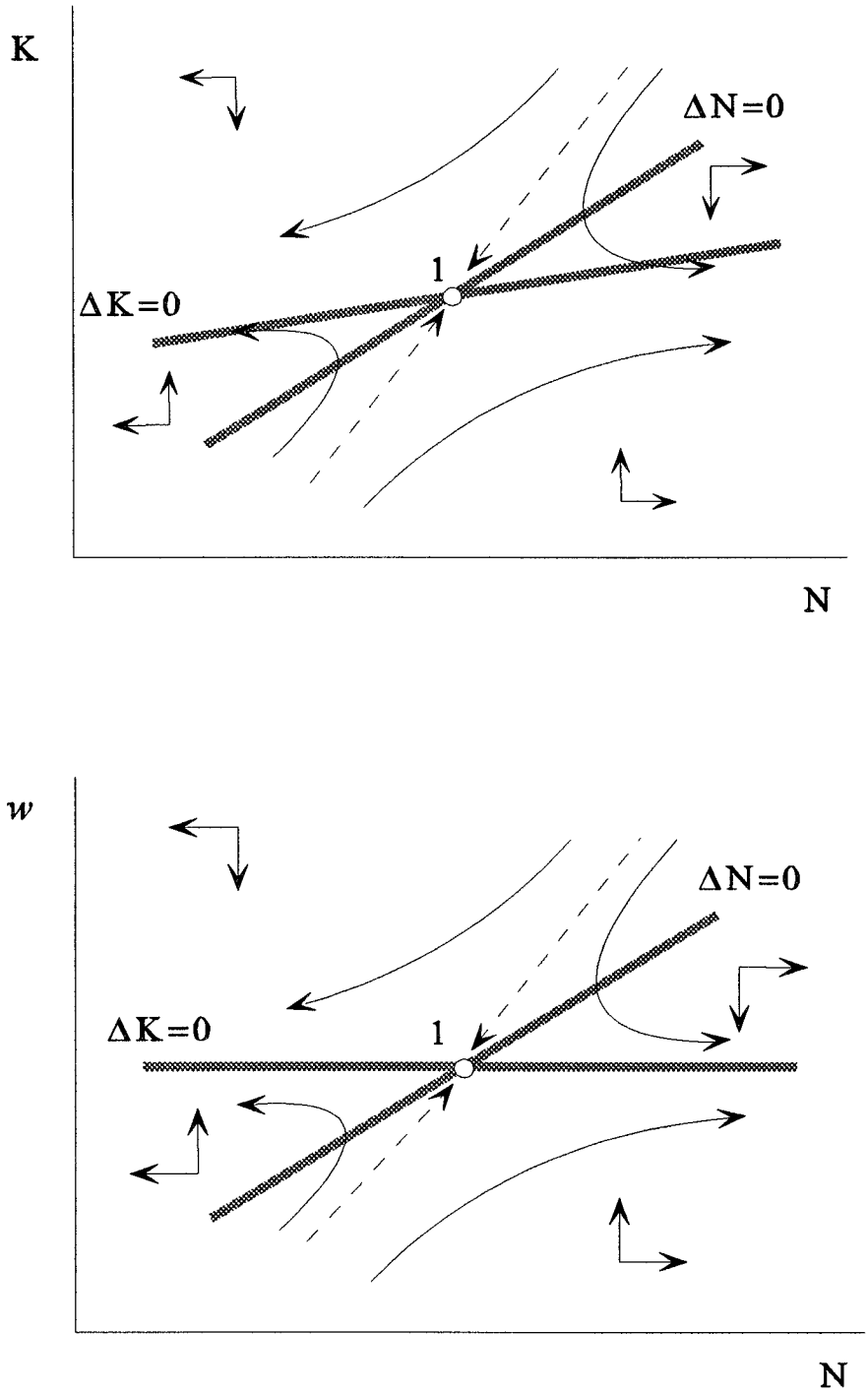

Figure 7. Dynamics of the model in the K/N space (above) and the w/N space (below).

the model comparable to other studies in this area.[10] To derive the demarcation lines, proceed as before by setting $N_t = N_{t+1}$ in equation (15) and $K_t = K_{t+1}$ in equation (16). Use the results to eliminate K from equations (3) and (12), after setting $N_t = N_{t+1}$ and $K_t = K_{t+1}$ in these equations as well. One obtains

$$w = \gamma_1 \left(\frac{\tau^{1-\alpha+\alpha^2}}{\xi A} \right)^{\frac{1}{\alpha^2}} N^{\beta + \frac{\beta(1-\alpha)}{\alpha^2}} \qquad \textbf{(17)}$$

$$w = \gamma_2 (\xi A)^{\frac{1}{1-\alpha}} \qquad \textbf{(18)}$$

where γ_1 and γ_2 are two unimportant constants. Equation (17) could be interpreted as a long-run labor supply curve and equation (18) as a long-run labor demand curve. The lower panel of figure 7 shows a logarithmic presentation of the phase in the w/N space. The demarcation line for capital is horizontal, whereas the demarcation line for employment slopes upward. The steady state equilibrium is, as before, a saddle point.

An adverse labor supply shock

The events in Trinidad and Tobago during the 1980s can be interpreted as a permanent increase in the labor supply parameter τ. During and after the second oil boom, large increases in real wages were spread across all industries by the action of powerful labor unions. The sharp deterioration in the terms of trade, which followed in the early 1980s, compounded the cost pressure on firms and the government. Figure 8 illustrates this event. A permanent increase in τ shifts up the demarcation line for employment, but does not affect the demarcation line for capital. On impact, employment falls and real wages rise, since they depend on the capital-labor ratio. The economy moves from the old steady state 1 to position 2, which could be compared to the situation in Trinidad during 1983-1985.

In the present model, wage earnings of young workers are the only source of savings in the economy. Wage earnings are proportional to output in our Cobb-Douglas setting. As employment declines at the initial level of capital, so does output. Consequently, wage earnings and savings fall (equations (8) and (14)). To maintain equilibrium on the goods market and the equality between savings and investment, investment has to decline as well.

The lower level of investment leads to a lower capital stock in the next period. This intensifies the downturn of the economy. Output falls again, as do savings and investment. Since a declining capital stock reduces the marginal product of labor, the initial rise in real wages is now reversed, and a pattern of declining employment and falling real wages develops. This pattern

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[10] E.g. Blanchard (1990)

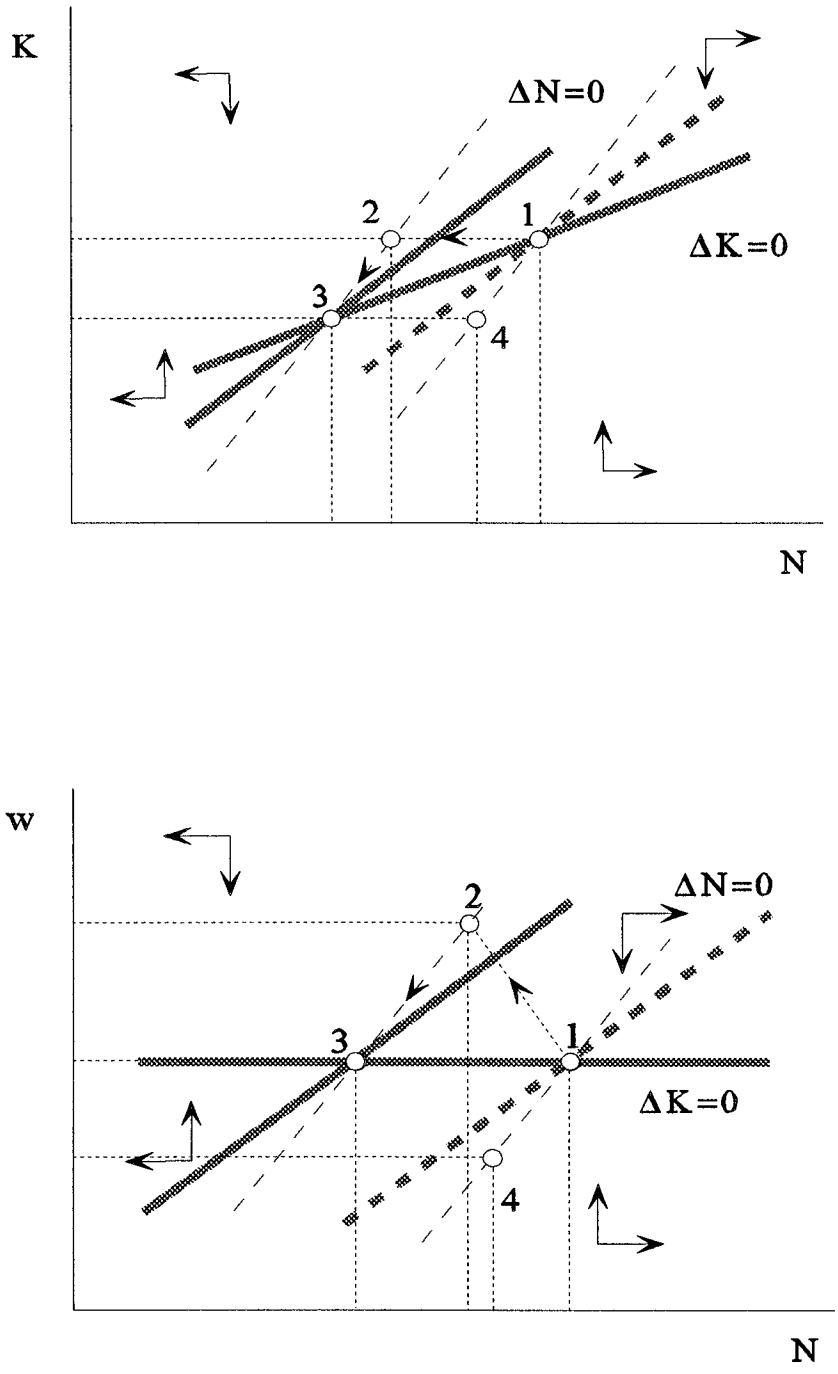

Figure 8. An adverse labor supply shock.

could be observed in Trinidad and Tobago during the later part of the 1980s. Declining real wages made labor less expensive, but not by enough to compensate for the loss in productivity due to the contraction of the capital stock. Therefore, labor demand kept falling.

In the lower panel of figure 8, the economy jumps to point 2 on impact. Labor can be reduced instantly, whereas capital cannot. Therefore, the capital-labor ratio temporarily increases. Since the real wage is positively related to the capital-labor ratio, it must rise during the transition from point 1 to point 2. After the initial shedding of labor, a decrease in savings sets in, and the capital stock starts declining. Along the saddle path, capital declines relatively faster than employment. The slope of the saddle path is greater than 1 in the upper panel of figure 8 since it lies above the K-demarcation line. During the movement from point 2 to point 3, the capital-labor ratio decreases, and so does the real wage.

Finally, as falling real wages catch up with the productivity loss, the economy settles into a new steady state. Real wages are back to their original level before the cycle, but employment and capital are permanently reduced. In the long run, the redistribution of oil windfalls did not pay off: It not only missed the goal of improving the living standard, but also damaged the country's physical capital stock and destroyed many jobs.

3. The Decline of the Capital Stock

The central transmission mechanism of the model discussed above is capital decumulation. This section tries to assess empirically to what extent the capital stock of Trinidad and Tobago indeed declined. Since there are no direct observations of the capital stock for this country, an attempt is made to estimate a time series from investment data and other information. The approach being used is the *perpetual-inventory method* which goes back to the growth accounting literature of the 1960s. A recent description can be found in Barro and Sala-i-Martin (1995), p. 384. The perpetual-inventory method constructs a capital stock series from gross investment data plus a set of assumptions concerning the initial capital stock and the rate of depreciation.

In general, the capital stock evolves according to:

$$K_{t+1} = (1-\delta)\, K_t + I_t \qquad (19)$$

If we knew the capital stock for a given base period K_0 and the depreciation rate δ, then constructing the time series would be simple: all we have to do would be adding gross investment to the (depreciating) initial capital stock. Gross investment data are available in national accounts tables. Unfortunately, since there are no data on either K_0 or δ, we must rely on estimates. The longer the investment series, the less important becomes K_0, since its value is depreciating rapidly. If the observations on investment cover 30 years or more, a rather accurate picture of the capital stock emerges, no matter how poor the estimate for K_0 was. On the other hand, the literature on

growth and business cycles gives reasonable estimates for the depreciation rate δ. For industrialized countries, the most widely used value is δ = 5 percent per year. It is often argued that depreciation rates in developing countries are somewhat higher, because the structure of their economies is changing more rapidly. Estimates for the depreciation rate of developing countries range between 5 and 10 percent.

The main result, namely a decline in the capital stock during the last ten years, is robust for a wide range of assumed depreciation rates. Trinidad and Tobago is considered a middle-income country with a GDP per head of about 4100 US$. Thus, the baseline scenario assumes a depreciation rate of 7.5 percent per year. We will, however, conduct a sensitivity analysis and use other values in the range from 5 to 10 percent.

K_0 is constructed by using the fact that over the long run, the growth rates of output and capital tend to be equal:

$$g_K = g_Y \tag{20}$$

Combining equations (19) and (20) yields

$$\frac{I_t}{K_t} = g_Y + \delta \tag{21}$$

The average growth rate of real output in Trinidad and Tobago was 1.7 percent during the period of 1966-95. Adding a depreciation rate of 7.5 percent gives a ratio of investment to capital of about 0.092. Dividing the real investment value of 1966 by this number, the initial capital stock K_0 can be estimated at about 32.2 billions of 1990 TT$.

Figure 9 shows the resulting capital stock series. Capital accumulation was especially fast during the first and second oil price hikes in the 1970s and at the beginning of the 1980s. The decline in oil prices during the 1980s, however, led to a marked reduction in national savings and investment. During 1984-88, gross investment was only just equal to depreciation. The capital stock stopped growing. Later on, net investment turned negative and the capital stock started to contract. Net investment has remained negative until the present day, and the capital stock continues declining. In the baseline scenario with δ = 7.5 percent per year, Trinidad and Tobago has lost almost a fifth of its capital stock between 1986 and 1995.

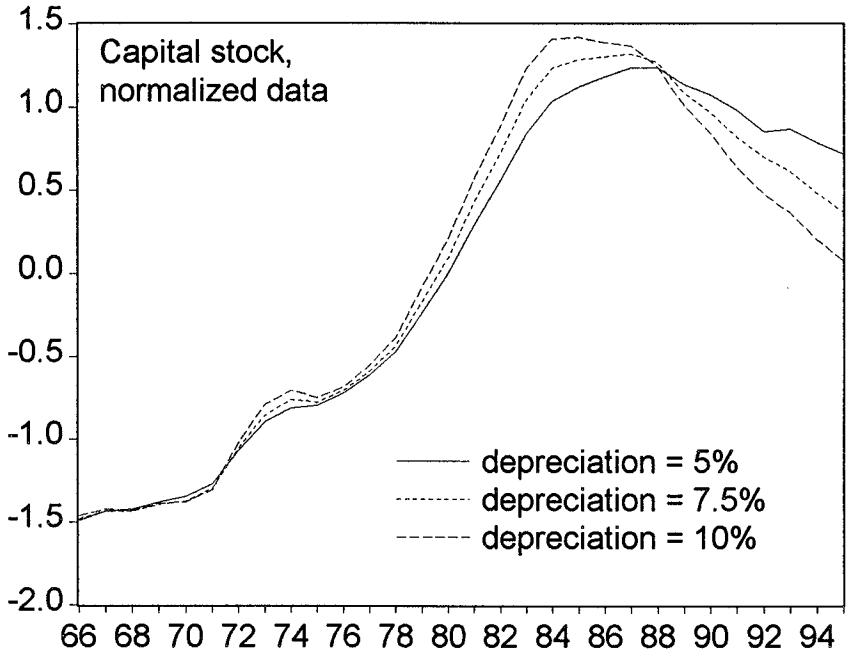

Figure 9. The capital stock of Trinidad and Tobago, different assumptions.

4. Policy Strategies

The model of section 2 suggests at least three strategies to rebuild savings and the capital stock. Unfortunately, none of them offers quick solutions to the unemployment problem, but instead involve time-consuming structural reforms. Also, some initial sacrifice in living standards by people currently holding jobs seems to be required. However, the reward is a lasting increase in employment and in some cases, real wages. We shall in turn consider the effects of (1) a temporary reduction of unit labor costs, (2) an increase in competition and (3) the introduction of a fully funded pension system. The theory shall be illustrated with successful empirical examples from the Netherlands, Chile and Trinidad and Tobago itself.

Reducing unit labor costs

It is obvious that a reversal of the shock experienced by Trinidad and Tobago during the 1980s could undo the loss of employment and capital. Figure 8 shows how a reduction of τ by the right amount could bring the economy back to position 1, via point 4. Trinidad and Tobago has actually seen a brief experience of this type in the 1970s. Figure 4 shows that real wages dipped for some years after the first oil boom in 1973. The reason was that nominal wages could not rise as rapidly as the price of oil at this time, since unions were taken by surprise. Figure 2 shows that

unemployment responded quickly and fell to its lowest level in the recent economic history of the country. Also, as indicated in figure 6, savings and investment soared, leading to a fast build-up of capital (see figure 9).

Of course, favorable terms of trade shifts such as in the 1970s are unlikely to occur again in the near future. Reducing unit labor costs (represented by τ) today would have to be achieved by more painful means, such as convincing unions to forgo some purchasing power, or lowering tax rates. However, the example of the Netherlands shows that labor demand is indeed responsive to a conservative wage policy. Figure 10 plots employment and unit labor costs for this country. Unit labor costs fell by roughly 20 percent in real terms over the last 15 years, as the result of a political consensus to give job creation priority over wage increases. The Dutch labor market was consequently able to create a remarkable number of jobs at a time when the rest of Europe struggled with increasing unemployment rates.

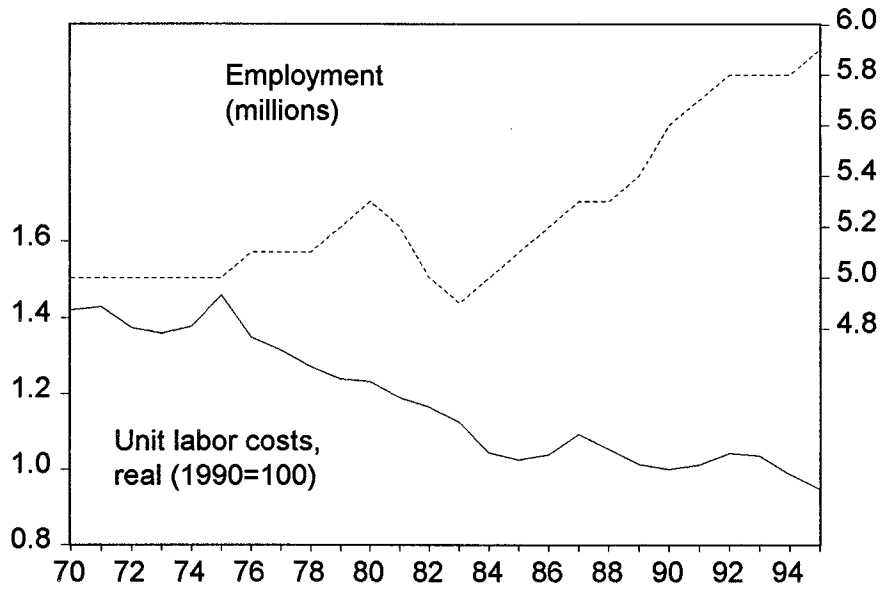

Figure 10. The Netherlands: Rising employment and falling unit labor costs.

Increasing domestic competition

Figure 11 shows the effects of an increase in either the competitiveness indicator ξ or total factor productivity A (or both). In the long run, the results are quite attractive: Employment *and* real wages increase. In the short run, however, real wages fall due to an initial decrease in the capital-labor ratio and the marginal product of labor. This can be interpreted as an up-front investment for higher living standards later on. As output and savings increase, the capital build-up gains

momentum. The economy gradually shifts into more capital intensive production, which allows real wages to rise and to finally settle above their initial level.

Reducing market power on the goods markets can be achieved by various means, two familiar examples being trade liberalization and the formation of a regional common market. By eliminating barriers to trade or merging several national markets into one, the number of competing firms increases. Consumers can choose from a broader variety of goods, and demand functions become more elastic. This lowers the markup charged by firms, and since the markup varies inversely with real wages, real wages rise. In recent years, Trinidad and Tobago has increasingly opened up its economy to the rest of the world. Since 1994, output is growing again, and unemployment embarked on a downward trend. Real wages, however, remain subdued, which is not unexpected according to the short-run behavior of the model.

Pension reform

Structural reforms in the social security system can have effects similar to an increase in factor productivity or in competition. At present, Trinidad and Tobago is using a pay-as-you-go system to finance pensions, which means that the currently young, working-age generation finances the retirement benefits of the currently old. Let's assume that young workers have to contribute a fraction θ of their wage income to the public pension system. This finances transfers Tr to the old-age population. The introduction of pay-as-you-go pensions modifies the budget constraint of an individual household (2) in the following way:

$$C_{t+1} = (1-\theta)\, w_t\, N_t\, (1+r_{t+1}) + Tr_{t+1} \qquad \textbf{(22)}$$

The capital accumulation equation (14) becomes

$$K_{t+1} = (1-\theta)\, w_t\, N_t \qquad \textbf{(23)}$$

It is straightforward to solve the modified model. Maximizing utility function (1) subject to (22) again yields the labor supply schedule. Substituting equation (12) for the real wage w_t and equation (13) for the real interest rate r_{t+1}, and setting $K_{t+1} = K_t$ and $N_{t+1} = N_t$ leads to the steady state solutions for employment and the capital stock:

$$\bar{N}^* = (1-\theta)^{\frac{\alpha}{\beta(1-\alpha)}}\, \bar{N} \qquad \textbf{(24)}$$

$$\bar{K}^* = (1-\theta)^{\frac{\alpha+\beta}{\beta(1-\alpha)}}\, \bar{K} \qquad \textbf{(25)}$$

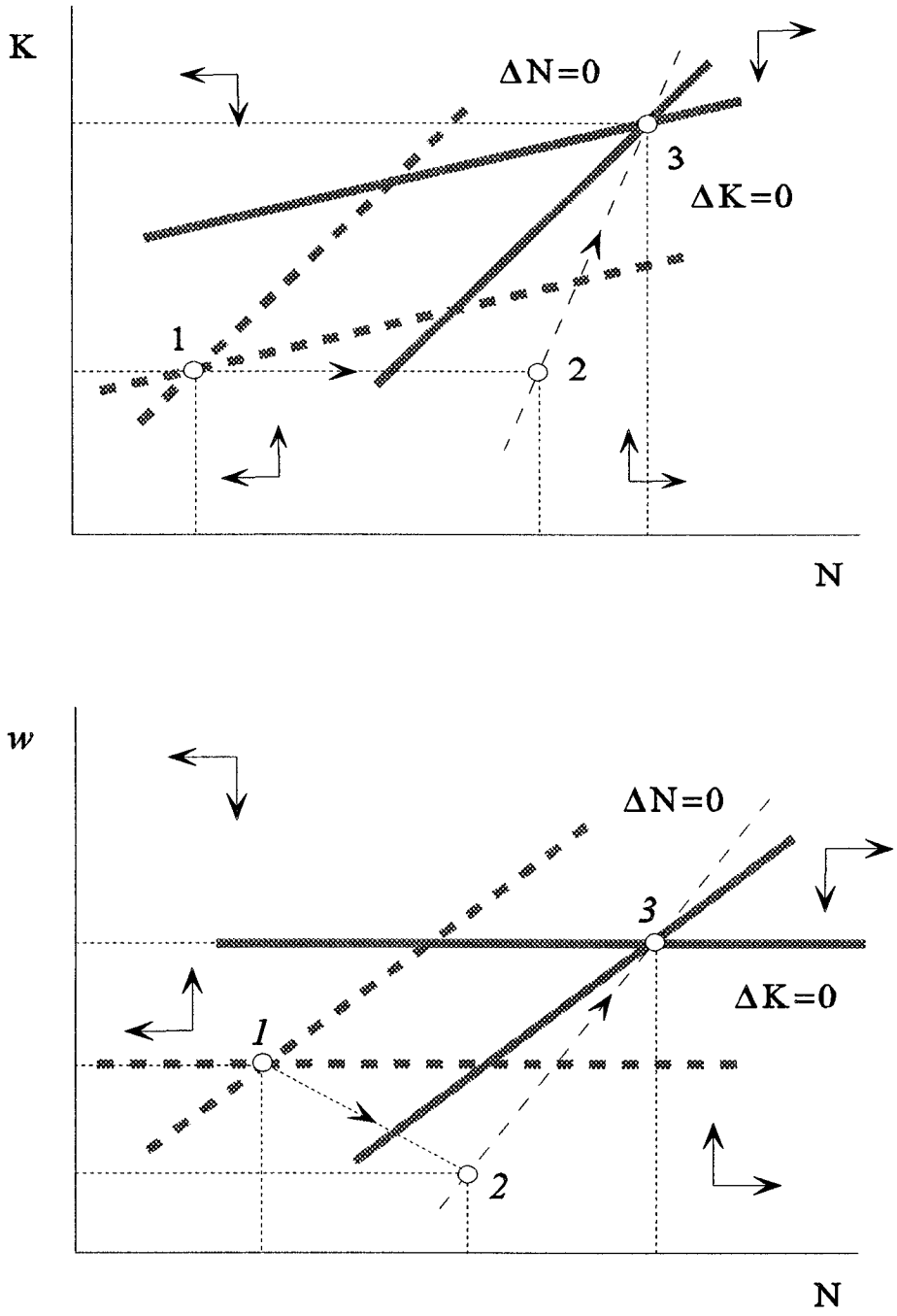

Figure 11. Dynamics of (a) an increase in competition, (b) a positive productivity shock, (c) a shift to fully funded pensions.

Steady state values are denoted by a bar, and the values without stars refer to solutions of the model without public pension in section 2. A higher rate of social security contributions θ decreases both employment and the capital stock. It also reduces real wages (which depend on the capital-labor ratio), since the capital stock is reduced by more than employment. The simple setup of the model highlights the distortionary effects of a pay-as-you-go system: Contributions are in effect a tax on labor income and reduce the incentive to work. This leads to a decrease of savings and investment, and consequently of the capital stock.[11]

Chile pioneered social security reform when it began shifting to fully-funded pensions in 1981.Basically, the intergenerational transfers of the pay-as-you-go system were replaced by individually owned and privately managed savings funds.[12] In terms of our model, both the transfers Tr and the social security tax θ were significantly reduced.

It is illustrative to see what happens if transfers Tr and contributions θ are reduced all the way down to zero. In this case, old-age consumption has to be financed entirely out of individual savings, just as in the original model without pensions. Equations (22) and (23) revert back to equations (2) and (14), and steady state values without stars apply in (24) and (25). Clearly, employment, real wages and the capital stock are higher in the new, long-run equilibrium. The move to fully funded pensions eliminates the distortions created by the taxation of labor income and increases the incentive to work and save. After a pension reform, the transition to the new steady state would be equivalent to the case illustrated in figure 11, where competition or factor productivity were increased. The demarcation line for capital shifts up, and the demarcation line for employment shifts down. Employment rises on impact, and after an initial dip, real wages rise as well, driven by a fast build-up of the capital stock.

There might be additional benefits from engaging in social security reform. Holzmann (1996) claims that Chile's shift to a fully funded pension system has also increased total factor productivity, besides reducing labor market distortions. Professionally managed private pension funds favor the development of deeper and more competitive financial markets This facilitates intermediation and leads to a more efficient allocation of savings, which is equivalent to an increase in the parameter A in our model. Holzmann estimates that over the last ten years, the increase in total factor productivity due to the pension reforms contributed up to 4 percentage points to real output growth in Chile. This effect, he argues, was even more important than the elimination of the labor market distortions.

Figure 12 shows that real wages and unemployment in Chile closely followed the pattern predicted by the model in the case of a reduction in θ (and increase in A). The new pension system was introduced in 1981, and reached a critical mass at around 1985. After an initial decline, real wages rose by roughly 40 percent between 1987 and 1995. At the same time, unemployment fell from a peak of almost 20 percent in 1982 to about 5 percent at present.

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[11] Blanchard and Fischer (1989, Chapter 3) derive this result in a more general setting.

[12] For redistributive reasons, there are still some pay-as-you-go elements in the Chilean pension model. For institutional details, the reader is referred to Holzmann (1996).

Finally, the savings rate (which in our model is 1-θ) increased from an average of 5.1 percent in 1979-86 to an average of 21.1 percent in 1987-95.[13]

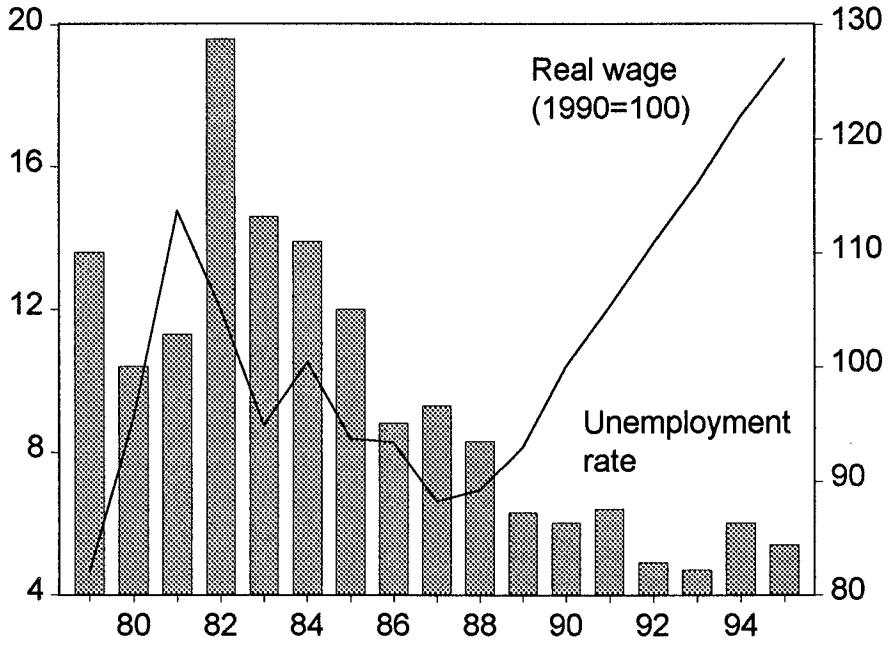

Figure 12. Chile: Unemployment and real wages.

5. Conclusion

The purpose of this paper was to examine the reasons for the observed persistence of high unemployment in Trinidad and Tobago. The first section presented some stylized facts of the Trinidadian economy to be explained by theory. These facts include: (1) a sharp increase in unemployment after the end of the oil boom, and a high degree of persistence until the present day, (2) a composition of unemployment which is almost entirely structural, (3) a remarkable "bubble" in real wages, which reached a peak in the mid-1980s, and (4) a sharp contraction of savings and investment.

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[13] Of course, additional factors such as fiscal consolidation have contributed to this increase in savings. See again Holzmann (1996).

The second section developed an intertemporal optimizing model, which was used to interpret the stylized facts. It was argued that a combination of falling oil prices and excessive increases in real wages at the end of oil boom led to intense cost pressure on firms and the government. As a result, output and employment declined, causing a contraction of national savings and investment. Investment became so low that the capital stock started to decline. This reduced labor productivity and intensified the downturn, leading to a high degree of persistence in unemployment. For the same reason, a fall in real wages had no positive effect on labor demand.

In the third section, a time series of the capital stock was estimated. The results - which were robust under a variety of assumptions - confirmed that the capital stock of Trinidad and Tobago declined during the last ten years. The final section examined possible policy responses and presented some international practices in addressing the unemployment problem.

Data Sources

Figures 1, 2: International Finance Statistics (IFS).
Figures 2, 4, 5, 6: Central Statistical Office (Trinidad and Tobago).
Figures 3, 5, 9: Own estimates.
Figures 11, 12: World Economic Outlook (WEO).

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