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GOVERNMENT DEFICITS, THE REAL INTEREST RATE AND LDC DEBT:
ON GLOBAL CROWDING OUT
by
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GOVERNMENT DEFICITS, THE REAL INTEREST RATE AND LDC DEBT: ON GLOBAL CROWDING OUT*

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*Valerie Kozel provided excellent research assistance, and John Fleming useful comments on a more comprehensive version of this paper which is available as a WDR VII Background Paper in Lal and Wolf (1984); that version also contains an appendix with full documentation of data sources.

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Abstract

This paper links the current problems of protectionism and debt in the global economy to certain longer-term trends and "structural" weaknesses of developed and developing countries exposed by the supply shocks of the 1970's. These are the possibility of an emerging global shortage of savings; the explosive growth of social expenditures in OECD countries; a fiscal problem of prospective structural public sector deficits in both developed and developing countries associated with certain "structural" features": the aging of the population in developed and its "green idol" in developing countries; the real wage resistance of workers in many industrial countries. Part I of the paper charts these trends and structural weaknesses and their interrelationships. The second part develops a three-region model of global savings-investment balances in which the world interest rate and the LDC/OECD terms of trade are endogenously determined and which is calibrated with data over the 1970's. The final part summarises the global interactions in which there is a link between the actions and reactions of the public sectors in both developed and developing countries through their effects on world interest rates and the terms of trade of LDC's relative to the OECD. In both sets of countries public expenditure is growing, partly fuelled by demographic trends. The financing of this global growth in public expenditure presents the prospect of (a) a global crowding out of private investment, and (b) the growth of OECD deficits to finance consumption-type entitlements threatening to crowd out the more productive social overhead public expenditures in developing countries. Finally, it is argued that the "debt crisis" can be seen as flowing essentially from a global fiscal crisis (with its accompanying upward pressure on real interest rates), that is, a crisis of the public sectors in both developed and developing countries.
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Introduction

The two major problems in the global economy clouding the future prospects of developing countries are those of rising protectionism in industrial countries and the debt crisis. Many hope that the current recovery will be sustained and will resolve these problems. Against this cyclical view of current problems, this paper explores other explanations which suggest that more fundamental changes in policies in both developed and developing countries are required.

Development economics has traditionally emphasised the trade linkage between developed and developing countries. By contrast another important link between developed and developing countries is emerging and is the focus of this paper: the integration of world capital markets and the explosion in commercial bank lending in the 70's, stimulated by the recycling of OPEC financial surpluses arising from the two oil price shocks of the past decade.

The problems of protectionism and debt are in turn linked to certain longer term trends and 'structural' weaknesses of developed and developing countries which have been exposed by the supply shocks of the 1970's. These are the possibility of an emerging global shortage of savings; the explosive growth in social expenditures in most OECD countries; a fiscal problem of prospective structural public sector deficits in both developed and developing countries associated with certain 'structural' features: the aging of the population in developed and its 'greening' in developing countries; the real wage resistance of workers in many industrial countries.

In the first part of the paper we chart these trends and structural weaknesses and their interrelationships, in the second part we present a simple three region model of global saving-investment balance, which is
calibrated with data over the 1970's, and the final part summarises our postulated global interactions.

I. THE BUILDING BLOCKS

I.1. Trends in OECD Real Wages, Social Expenditures, and Fiscal Deficits

The deteriorating economic performance of the global economy and the industrialized countries in particular is well documented (see OECD (1983)). Two 'structural' aspects of industrialized economies were exposed by the supply shocks of the 1970's: first, the expected real wage growth workers were willing to enforce at the cost of a declining share of profits since the late 60's; second, the increasing commitments made by governments to various groups to subserve their notions of social justice.

Both features influenced public policy in the post-war decades. A common belief was that, except for minor recessions which could be smoothed by suitable demand management policies, the post war boom would be unending. This would allow both increased real wages as well as social expenditures to be financed without the need for difficult choices concerning tradeoffs between wages and profits, or consumption and investment, (see Crosland (1950)) for the classic statement of this view). Increasingly, since the 60's, micro-economic interventions (industrial subsidies, regional subsidies, and in the 1970's various forms of protectionism) to maintain workers in particular occupations and locations at income levels above their value marginal product were justified as a legitimate tradeoff between "economic security" and economic growth. (For a rough quantification of these micro-economic distortions for Europe see Curzon-Price.)
The supply shocks of the 1970's and the universal slowing down of productivity growth in the OECD countries, exposed the unreality of these assumptions and the unviability of the policies they had engendered. The most obvious and best analysed was the discrepancy between the real wage workers expected and the "full employment wage" which had been lowered by both the terms of trade losses suffered by the OECD countries in the 1970's, as well as their worsened growth prospects flowing from the productivity slowdown. Sachs (1979)(1983) has shown how slowly the real wage in different industrial economies and particularly in Europe adjusted downwards towards the new 'equilibrium' real wage. The U.S. was an exception, as it succeeded in creating 20 million extra jobs in the 1970's, whereas in Western Europe employment changed by only 2 million. With labor supply increasing as the 'baby boom' generation matured, the result was levels of unemployment unprecedented since the 1930's. The distortion in relative factor prices resulting from the relative rigidity of real wages, provided producers an incentive to substitute capital for labor (see Scott and Laslett (1978)); whilst the accompanying squeeze on profits attenuated the means to finance investment to create future employment and growth. The rise in commodity prices and the associated structural changes in the economy, moreover, led to a reduction in the "effective" capital stock, as the expected return on capital employed in oil intensive and other raw material intensive industries declined, (see Baily (1981) and Bruno (1984), (1982)).

In these circumstances, conventional demand management policies cannot avoid the transitional unemployment that a real wage that was higher and only adjusting slowly towards that "warranted" by the changed circumstances would in any case cause. For the conventional method of
reducing such transitional unemployment is premised on the assumption that workers suffer from some money illusion, and therefore by boosting demand and the inflation rate, a lower real wage and unemployment rate can be obtained. However, with the disappearance of money illusion there is no long run tradeoff and possibly not even a short run one between inflation and unemployment. The increased labor militancy in Europe in the late 1960's illustrated by the explosion in money wages in the 1964-70 period, particularly in west European countries (see Fig.1 and Phelps-Brown, Sachs (1979), Soskice) at a time when productivity was slowing down can be taken as a sign that, with rising inflation, workers' money illusion had progressively disappeared. The resulting unemployment can then be ascribed to the rigidity of real wages rather than a lack of effective demand.

The social commitments of governments posed equally serious problems. Even if the level and coverage of social commitments were justified, given the growth expectations of the post World War II Golden age, \(^\text{1/}^\) the worsening prospects in the 1970's required some downwards adjustment in the levels and coverage of these social benefits even with unchanged social preferences. Instead, till the late 1970s, social expenditures grew rapidly (due to improved levels of benefits) in most OECD countries (see Fig II and Table 1, and Hakim and Wallich for a summary of the evidence). Following the recent project evaluation literature (Little-Mirrlees, Lal (1974), (1980)) a "critical consumption level" of income can be defined at which a marginal increase in publicly funded income transfers are considered socially as valuable as a marginal change in public revenue. The

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1/ For a comparative analysis of this period over time and space, see Maddison (1982).
worsened growth prospects of the 1970's required a downwards adjustment in this critical consumption level. The net effects of both a real wage and critical consumption level higher than warranted by the new circumstances is a socially sub-optimal consumption-savings balance for the economy, requiring a premium on domestic savings.

Instead, this emergence of a social premium on savings in OECD countries also saw the growth of large fiscal deficits in many OECD countries (see Fig. 3). The decomposition of these deficits into their cyclical and structural components is controversial, as it requires a judgment on the current (not historical) natural rate of unemployment. However, even in terms of conventional accounting, in the 80s, the fiscal deficits in some OECD countries (particularly in the U.S.) have an increasing structural component (see Fig. 4). It is to the causes and implications of these structural deficits that we now turn.

I.2. The Financing of Social Expenditures, Budget Deficits and "Crowding Out"

The implications of the rising budget deficits in OECD countries is best seen by their relationship to the gross domestic savings in the area over time. In 1970, OECD budget deficits absorbed less than 1% of gross savings; by 1975 this had risen to 44% and by 1983 to nearly 52%. The relationship with respect to the more nebulous notion of net savings was even worse (see Fig. 5). The resulting crowding out of private expenditures, particularly investment, that this public draught on available domestic savings represents is the most serious long term trend in these countries. We explore its implications for the global savings-investment balance, and world interest
rates, and thereby the effects on developing countries in the next few sections.

A substitution of public for private uses of available domestic savings in itself poses no problem if the social value of these alternative uses is equated at the margin. There are some grounds, however, for questioning if this is currently the case.

(a) Social Expenditures

The increased pressures on budgets is due to increases in expenditure (representing improved levels of benefits as well as extensions in their coverage) on social security (public pensions) and public health provision (see OECD (1984), Hakim & Wallich (1984)). These expenditures are the equivalent of providing public insurance for expenses incurred on private illness and the possibility of fluctuations in income over the life cycle. They thus provide wealth holders with an asset (whose 'value' is equal to the present expected value of the programmed benefits) which is a substitute for private capital in their portfolios. If these public enticements were funded through the accumulation of public capital, whose efficiency were no worse than that of private capital, the publicly provided capital asset would purely substitute for a privately provided one in the portfolio of wealth holders. There would be no adverse effects on the overall savings-consumption balance, the long run capital stock and intertemporal welfare of the economy.

However, most of these social insurance type expenditures in OECD countries are funded through 'pay as you go' schemes, which tax current workers, in order to provide transfers of entitlements to the old and the sick. The reduction in the privately held capital for these insurance purposes is not then matched by any offsetting capital accumulation by the
government. It can be shown (see L. Johnson and others) that 'pay as you go' social security systems can substitute for physical capital in private portfolios and thus reduce the long run equilibrium capital stock, if the size of bequests left by one generation to the next is not subject to economic choice and each generation does not put the same weight on its children's welfare as on its own. If, however, each family is linked to the infinite future because of an altruistic concern for their children, who in turn are concerned about the welfare of their children..., then in effect we have a one consumer 'infinite horizon' model of the choice of the optimal intertemporal time path of consumption. Once this is chosen--given technology and tastes--a government enforced intertemporal transfer will have no effect on the optimal choices of these infinitely lived consumers, (if capital markets are efficient). Private actions will completely offset public ones to yield the same intertemporal outcomes with or without a 'pay as you go' insurance scheme.

However, there may be various reasons why this link between the present and the infinite future may be snapped: e.g., some consumers may have tastes which do not make it optimal to leave any bequests; some consumers may plan not to have any children; consumers may not care at all about the welfare of their children; there may be capital market imperfections, most importantly due to the difficulty of borrowing against human capital. Then the effect of increased social security wealth on reducing savings and thence the long run equilibrium capital stock will be reintroduced. Unfortunately the empirical evidence on the effects of social security on savings is inconclusive (see Feldstein, Thompson) but there would seem to be some support for some reduction in savings resulting from increased social security payments.
(b) **Bond Financing of Fiscal Deficits**

Besides this 'wealth illusion' effect on savings of recent public expenditure increases financed by taxation on the working population, there is a further reason for concern. Typically, increased expenditures are being funded in many OECD countries (particularly the USA) through bond financed budget deficits, with further distortionary effects on the savings-consumption balance in OECD countries. For, besides current taxation, there are essentially only two other ways of financing the increased social expenditures—through the seigniorage of printing money, or through bond financing and the implicit future taxes needed to pay the interest on a growing stock of public debt. It has been argued (Barro, Friedman) that, the effects of public spending on the consumption-investment balance in the economy is fully measured by the level of public expenditure. The form of financing, either through explicit taxation or the hidden taxes of inflation (associated with the printing of money) or borrowing from the public (bond financing) is immaterial. This so-called Ricardian equivalence theorem concerning debt neutrality is based on assumptions very similar to those which yield the result that 'pay as you go' social security systems have no effect on the level of savings. This Modigliani-Miller theorem for public finance states that there will be no difference in the effects of tax or bond financing on savings as every wealth holder voluntarily negates the involuntary intergenerational transfer associated with bond financing by reverse changes in intergenerational bequests. As before, if for some reason this private intergenerational link is weak, or else the public suffers from some form of "debt illusion" and considers government bonds as part of its net wealth, then the expansion of the interest bearing public debt will lead to a substitution of bonds for real capital in their portfolios, and thence to a
decline in aggregate savings and the long run capital stock. Though again the econometric evidence is equivocal, Tobin and Buiter's conclusion on surveying it is that: "on the basis of currently available theoretical models and empirical evidence our provisional conclusion is that the case for debt neutrality is not well established." (p.58). The most recent, empirical test of the hypothesis by Koskela and Viven for nine OECD countries for the period 1964-1979, seems to reject the debt neutrality hypothesis convincingly, as does our own test in the fifth part of this paper.

Thus, at this stage, we may tentatively accept two links in our chain of reasoning concerning the global economy, whilst noting that the evidence for them is equivocal. First, the expansion of social security and other social insurance type schemes in 'pay as you go' systems will tend to diminish domestic savings. Secondly, the financing of this increased public expenditure through bond financing rather than through taxation is further likely to crowd out private investment, and reduce the long run capital stock of the economy, thereby further raising the social premium to be attached to savings in OECD countries.

There are a further set of problems connected with the funding of higher social expenditures through bond financed budget deficits. These concern their effects on inflation. The stock of bonds cannot grow faster than the rest of the economy, ad infinitum. If the public, noticing a sustained excessive growth in the stock of bonds, anticipates a future switch from bond financing to monetization of the deficit, long term inflationary expectations and current inflation will increase. (Sargent and Wallace (1981)).
I.3. The Global Capital Market and Real Interest Rates

The discussion up to this point, has implicitly been within the context of a closed economy; we now relax this assumption. The increased worldwide financial integration of the 1970s was aided and accompanied by the general movement to flexible exchange rates and the concomitant removal of exchange controls in most OECD countries. This has meant that in the 1970's capital movements themselves became a major determinant of exchange rates, which were determined as much by national savings and investment balances, and the portfolio choices of international lenders, as by the underlying 'real' trade balances of the respective national economies.

(a) Global Financial Integration

In the resulting relatively integrated international financial market, it is most useful for our purpose to consider a closed world economy, where (to maintain flow equilibrium) the ex ante global savings-investment imbalances are mediated through changes in world interest rates which lead to an ex post equality of global savings and investment. Furthermore, as a useful simplification we can aggregate countries into three 'regional' aggregates in the world economy--the industrialised world (OECD), the oil exporting countries (OPEC) and the oil importing developing countries (LDCs).

Historically most capital flows have been from developed to developing countries. In the 1970s however, OPEC countries emerged as major suppliers of capital to the world economy, as a result of the rise in the financial surpluses flowing from the two oil price rises in that decade. Whereas till 1974, the major sources of external capital for most developing countries were official capital transfers and direct foreign investment, the recycling of the OPEC surpluses reopened the market for commercial credit to them for the first time after their defaults in the 1930s.
Given the historically low interest rates (whose determinants we discuss below) during the mid 1970s, it was reasonable for many developing countries to borrow from abroad to finance investment and even consumption. The accumulated debt, however, became a problem when after the second oil price shock and the unexpected tightening of monetary policy in the USA, real interest rates instead of remaining at their previous low levels increased to historically very high levels. This was a major cause of the debt crisis.

In explaining this divergent behavior of real interest rates after the two oil shocks it is important to chart the trends in global savings and investment balances in the 1970s, as well as in the three regions, as there have been important changes in their capital importing and exporting status during the 70s.

These changing regional balances between savings and investment, in turn reflect the effects of particular public policies, primarily fiscal and monetary policies. Table 2, provides a rough indication of regional and global savings during the 1970s.

(b) Trends and Determinants of World Interest Rates

What then explains the behavior of real interest rates during the 1970s? In a perfectly competitive economy, where all taxes were lumpsum and there was no money illusion, the real interest rate on financial assets would equal, (i) the cost of capital to the firm and thence the marginal productivity of capital; and (ii) the real return to savers. If the underlying technology (marginal productivity) and tastes (rates of time preference and degrees of risk aversion) remained unchanged, then the nominal interest rate would rise by the rate of inflation leaving the real rate of interest unchanged (Fisher neutrality of inflation on interest rates).
Feldstein, however, emphasised that there are various aspects of the interaction of existing income and corporate taxes with inflation which work against the Fisher neutrality hypothesis. Generally, inflation distorts the measurement of profits, interest payments and capital gains. The provision in most income tax codes for the deduction of mortgage interest and other nominal interest payments to derive taxable income introduces a bias towards the expansion of consumer debt and increased demand for housing and against physical capital formation during an inflation. The corporate tax treatment of depreciation, limiting it to the original or "historic cost" of the firm's capital stock causes the effective tax rate on corporate income to rise with inflation, as the real value of depreciation allowances is reduced.

Similarly firms which use FIFO inventory accounting will be reporting mythical profits with inflation, as they will be deducting the acquisition and not, the replacement cost of inventories. (See Feldstein, 1983 for these and other arguments). For all these institutional reasons the Fisher neutrality hypothesis may not hold.

The historical evidence (surveyed for instance for the U.S. in Summers (1983), for short term interest rates) does not support Fisher neutrality. But nor does it support the Feldstein position unequivocally. Nominal interest rates have exhibited both greater than and less than unitary response to inflation in different periods.

Wilcox (1983) has attempted to develop and test a model for U.S. short term rates for the period 1952-1979, in order to explain the low rates in the early 1970's, and mutatis mutandis the higher rates in the late 70's. He emphasises the important interactions between the supply shocks flowing from the changing relative prices of primary commodities (particularly energy) and changes in expected rates of inflation during the post-war decades.
The energy shock's main effect was to reduce the net demand for capital, as many studies (e.g. Hudson & Jorgenson) have found empirically that energy and capital are "co-operative" in production. This is also borne out by the dramatic fall in the growth rate of investment and its share of total output in industrial countries after relative energy prices rose by about 60% in 1973. Thus, ceteris paribus, the negative supply shocks of the 1970's would have reduced real interest rates.

By contrast, till 1973, the industrial countries were faced with a positive supply shock flowing from a fall in the relative price of primary commodities, mainly energy. Between 1950 and 1970, for instance, the relative price of Saudi crude declined by 55 percent. This put upward pressure on the real interest rate as the positive supply shock would ceteris paribus, raise the net demand for capital.

Against this, the steadily rising expected inflation rate put downward pressure on real interest rates. The net effect was dominated by the positive effect of the favorable supply shock, and so there was a marginal rise in real interest rates. In the 1970's the negative supply shock reinforced the downward pressure on real interest rates flowing from an acceleration in the expected inflation rate. So real interest rates became negative.

To these factors we need to add the shifts in global savings balances that occurred as a counterpart to the oil price rise. The rise in OPEC savings was matched by falls in savings in the other two regions, so that there was no marked deterioration in the overall global savings rate; but as there was a shift in the international distribution of income towards a region with a higher ex ante savings rate, this in itself would ceteris paribus have put downward pressure on real interest rates.
But that was not all, in many industrialised countries particularly the U.K. and U.S.A., there was an inflationary explosion, which yielded substantial revenue from the inflation tax to cover the public sectors' borrowing requirements. This inflationary tax hit public debt holders particularly hard. In the U.K. the public debt in real terms was reduced by half (public debt to GDP ratio was 95% in 1970 and 58% in 1979), even when nominal debt was rising to cover the actual public sector deficit (see Hakim & Wallich (1984). As governments were able to extort the inflation tax from bondholders in the mid 1970's it would appear that the inflation was unanticipated by the capital markets.

Whilst these factors—a decline in the marginal product of capital, and hence demand for investment at a time when global savings did not fall markedly; a rise in the expected rate of inflation; the success in recycling the OPEC surpluses to finance the increased public expenditure needs of industrialized and many developing countries—all led to historically low real rates of interest, what explains their subsequent rise?

The supply factors, particularly changes in the real price of energy in the early 1980s and other primary commodities exerted a favorable supply shock in OECD countries, which ceteris paribus could have been expected to raise real interest rates. In addition, the disinflationary policies which most industrial countries had to pursue meant that expected inflation fell, and this would also ceteris paribus have put upward pressure on real interest rates. But there was a third factor of some importance, which though speculative may be of some importance, namely that the inflationary expropriation of bondholders in the 1970s reduced (if it did not completely remove) money illusion in capital markets. Thus from Figure 5(a) it would appear that till 1980 expected inflation in the U.S. was below the actual, but
this pattern has since been reversed. This has meant that subsequently, the actual budget deficits (particularly in the U.S. and U.K.) could not be financed by the inflation tax. But this in turn means money would have to remain tight, putting further upward pressure on short term rates. Meanwhile the loose fiscal policy reflected in large budget deficits would need to be financed through borrowing. The resulting "crowding out" of private expenditures could also be expected to exert pressure on real interest rates, if for no other reason than that as the share of government debt in private portfolios rises, it will only be held at a lower price (that is higher interest rates). Moreover, taking account of the argument that bond financing of growing public expenditures may worsen expectations of future inflation, lenders fully cured of money illusion may now be including a risk premium to cover the future possibility of another inflationary upsurge, as governments unable to finance further public expenditures (including a increasing interest rate burden on the growing public debt) in the future maybe forced to monetise the resulting budget deficits.

4. Third World Debt, Infrastructural Investments and Fiscal Deficits

The final link in our chain or reasoning, concerns the public finances in developing countries, and the role of foreign borrowing in development.

Historically, (see Lewis (1978)) the flow of international capital has not necessarily been from rich to poor countries, nor from those with high to those with low domestic savings rates. In the 19th century, per capita income was higher in the major borrowing (U.S.A., Australia, Argentina) than in the lending countries—UK, France, Germany. The major determinants of
foreign borrowing were differences in rates of population growth and the associated urbanisation. (Lewis (1978), p.39).

Urbanisation is expensive in terms of capital because of the capital intensity of urban physical and social infrastructure, which requires both more highly priced labour as well as more capital per unit of provision than similar rural infrastructure. Because of its public goods characteristics, this infrastructure is usually publicly provided. The resulting positive link between the growth of public expenditure and urbanisation is a well-documented statistical relationship in both current developed and developing countries. (see Tait & Heller (1982), Mitra (1978), Lluch (1984)).

These items of public expenditure in developing countries, differ from the health and social security related ones in developed countries in being complementary to other inputs in the production process. They thus raise the long run productivity of the economy, as compared with the pure transfer type effects of developed country social expenditures on the health care and pensions of the "aged".

The financing of this expenditure need not pose a problem for the government if domestic savings are sufficient, and can be mobilised by governments in the form of tax revenues. Most developing countries have raised domestic savings rates steadily since the fifties (see Lluch (1984)). The exception is Africa, where having peaked at about 15 percent at the end of the 1960s, domestic savings rates have collapsed in the 1970s.

Though taxes have also been raised in many developing countries, these have proved to be insufficient to meet the rise in public expenditure; which has been financed instead by covert taxation usually in the form of the 'inflation tax', particularly in Latin America (see Sjaastad et.al. (1984) and Harberger & Edwards (1980)).
The opening up of the commercial loan markets to developing countries in the late 1960s, and the availability of cheap and plentiful commercial credit after the 1973-4 oil price rise allowed a rising proportion of their growing public expenditure and incipient fiscal deficits (particularly in Latin America) to be financed by commercial borrowing rather than the inflation tax (see Sjaastad et. al. (1984)). With low and even negative rates of interest on the loans, it was not imprudent to borrow to finance even public consumption as the real rates of interest were likely to have been below the country's social rate of time preference, assuming that the decision was based on taking adequate account of risk and future ability to repay the loans. Though there was undoubtedly some waste involved in the public investments financed by foreign borrowing, by and large much of the public investment is likely to have had social rates of return above the real cost of borrowing (see Sachs (1981)).

Problems arose because most of the borrowing was made by countries with weak fiscal systems through commercial bank loans of short maturity and with a floating rate of interest. If the world environment had been stable and real interest rates had remained at their mid 1970s levels, or the government had complete fiscal control, the uses (on long gestation projects or on consumption) to which the borrowed funds were put could have been justifiable. If the loans could be rolled over (as they were for a time) at relatively low real interest rates, both public consumption and, of course, investment would have been justifiable, even if the government's fiscal powers were weak.

The changes in world capital markets in the late 1970s, however, exposed the fiscal weaknesses in the major borrowing countries. The liquidity crisis precipitated by the Mexican government's inability to continue debt
service in 1982, was essentially a crisis of confidence in the ability of the public sector in many borrowing countries to generate the requisite net resources (through either cutting back public expenditures or raising taxation) to meet the rising cost of public debt service. The resulting rise in the incipient public sector deficits was once again financed by levying the inflation tax (see Sjaastad et. al.). At the same time attempts were made to cut back public expenditures, usually by cutting back on the infrastructural public investment which in the long run is necessary for the development of their economies.

We thus have an interrelated global economy where the financing of public expenditures in both developed and developing country impinges on the pool of global savings and thus world interest rates. The next part formalises and integrates this aspect of global interactions with the conventional interrelationships through the terms of trade between developed and developing countries.

II. A MODEL OF GLOBAL CROWDING OUT

II.1. Model Description

1.1 Model Structure and Estimation Results

We use a simple three region - three commodity model with each region completely specialized in the production of its "own" good. The three regions are OPEC, which only produces oil, and the OECD and LDC’s, each of which produce a final good consumed by all others. There is, by assumption, no direct consumption of oil and no use of oil at all in OPEC itself, but LDC’s and the OECD use oil as a factor of production.

(a) The OECD
Consider first the OECD block of the model. With Cobb-Douglas technology we can write output supply (measured by GDP) as function of the real product wage WOE, the real price of oil in terms of OECD goods, PROIL, the capital stock KOE and the rate of technological progress ρ:

\[ XOE = C_0 e^{\rho WOE} PROIL^{C_2} KOE^{C_3} \]  

(1)

Estimation of (1) after taking log differences gives:

\[ \Delta \log XOE = -0.14 \Delta \log WOE - 0.03 \Delta \log PROIL + 0.02 \Delta \log KOE + 0.038 \]

(0.47) (1.28) (0.47) (2.42)

\[ r^2 = 0.301 \]

The derived demand for oil imports, OILOE, can be similarly derived and will depend on output and the real price of oil in terms of OECD goods:

\[ OILOE = e^{C_21 \times XOE^{C_22} \times PROIL^{C_23}} \]  

(2)

which, when estimated in loglinear form, gives:

\[ \log(OILOE) = 4.65 + 0.49 \times \log XOE - 0.20 \times \log PROIL \]

(1.39) (2.31) (6.18)

\[ r^2 = 0.891 \]

Neither equation presents surprizes. Output depends negatively on real product wages and the real price of oil and positively on the capital stock; the rate of technological progress is estimated at 3.8 percent, not an unreasonable number. Real oil imports depends positively on output but negatively on the real price of oil.

1/ The figures in brackets are t statistics. It should be noted that, the insignificant and low value of the log KOE parameter reflects the productivity slowdown in the 1970's. As a result, the implicit production function for OECD countries estimated above cannot be used to make projections into the future.
Real tax revenues are a function of real output:

\[
TAX = -213519 + 0.23 \times XOE \\
(2.03) \quad (12.7) \\
\hat{r}^2 = 0.953
\]

Private consumption depends on the real interest rate and real disposable income. This is the first place where crowding out issues arise. If the private sector is completely indifferent between different ways of financing the deficit, i.e., if a strong version of the Ricardo equivalence theorem holds, disposable income equals income minus government expenditure, giving rise to the following consumption function:

\[
PCON = -28717 + 0.85 \times YDNC + 7779 \times RRATE \\
(0.86) \quad (11.7) \quad (0.77) \\
\hat{r}^2 = 0.961
\]

where \( PCON \) is real personal consumption, \( GCON \) and \( CINU \) are real government consumption and investment respectively, \( RRATE \) is the real interest rate and \( NCO \) stands for No Crowding Out, and disposable income \( YDNC \) equals GDP plus interest earnings on foreign assets minus government expenditure:

\[
YDNC = XOE + RRATE \times FAROE(-1) - GCON - GINV.
\]

If however the private sector does not recognize that bond issues give rise to future tax liabilities with a discounted value equal to the value of the issue, then a proper measure of disposable income is income minus tax revenues, giving rise to the following private consumption equation:

\[
PCON = -433675 + 0.86 \times YDC + 11442 \times RRATE \\
(-1.8) \quad (17.1) \quad (1.7) \\
\hat{r}^2 = 0.981
\]

where \( CO \) stands for Crowding Out.
Here disposable income is defined as:

\[ YDC = XOE + RRATE \times FAROE(-1) - TAX - OIL \times PROIL \]

This suggests a natural test of whether there is crowding out or not: by including income minus government expenditure (YDNC) and government expenditure minus tax revenues in the equation, 4 - NCO and 4 - CO become special cases: if the coefficient on the government deficit equals zero, 4 - NCO is relevant, but if it equals one, 4 - CO comes out. In other words, if the coefficient is not significantly different from zero, crowding out is not a problem; if it is not significantly different from one, crowding out is a problem. The results when we ran this regression were:

\[
\begin{align*}
PCON &= -509700 + 0.65 \times YDNC + 1.72 \times (GCON + GINV - TAX) \\
&\quad (2.43) \quad (19.7) \quad (3.67) \\
&+ 15938 \times RRATE \\
&\quad (2.48) \quad r^2 = 0.989
\end{align*}
\]

Clearly the coefficient on the deficit is significantly larger than zero but not significantly different from one at normal confidence levels (for example 5%). This clearly demonstrates that crowding out is a problem, the data do not support the Ricardo equivalence theorem.

We could finish the OECD block by running an investment equation, and derive the Current Account as the difference between aggregate savings and investment; instead we choose to go the other way around and use a current account (CA) equation which will, after the appropriate substitutions, give us investment.
In the No Crowding Out case, the CA is independent of the government deficit. We accordingly ran the following equation:

\[ \text{CAROE} = -6916 + 0.023 \times \text{XOE} + 4998 \times \text{RRATE} - 158047 \times \text{PROIL} \quad (6-\text{NC}) \]

\[ r^2 = 0.666 \]

which shows a positive dependence on the real interest rate and GDP, and a strong negative dependence on the real price of oil (in terms of OECD goods).

The Crowding Out version should depend on the deficit, which gives us an equation like the following:

\[ \text{CAROE} = 11128 + 0.03 \times \text{YDC} + 4056 \times \text{RRATE} \quad (6-\text{CO}) \]

\[ r^2 = 0.688 \]

Finally we have to make an assumption on the share of total OECD expenditure falling on OECD goods. We assume that investment uses OECD goods only, while the consumption share will depend on relative prices:

\[ \text{ADOE} = \text{INVOE} + 0.95 \times (\text{PRLDC})^{\text{DEOE}} \times (\text{PCON} + \text{GCON}) \quad (7) \]

Investment INVOE can be obtained from the savings minus investment equals the current account identity:
INVOE = TAX - GCON + YDC - PCON - CAROE \quad (8)

\begin{align*}
\text{gov. savings} & \quad \text{private savings} \quad \text{(current acc.)}
\end{align*}

### 1.2 OPEC

The OPEC part of the model is more simplified than the OECD part. In particular, we do not distinguish between the government and the private sector, but look at aggregate income, savings, and expenditure. OPEC sets the price of oil in terms of OECD goods, \(\text{PROIL}\), as a policy variable and supplies all oil demanded at that price. Accordingly, the income equals:

\begin{align*}
YDOPEC &= \text{PROIL} \times (\text{OILOE} + \text{OILLDC}) \\
&\quad + \text{RRATE} \times \text{FAROPEC(-1)} \\
\end{align*} \quad (9)

where \(\text{FAROPEC}\) represent the value of net claims on the rest of the world (in terms of OECD goods).

Net savings and investment behaviour is summarized in a Current Account equation:

\begin{align*}
\text{CAROPEC} &= 18128 + 0.31 \times YDOPEC + 4513 \times \text{RRATE} \\
&\quad + (1.52) \\
\end{align*} \quad (10)

Simple accounting then gives us total OPEC expenditure \((YDOPEC - CAROPEC)\), all of which is assumed to fall on OECD goods:

\begin{align*}
\text{ADOPEC} &= YDOPEC - CAROPEC \\
\end{align*} \quad (12)

Finally, the current account equals net foreign asset accumulation:

\begin{align*}
\text{FAROPEC} &= \text{CAROPEC} + \text{FAROPEC(-1)} \\
\end{align*} \quad (13)
1.3 The LDC's

LDC output is introduced as an exogenous trend, mainly because the lack of good factor price and capital stock data precludes explicit estimation of an aggregate supply curve. The parameters were obtained by running log of real output on a time trend:

\[ XLDC = \exp(14.3) \times \exp(0.05 \times \text{time}) \]  
\[ r^2 = 0.986 \]  

The LDC current account equation performs remarkably well:

\[ CAFLDC = -170559 + 5606 \times (\text{RRATE} - \text{CHCORR}) \]  
\[ (2.02) \quad (3.20) \]  
\[ + 0.07 \times \text{YDLDC/PRLDC} - 42940 \times \text{PROIL/PRLDC} \]  
\[ (0.87) \quad (.74) \]  
\[ r^2 = 0.693 \]  

CAFLDC is the real CA surplus in terms of LDC goods, YDLDC/PRLDC is real LDC income in terms of LDC goods and PROIL/PRLDC is the real price of oil in terms of LDC goods. The variable CHCORR measures the influence of gradual relative price changes on the real cost of borrowing:

\[ \text{CHCORR} = \frac{\text{PRLDC} - \text{PRLDC}(\text{-1})}{\text{PRLDC}(\text{-1})} \]  

LDC income (in terms of OECD goods) equals (14) minus real interest payments on foreign debt and minus the value of oil imports:
LDC expenditure can be obtained by combining (14) and (15); we assume zero price elasticity in LDC demand for OECD goods, which, when combined with (14) and (15) gives us LDC demand for OECD goods:

\[ ADLDC = SCLDC \times (YDLDC - CAFLDC \times PRLDC) \]

Oil imports are a linear function of output, time and the real price of oil.

Finally, increases in debt equal the current account deficit (or, as defined here, increases in net foreign assets equal the CA surplus:

\[ FARLDC = CARLDC + farldc(-1) \]

1.4 Closing the Model

The two main endogenous variables are the world rate of interest and the OECD/LDC terms of trade, RRATE and PRLDC. PRLDC is defined as the LDC's final goods terms of trade with respect to the OECD.

The model is closed by requiring OECD goods market clearing:

\[ XOE = ADOE + ADOPEC + ADLDC \]

and by requiring that the world current account equals zero:
\[ \text{CAROE} + \text{CAROPEC} + \text{CAFLDC} = 0 \]  

(19)

Loosely speaking, (18) determines relative prices and (19) ties down the world interest rate.

1.2 A Simple diagrammatical analysis of how the model works

After suitable substitution in the above equations we can reduce the model to two basic equations, with two variables, the real interest rate \( \text{RRATE} \) and the LDC/OECD terms of trade \( \text{PRLDC} \).

The first equation says that the world current account should equal zero.

\[ \text{CA}(\text{RRATE}, \text{PRLDC}) = 0 \]  

\[ (+) \quad (-) \]  

(20)

Higher interest rates will lead to an ex-ante world current account surplus, but higher LDC/OECD terms of trade to a deficit since it implies a transfer from high to low savers. We depict that relation in a diagram with \( \text{RRATE} \) on the vertical axis and \( \text{PRLDC} \) on the horizontal one (Fig. 1).

The curve, labeled \( \text{CA} \) in Fig. 6, slopes upward: higher interest rates would lead to an ex-ante \( \text{CA} \) surplus; a terms of trade improvement for LDC's transfers income to high spenders and pushes the world \( \text{CA} \) back down.

The second equation sets excess demand for OECD goods equal to zero (see the curve labeled \( \text{GM} \) in Fig. 6):

\[ \text{GM}(\text{RRATE}, \text{PRLDC}) = 0 \]  

\[ + \]  

(21)

Higher rates push down expenditure and so lead to excess supply; higher relative prices for LDC goods will however shift demand to OECD goods.
and therefore cures the excess supply. This curve therefore also slopes upwards. Stability analysis based on the assumption that an incipient CA surplus pushes down the interest rate and an excess demand for OECD goods pushes up their relative price indicates that the configuration in Fig. 1 (GM steeper than CA) is stable; the other case (CA steeper than GM) is not. We therefore confine our attention to the case given in Fig. 6.

To get a feel for how the model works we will consider the effects of two "shocks" an increase in government expenditure not financed by taxation or, similarly a tax cut, and an increase in the real price of oil.

Consider first the deficit financed increase in government expenditure (cf. Fig. 7).

An increase in government consumption leads to excess demand for OECD goods and therefore shifts the goods market locus to the left. If there is no crowding out, private savings will offset the increased deficit and the CA curve will not shift. This leads to an equilibrium with lower interest rates and deteriorated terms of trade for LDC's. PRLDC goes down because of incipient excess demand for OECD goods; this transfers income from low net savers (LDC's) to high net savers (OECD) and therefore leads to a fall in interest rates (point B in Fig. 7.)

However, if there is crowding out, if private savings are not accommodating the deficit, the world CA will have an incipient deficit which will push up interest rates (CA shifts up). This will, if large enough, lead to an equilibrium as at point C, where the world interest rate goes up and the LDC's terms of trade deteriorate with respect to the OECD. So in the crowding out scenario deficit financed government consumption hits the LDC's twice, both via higher world interest rates and deteriorating final goods terms of trade.
This scenario looks very much like the world situation in the early 1980s.

Consider next an increase in oil prices. Higher oil prices transfer income to OPEC from LDC's and the OECD; OPEC has higher savings propensities than the other two groups, so there is an incipient world current account surplus: the CA curve shifts down (Fig. 8). Supply in the OECD may fall more than demand (although the reverse cannot be excluded), resulting in a leftward shift of GM. If demand falls more than supply, GM shifts to the right.

The first case is given in Figure 8a., the second in Figure 8b.

In all cases the interest rate will fall, but the LDC/OECD final goods terms of trade may either improve or deteriorate. The first scenario seems a plausible description of the aftermath of the oil price shocks of 1973/1974.

II.2 Simulation Runs

The base run of the model tracks the in-sample data remarkably well. (See Figures 9 and 10 which chart the actual and simulated current account surpluses of the three regions and the debt service payments of developing countries).

We next performed two basic policy experiments with the model. In the first one, we added $400 b. (1980 US$) to aggregate government consumption in 1979 and 1980, under the assumption of deficit financing. In the no-crowding out scenario not much happens, see Figures 11 and 12.

Private savings increases substantially to offset the increased deficit (between 7% and 8% drop in private consumption in 1978 and 1980) and a small decrease in private investment (between 6 and 7%), to accommodate the increase in government expenditure.
Accordingly, the CA is not really affected in either of the three countries, and no noticeable change in the interest rate or LDC interest payments on debt result.

The outcome is very different in the crowding out scenario however (the version of the model that was supported by our test above). Now private consumption does not fall, private saving does not accommodate the new deficit and the OECD CA accordingly swings into deficit. To bring the world current account back into equilibrium, there is a 2.9 percentage point increase in the world real interest rate in 1979 and a 2.6 percentage point increase in 1980. This leads to a dramatic fall in private investment, which falls off with a whopping 26.3% in 1979 and 25.8% in 1980. This limits the CA deterioration in the OECD to about 30 billion US$ in both years. There is a dramatic effect on LDC real interest payments on debt which increase by around 24 billion US$ in each year.

On top of that comes a small terms of trade deterioration for LDC's of about half a percent.

Similar results obtain in the simulation runs where we cut the marginal tax rate from .22 to .15. In the no-crowding out scenario there is no effect whatsoever on any variable except tax revenues, since the private sector accommodates one for one by saving the entire increase in disposable income.

The results are very different however in the crowding out version. Private savings do not go up one for one with the result that the government deficit increases, so that incipient CA deficits and excess demand for OECD goods develop.

The terms of trade deteriorate for LDC's (one percentage point); the real interest rate increases between two and 3 percentage points throughout
the period (Figure 13), leading to around a $20 billion dollar increase in real interest payments for LDC's on debt. The OECD current account deficit deteriorates with up to 36 billion US$ in 1980, and somewhat smaller amounts (but always in excess of $16 billion). This in spite of a dramatic slowdown in investment (between 20 and 30% throughout the decade) leading to a cumulative shortfall in capital accumulation of 30% (the 1980 OECD capital stock is 30% below the base run value).

III. A SUMMARY OF THE GLOBAL INTERACTIONS

We thus have arrived at the following interdependent global system where there is a link between the actions and reactions of the public sectors in both developed and developing countries though their effects on world interest rates and the terms of trade of LDC's relative to the OECD. In both sets of countries public expenditure is growing, partly driven by demographic trends—the ageing of a relatively stable population, and the consequent need for increases in public spending on the health and social security of the aged in developed countries; and the 'greening' of a growing population and the consequent need for related increase in human and physical infrastructural public expenditures in developing countries. This growth in global public expenditures in both sets of countries has to be financed.

Increasingly in industrial countries tax resistance which has led to the adoption of indexed income tax systems is going to make it difficult for governments to raise adequate taxes to fund their social commitments. This means, *ceteris paribus*, they will have structural fiscal deficits. If these are financed through bonds, and if private savers do not raise their savings
by the amount of this public dissavings, this increased public expenditure will raise the draft on a given pool of savings and real interest rates will rise, and the LDC's terms of trade deteriorate with respect to the OECD. For a country with a large weight in the world economy such as the US, the rise in domestic interest rates also leads to an appreciation of its currency as a concomittant of the capital inflow that is induced—some of it from developing countries.

In developing countries, given the inherent weaknesses of their fiscal system and the pressure on the public finances flowing from the need for growing public sector infrastructural expenditures, the rise in world interest rates resulting from the structural public sector deficits in developed countries is likely to worsen the Third World's fiscal crisis. Whilst the concomittant deterioration in their terms of trade with respect to the OECD will worsen their external transfer problem. The opportunity cost of financing infrastructural as well as other investments in developing countries would thus have been raised (via the interest rate linkages of the global market for savings) by the growth of transfer payments in developed countries. In an integrated global market for savings, the growth of "old age related" social expenditures in developed countries financed through fiscal deficits is thus likely to crowd out, at the margin, the infrastructural developmental expenditures in developing countries required to provide some of the complementary goods necessary to raise the living standards of their poor, young and growing labor forces.

Moreover, a major reason for the big buildup of debt by many Third World countries was the need to finance rising public expenditures, and the associated incipient fiscal deficits. The debt crisis arose because the rise in interest rates and thence the costs of public debt service exposed the
underlying fiscal weaknesses which the earlier build up of debt by many Third World borrowers had masked. As this rise in interest rates was in part the result of the actual and expected structural fiscal deficits in industrial countries, the current and continuing debt crisis can thus be seen as flowing essentially from a global fiscal crisis, that is a crisis of the public sectors in both developed and developing countries.
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### Table 2

DOMESTIC SAVINGS RATIOS—BY REGION AND TOTAL—LDC, OECD, OPEC

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<td>16.6</td>
<td>19.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Lluch (1984)

T-ER-002
Figure 1

The origins of trade union power.

Fig. 1. Rise of hourly rates or earnings, mostly in manufacturing, in nine countries of OECD, 1960–79, showing change in rate of rise about 1969–70. (Ratio scale: number at end of each curve gives hourly rates or earnings in 1979 (average of first 3 quarters) as relative to 1960 = 100.)

Source: Phelps-Brown (1983)
Figure 2
The Growth of Social Expenditure and Other Public Expenditure: 1960-81
(Averages for the seven major OECD countries)

Figure 3

Seven Major OECD Countries
Budget Deficits as % of GDP

Figure 4

Figure 4
U.S. BUDGET DEFICIT

Savings Rates and Budget Deficits as % of GDP

OECD 1970-1981

Figure 5

Figure 5(a)

U.S. Interest Rate, Inflation and Borrowing
Figure 6

[Graph showing two lines: one labeled RRATE and the other labeled PRLDC. The lines do not intersect.]
Figure 7

Effects of deficit financed increase in government expenditure
Figure 8(a): A dominant supply effect of an oil price shock

Figure 8(b): Dominant demand effect of an oil price shock
Figure 10(a)
REAL INTEREST RATES

Figure 10(b)
DEBT SERVICE PAYMENTS OF LDCs
(Billions of U.S. Dollars)
Figure 12(a)

DEBT SERVICE PAYMENTS OF LDCS
(Billions of U.S. Dollars)

Figure 12(b)

REAL INTEREST RATES
Figure 13

REAL INTEREST RATES

![Chart showing real interest rates over time with two lines: one for base simulation and another for tax cut, CO. The chart has a time scale from 1971 to 1980.]