EMPLOYMENT AND TRAINING PAPERS

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Employment, structural adjustment and sustainable growth in Mexico

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Foreword

The present study on the Mexican employment situation forms part of a set of country studies and sectoral studies to indicate shifts in sectoral output and employment composition during various spells of adjustment efforts in the early 1980s and throws some lights on the employment consequences and sustainability of adjustment efforts under regimes of capital inflows in the 1990s.

This study documents the impact that slow growth since the early 1980s had on the Mexican labour market by comparing Mexico's employment performance to that of other OECD countries through 3 different components, i.e. the labour force participation ratio, occupational structure and output per worker.

The "old" employment components of Mexico's development problem – related to relatively low participation ratios and a relatively high employment share of agriculture – are still there, and remained largely unaffected by the crisis of the 1980s. However, a new employment component has been added, which accounts for the greatly increased development gap and which was the result of a massive increase in underemployment in the tertiary sectors of the economy, which drove down wages for a large part of the population.

Following this analysis, the study raises two sets of questions. First, given the current employment problem and the prospective expansion of the labour force, what are the output and employment growth rates, and the related pattern of structural change, required to prevent a worsening of underemployment and income distribution? Second, given Mexico's debt problems since the early 1980s, what is the output growth rate that would make the path of the debt-output ratio sustainable over time? How much have the medium term growth prospects been changed by the crisis that erupted in late 1994? And how do these growth prospects compare to the investment and external finance requirements associated to the socially necessary growth rate? The author argues that it will remain difficult to maintain financial sustainability and social sustainability at the same time, and regards this as the major challenge for Mexico's economic and social policy-making.

Other studies published in this series deal with employment trends in Brazil and the Philippines, followed by a general study on accounting for economic growth, adjustment and structure change of employment in developing countries.

These studies form part of a project undertaken by the Employment and Labour Market Policies Branch. The project was managed by Rolph van der Hoeven (staff member of the above branch) and Lance Taylor (New School of Social Research, New York). Niall O'Higgins (Employment and Labour Market Policies Branch) provided useful comments.

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1. The employment problem since the early 1980s

In the early 1980s, Mexico was an upper-middle-income country in the midst of a demographic transition. As shown in table 1.1, at that time GNP per capita was about half of the average of a group of high income OECD countries[1] (and over one-third of the US income per capita). The reference to the demographic transition is important. Fast rates of population growth in the past led to very high dependency ratios. Having reached a peak of over 3.5 per cent per year, population growth started a sharp deceleration in the mid-1970s. Since then, the demographic structure has been undergoing dramatic change with an increasing participation of working age groups in the population which has kept a high growth inertia in the expansion of the labour force. The decline in fertility rates and in the dependency ratio were also to contribute to increasing participation of women in the labour market.

Table 1.1 Mexico's development gap in 1980 and 1993

	1980		1993	
	Mexico	OECD	Mexico	OECD
GNP per capita[1]	7.3	14.4	6.8	18.6
	(36.6)	(72.5)	(27.5)	(75.0)
Participation ratio[2]	33.1	47.8	36.7	49.4
Output per worker[3]	22.0	30.1	18.6	37.6
Agriculture[4]	7.2	11.1	5.5	19.1
Industry[4]	21.0	27.4	23.6	42.6
Services[4]	31.8	34.3	22.9	37.0
Employment shares[5]				
Agriculture	27.6	9.5	26.9	5.9
Industry	28.9	34.1	22.0	28.4
Services	43.5	56.4	51.1	65.7
Output shares[6]				
Agriculture	9.1	3.5	8.0	3.0
Industry	27.6	31.4	28.0	32.2
Services	63.3	65.1	64.0	64.7

Notes and sources:

OECD = average of Australia, Austria, Denmark, Finland, France, Italy, Japan, Norway and Sweden.

[1] PPP estimates in thousands of 1993 international dollars. Numbers in parentheses are relative to United States (US =100). For 1993, World Bank, *World Development Report 1995*, Table 30. For 1980, estimates based on GNP per capita growth rates 1980-1993 (*World Development Report*, Table 1).
[2] Labour force/Population. *World Development Report 1995*, Table 25.
[3] Estimated as p = y/r, where y is GNP per capita (line 1) and r is the participation ratio (line 2).
[4] Estimated as $p_j = p.(q_j/l_j)$, where p_j is the sector's output per worker, p is average output per worker (line 3), q_j is the sector's output share and l_j is the sector's employment share.
[5] For Mexico: *ILO Yearbook of Labour Statistics 1995*. For 1980, the large residual category (other and unspecified activities) was allocated using OCED estimates (OECD, 1992; Statistical Annex, Table M). For OECD countries: OECD, *Labour Force Statistics 1973-1993*, 1995 Edition.
[6] *World Development Report 1995*, Tables 2 and 3.

I shall refer to the difference in income per capita separating Mexico from the high income countries in table 1.1, as Mexico's development gap. In a statistical sense, this gap can be seen as

[1] The OECD figures in table 1.1 are (simple) averages of nine OECD countries for which data on PPP estimates of GNP per capita and output shares were readily available in the World Bank's World Development Report. See notes in table 1.1.

the sum of three components:[2] i) the labour force participation ratio, largely attributable to differences in age structure and gender participation rates; ii) occupational structure arising from the fact that the employment share of low productivity sectors is typically larger in developing countries; iii) output per worker in individual sectors (leaving aside differences in occupational structure). We may tentatively think of the sum of the first two elements as the employment component of the development gap, related to demographic and employment composition factors, and of the third component as a pure productivity gap.

Table 1.2 shows the results of this decomposition exercise. To the surprise of the reader (and certainly to that of the author), over two-thirds of Mexico's development gap had an employment component in 1980. This was largely due to Mexico's high dependency ratio (almost half of the gap is related to differences in participation ratios). Still significant, although probably less than in earlier decades, was the difference in occupational structure: over one quarter of the gap, largely due to the still high employment share of low productivity agriculture and a surprisingly low productivity gap in services (together with a relatively low services employment share). This is what leaves less than on- third to be accounted for by a "pure productivity component", arising largely in agriculture and industry productivity differences.

The results can be summarized as follows: had the Mexican economy absorbed the rapidly growing labour force since 1980 while maintaining 1980 levels of output per worker and changing its occupational structure along past trends, it would have largely become a high-income country as its demographic structure and women's participation in the labour market approached those of a typical OECD country. Or to put it in a slightly different way: had the Mexican economy continued to grow at the pace of the previous decade, it would have reached the 1980 income levels of an OECD country by the end of the present decade and the 1993 OECD levels a few years later.[3]

As is well known, it did not. The GDP growth rate sharply decelerated from 1982 onwards and GNP per capita fell at an annual rate of 0.5 per cent from 1980 to 1993. By 1993, its income per capita was only slightly over one-third of that of the high income countries.

Surprisingly, the "employment components" of the development gap shrank (as a percentage of the total gap) during the 1980-1993 period. This was not because the difference in participation ratios dramatically narrowed. There was a narrowing of the gap here but the difference remains very large, as can be seen in table 1.1. Nor was it because of large changes in occupational structure: the employment share of agriculture fell by less than one percentage point. The reason was that, by 1993, a large "productivity gap" had emerged, a productivity gap that, as we have seen, was of minor importance at the beginning of the period.

[2] This decomposition is presented in Bhaduri (1993).

[3] On the following assumptions: a GDP growth rate of 6.3% (the average of 1970-1980), and a population growth rate of 2.3% (the average of 1980-1993).

Table 1.2 The components of Mexico's development gap

	1980	1993
Percentage points due to differences in:		
Participation ratio	45.2	20.0
Occupational structure	26.0	15.5
Output per worker by sector	28.8	64.5
TOTAL	100.0	100.0

Note:

Let y = GNP per capita
r = labour force participation ratio
p = output per worker
p^j = output per worker per sector
l^j = employment share by sector
Subscripts H and M refer respectively to OECD countries and Mexico.

The difference in GNP per capita (y_H - y_M) is by definition:

$y_H - y_M = (r_H - r_M) \,.\, p_M$ (difference in participation ratios)
$+ \; p_H - p_M \,.\, r_H$

The residual is in turn decomposed noting that:

$p_H - p_M = 3 \; (l^j_H - l^j_M) \,.\, p^j_M$ (difference in occupational structure)
$+ \; 3 \; (p^j_H - p^j_M) \,.\, l^j_H$ (difference in output per worker per sector)

Unlike the initial productivity component, the one that developed during the period is not a genuine productivity gap. As can be seen in table 1.1, the fall in output per worker between 1980 and 1993 is largely the result of a dramatic decline in output per worker in services that took place along with a substantial increase in this sector's employment share. What appears to have happened is simply that, as the economy was unable to absorb the new entrants to the labour force into the high productivity sectors of the economy, the expanding labour force found its way into the low productivity activities of the services sectors where, in addition, a decline in hours worked (per worker) must have taken place. This simultaneously increased the employment share of services and reduced the average output per worker of this sector. This phenomenon would probably reveal itself clearly had we been able to adjust productivity for hours worked or had we been able to disaggregate the services sector at a much higher level than we can do here. In that case, the decomposition exercise would probably show that the increased gap in output per worker has a very large employment component, being the result of an increasing employment share of the low productivity activities of the services sector and of a decline in hours worked. It is in this sense that the emerging productivity gap is not genuine. The old employment components of Mexico's development gap - related to relatively low participation ratios and a relatively high employment share of agriculture - are still there, and remained largely unaffected. To them a new employment component has been added, which accounts for the greatly increased development gap and which was the result of a massive increase in underemployment in the tertiary sectors of the economy.

2. The employment problem and the socially necessary growth rate

To address its old and new employment problems, the Mexican economy must grow. At what rate? This is the question to which we now turn. To provide an answer, an expression is derived for the "socially necessary" growth rate. Estimates are then presented for the current and medium term values of this rate.

Employment and output growth by sector

Our analytical framework considers a three-sector decomposition (agriculture, industry, services) of employment and output growth rates. Assuming no open unemployment in the rural labour market,[4] employment growth in agriculture (e_a) can be expressed as a function of the natural rate of growth of the agricultural labour force (l_a) and the rate of labour force transfer (m) from the rural to the urban sectors:

(2.1) $e_a = l_a - m.L_u/E_a$

where m is the rate of labour transfer (expressed as a fraction of the urban labour force, L_u) and L_u/E_a is the ratio of the urban labour force to agricultural employment.

By definition, the growth of output per worker in agriculture (p_a) can be written as the difference between output growth in agriculture (g_a) and employment growth (e_a).

(2.2) $p_a = g_a - e_a$

Substituting from (2.1) into (2.2), the productivity growth rate in agriculture can be expressed as:

(2.3) $p_a = g_a + m.L_u/E_a - l_a$

Assuming a Verdoorn productivity relationship in industry, industrial employment growth (e_i) can be expressed as a function of output growth (g_i) and an autonomous rate of labour productivity growth ($p^a{}_i$):[5]

(2.4) $e_i = \theta \, . \, g_i - p^a{}_i$

where θ is an employment-output elasticity, the Verdoorn coefficient in the productivity function being ($1 - \theta$).

The growth of employment in services, measured in hours worked, is by definition equal to the growth rate (h_s) of hours worked per worker plus the growth rate in the number of workers in services (e_s). The sum of these growth rates ($h_s + e_s$) is also, by definition, equal to difference between the output growth rate for services (g_s) and an autonomous productivity growth rate ($p^a{}_s$) (with productivity measured as output per hour worked). Thus,

(2.5) $h_s + e_s = g_s - p_s$

In what follows, the assumption will be made that changes in the difference between g_s and e_s are reflected in the growth of hours worked (h_s) rather than in the growth of productivity per hour worked ($p^a{}_s$). It is in this sense that $p^a{}_s$ is an autonomous productivity growth rate.

I shall also make here a "constant unemployment" assumption that changes in the non-industrial urban labour force are absorbed by the service sector rather than leading to changes in the rate of urban unemployment. The rate of growth of services employment, measured in number of workers, can then be expressed as:

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[4] The assumption in equation (2.1) can be modified to allow for a constant rate of rural unemployment. The basic property remains: changes in the rate of employment growth are reflected in changes in the rate of labour transfer rather than changes in the rural unemployment rate.

[5] On Verdoorn's law, see Kaldor (1967) among many other references.

(2.6) $e_s = (l_u + m - e_i.E_i/L_u).L_u/E_s$

where l_u is the natural rate of growth of the urban labour force, and E_i and E_s are the number of workers in industry and services respectively.

Substituting from (2.6) into (2.5), the proportional rate of change in hours worked (h_s) can be expressed as:

(2.7) $h_s = g_s - p^a{}_s - (l_u + m - e_i.E_i/L_u).L_u/E_s$

The three output growth rates by sector are linked to the overall output growth rate (g) through the changing pattern in the composition of output demand. Even though these links are far from rigid in an open economy, it seems permissible to derive the "output elasticities" by sector from the assumption that Mexico will follow a "typical" pattern of output composition shifts as per capita incomes increase from current to higher levels. Let $:_j = (g_j - n)/(g - n)$ be the corresponding "output elasticity" for each sector ($j = a, i, s$), where n is the population growth rate. These elasticities link the growth of per capita demand for each sector ($g_j - n$) to the overall rate of growth of per capita output (g - n). The growth rates by sector can then be expressed as a function of the output elasticities, the population growth rate and the rate of per capita output growth:

(2.8) $g_a = n + \mu_a.\ g_n$

(2.9) $g_i = n + \mu_i.\ g_n$

(2.10) $g_s = n + \mu_s.\ g_n$

where g_n is the rate of growth of per capita output (g - n).

The socially necessary rate of growth

The model so far is undetermined and this simply reflects the lack of behavioral relationships. Yet, given the initial conditions regarding the composition of the labour force (the ratios L_u/E_a, E_i/L_u, and L_u/E_s) and the rates of labour force and population growth (l_a, l_u, n), the model has only two degrees of freedom and can thus be solved for the rate of labour force transfer (m^*) and the rate of growth of per capita output ($g_n{}^*$) that fulfill the two conditions that the rate of growth of output per worker is the same in agriculture and services and that hours worked (per worker) in services remain constant:

(2.11) $p_a = g_s - e_s$ (2.12) $h_s = 0$

We shall refer to the value of g_n that satisfies these two conditions as the socially necessary rate of (output per capita) growth ($g_n{}^*$). It is worth noting here that on the assumption $p_s = 0$, $g_n{}^*$ has a simple interpretation (see conditions 2.11 and 2.12): it is that growth rate which generates a sufficiently fast expansion of industrial employment to prevent output per worker from falling in the non-industrial sectors.

We set, for simplicity, $l_a = l_u = l$, where l is thus the natural growth rate of the overall labour force. Substituting from (2.3) and (2.6) into condition (2.11), we can solve for the value of the rate of labour transfer (m) that satisfies condition (2.11):[6]

$$(2.13)\ m = \$ \,.\, ((e_i - l).\, N_i + (g_s - g_a)\,.\, N_s)$$

where $\$ = N_a / (N_a + N_s)$, and:

$N_a = E_a/L_u$
$N_i = E_i/L_u$
$N_s = E_s/L_u$

(2.13) shows that the rate of labour transfer at which output per worker grows at the same rate in agriculture and services, is an increasing function of: i) the excess of industrial employment growth over the natural growth rate of the labour force ($e_i - l$); and, ii) the excess of services output growth over the agricultural output growth rate ($g_s - g_a$). Indeed, a higher rate of industrial employment growth (or a smaller rate of growth of the labour force) tends to increase (given g_a and g_s) output per worker in the services sector at a faster rate than in agriculture. To maintain condition (2.11), this implies a higher rate rate of labour force transfer. Analogous reasoning explains why the value of m that satisfies (2.11) must be an increasing function of ($g_s - g_a$).[7]

Substituting now from (2.4), (2.8) and (2.10) into (2.13), and using (2.9), yields a locus of (m, g_n) combinations along which output per worker in agriculture and services grow at the same rate. The equation of this locus is:

$$(2.13')\ m = f.\, g_n + \$.N_i.(\theta.n - p^a{}_i - l)$$

where $f = \$ \,.\, (N_s.(m_s - m_a) + N_i.\theta\, .m_i)$

This locus can be seen as showing, at each level of g_n, the value of m at which "urban-rural disparities" remain constant. Values of m below the locus fail to fulfill this condition and imply thus that $p_a < g_s - e_s$. A sufficient condition for this locus to slope upwards is $\mu_s > \mu_a$. Indeed, if this last condition is fulfilled, a higher overall growth rate will tend to increase output per worker in the service sector at a faster rate than in agriculture and this requires an increase in the rate of labour transfer (m) - which given g (and thus g_a raises p_a) - in order to maintain the equality between p_a and $g_s - e_s$.

Substituting from (2.7) into condition (2.12), and solving for e_i:

$$(2.14)\ e_i = (1/N_i).(l + m) - (N_s/N_i).(g_s - p^a{}_s)$$

which shows the growth rate of industrial employment that is required to maintain constant the number of hours worked (per worker) in the services sector. This value of e_i, not surprisingly, is an increasing function of the rate of growth of the urban labour force ($l + m$) and a decreasing function of the output growth rate in services (which, other things held constant, tends to increase hours worked per worker in the services sector).

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[6] The derivation of (2.13) also assumes, for simplicity, no open urban unemployment (i.e. it assumes $L_u = E_i + E_s$).

[7] Had we assumed (which we need not in order to derive g_n*) a Harris-Todaro type of migration function, in which migration is an increasing function of urban-rural disparities, equation (2.13) could be interpreted as yielding the equilibrium migration rate (the one that keeps urban -rural disparities constant) for given values of e_i, l, g_s and g_a.

Substituting now from (2.4), (2.9) and (2.10) into (2.14), yields a locus of (m, g_n) combinations along which $h_s = 0$. The equation of this locus is:

$$(2.14')\quad g_n = S.(\,(l + m) + N_i.(p^a_i - \theta.n) + N_s.(p^a_s - n)\,)$$

where $\Omega = 1 / (\theta.N_i.\mu_i + N_s.\mu_s)$

This locus can be seen as showing the value of g_n, at each level of m, that keeps constant hours worked (per worker) in the service sector and thus that prevents urban underemployment from rising. This value of g_n is an increasing function of the natural rate of growth of the labour force (l) and of the autonomous productivity growth rates (p^a_i and p^a_s). Increases in these rates, other things equal, tend to increase underemployment in the services sector and thus a higher growth rate (g_n) is required to satisfy condition (2.12). A smaller population growth rate increases the required growth of per capita output. This is not surprising since in equation (2.14'), we are taking the growth rate of the labour force (l) as given. This is legitimate in a period of demographic transition in which changes in n will be reflected in changes in l with very long lags indeed.

Values of m above this locus fail to fulfill condition (2.12) and thus imply that $h_s < 0$. The locus is upward sloping: an increase in the rate of labour transfer from agriculture raises the rate of growth of the urban labour force and this requires an increase in the output growth rate to prevent urban underemployment from rising.

Eliminating m from (2.13') and (2.14') and solving for g_n yields the following expression for the socially necessary rate of growth ($g_n{*}$):

$$(2.15)\quad g_n{*} =)\,.(\,(l - \$.N_i).l + N_i.\,(1-\$).(p^a_i - \theta.n) + N_s.(p^a_s - n\,)\,)$$

where: $\Delta = \Omega / (1 - \Omega.f)$

It is easily verified, from the definitions of $\$$, f, and Ω given above, that because $\$$ is less than one, Δ is necessarily positive. Expression (2.15) shows that given the initial composition of the labour force, $g_n{*}$ depends on demographic and technological variables together with the output elasticities determining the shifts in the composition of output. In particular, higher natural rates of growth of the labour force (l), faster autonomous productivity growth (p^a_s and p^a_i) and a smaller industrial employment elasticity, all tend to increase the value of $g_n{*}$. It is worth noting that the effect of the population growth rate (given l) on $g_n{*}$ is unambiguously negative. This means that a decline in n, during a demographic transition in which l will remain unaffected (or may even increase for some time), unambiguously increases the socially necessary rate of growth of per capita output.[8]

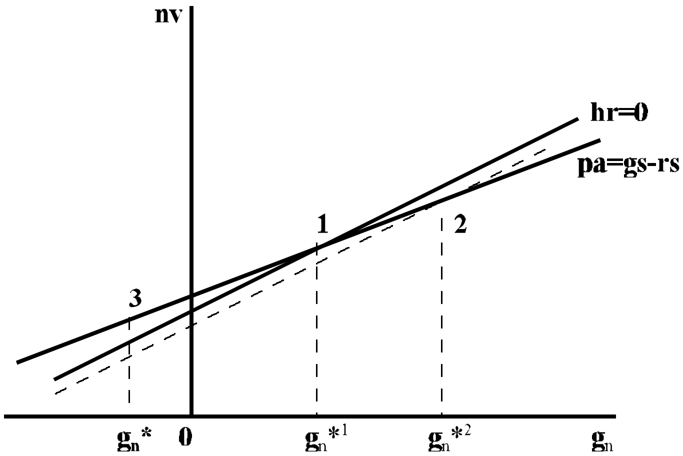
Figure 2.1 illustrates the determination of the socially necessary rate of growth and the aggravation of the employment problem since the early 1980s. Before the economic crisis of the early 1980s, the two loci crossed at, say, point 1 with the corresponding value of $g_n{*}$ being $g_n{*}1$. Suppose, for simplicity, that before 1980 this rate was also the actual growth rate of per capita output (the actual rate may, actually, have been slightly higher). In the 1980-1993 period, two things happened. First, we had the dramatic demographic transition which, in the context of the present model implied a fall in the population growth rate without significant changes in the

[8] The changing composition of the labour force will modify over time the value of $g_n{*}$. It can be verified, for example, that a falling ratio of the agricultural to the urban labour force (N_a) reduces the value of $g_n{*}$ provided that the output elasticity of the agricultural sector is sufficiently low.

growth of the labour force. This implied a downward shift in the $h_s = 0$ locus (corresponding to equation 2.14') which led to an increase in $g_n{}^*$ (to $g_n{}^*2$) along the locus ($p_a = g_s - e_s$).[9]

At the same time, the actual growth rate fell, down to, say, g_n3. Interpreting now the locus $p_a = g_s - p_s$ as showing the equilibrium rate of labour transfer (see footnote 7), the economy moved along this locus down to point 3. The resulting gap ($g_n{}^*2 - g_n3$) generated a massive increase in urban underemployment and the decline in output per worker in services shown in table 1.1. A worsening of urban-rural disparities was prevented by the fall in the rate of labour transfer along the locus, although it was through this fall that the decline in urban living standards was transmitted to the rural areas (leading to the fall in output per worker in agriculture shown in table 1.1). This explains why the rate of labour transfer from agriculture to the urban sectors fell well below past trends (the almost constant agricultural employment share in table 1.1). And why, despite this fall, it remained too high - given the value of g_n (i.e. g_n3) - to prevent a *continuous* increase over time in urban underemployment (point 3 is above the $h_s = 0$ locus).

Figure 2.1



[9] We can ignore, for simplicity, the shift in this locus due to the fall in n since, as we know from our discussion of the effects of n on $g_n{}^*$, this shift could not have offset the increase in $g_n{}^*$. We may note also that, in addition to the effects of the demographic transition, the downward shift in the $h_s = 0$ locus was strengthened by the fall in the employment generating effects of a given rate of industrial growth that took place towards the end of the period (and which is implied in our model by a fall in Θ and an increase in $p^a{}_i$).

Estimates for the period 1995 - 2010

Using (2.15), we now present estimates of g_n* and $g*$ (= $g_n* + n$) for the three five-year periods between 1995-2010. The output elasticities ($\mu_a = .01$, $\mu_i = 1.24$, $\mu_s = 1.0$) were obtained by comparing outputs per capita by sector in Mexico and in a "typical" industrial country (an OECD average). The autonomous productivity growth rates ($p^a{}_s$ and $p^a{}_i$) are assumed to be zero and the industrial employment elasticity is assumed to be equal to the average of the 1988-94 period ($\theta = 0.38$) and thus below the historical average since 1960. The assumption of an employment elasticity below the historical average is suggested also by a comparison with the OECD average (a comparison which, in fact, would suggest an even lower employment elasticity). This set of assumptions is common to the three periods.

Current population projections suggest a continued slowdown of demographic growth rates from around 2 per cent per year in the last five years to 1.8 per cent in 1995-2000 and 1.75 per cent in 2000-2010. Labour force growth rates will also slow down after the year 2000 but will remain well above population growth rates for the entire period. This large gap is accounted for by the increasing share of working age groups in the population and the rising activity rates within each age group, particularly in the case of women (see table 2.2). Labour force growth (assumed equal in urban and rural areas) is thus taken to proceed at annual rates of 3.2 per cent in 1995-2000 and 2.9 per cent in 2000-2010.

The estimates for g_n* and $g*$ and the related changes in the composition of employment are presented in tables 2.1 and 2.2. They show that $g*$ will remain above 4 per cent per year over the next five years (with an associated per capita growth rate of 2.7 per cent). This rate would fall during and after the period stabilizing at close to 4 per cent in 2000-2010 on account of: i) the falling population and labour force growth rates; ii) a declining ratio of the rural to the urban labour force. The only force exerting a positive influence on $g*$, and thus preventing a further decline, is the result of the relatively low industrial employment elasticity. Indeed, this low elasticity accounts for the declining employment share of industry, despite the fact that this sector has the highest output elasticity during the period. This combination (low employment absorption in a sector with a high output elasticity) keeps $g*$ from falling further.

Table 2.1

	1995-2000	2000-2005	2005-2010
g*	4.5	3.9	3.8
n	1.8	1.75	1.75
g_n*	2.7	2.1	2.1
l	3.2	2.9	2.9

Table 2.2

	1995	2000	2005	2010
Employment shares				
Agriculture	27	25	23	22
Industry	22	21	19	18
Services	51	54	57	60
Activity rates				
Average	54	57	-	61
Men	74	76	-	80
Women	35	39	-	43

3. The debt problem and the sustainable growth rate

The economy must grow. But can it grow? This section addresses this question. It first presents a model of growth and debt accumulation in which the steady state values of the debt capital ratio and the rate of capital accumulation are simultaneously determined. The model is then used to discuss the events leading to the recent economic crisis and to assess the sustainability of growth after the recent crisis and devaluation. An appendix gives a full explanation of the equations presented in this section.

The model

The model stands on two legs. One is an open economy extension of Domar's model of debt dynamics. The other is Harrod's warranted growth rate, derived from the (open economy) savings-investment balance and an investment function

Debt dynamics

The proportional rate of change of the debt-capital ratio (M) can be expressed as:

(3.1) $M\^{} = (td - N)/M + (r^* - g)$

where td and N are respectively the trade deficit and the flow of foreign direct investments (net of remittances) expressed as a fraction of the total capital stock, r^* is the interest rate on external debt and g is the rate of growth of the capital stock (and of potential output under the assumption of a constant capital-output ratio). Equation (3.1) simply states that the growth of the stock of external debt ($M\^{} + g$) is proportional to the interest rate on the debt (r^*) and the excess of the trade deficit over the flow of net foreign investment.

Net foreign investment (N) is assumed to be a function of the rate of capital accumulation:

(3.2) $N = f.(g - g_F)$

where g_F is the growth rate at which net foreign direct investment is zero (and, thus, remittances are just equal to gross foreign investment), and f is a positive parameter whose value depends on the foreign share in the capital stock and the parameters of the investment functions of the model.

The trade deficit (td) can be expressed as a function of the difference between the growth rate and that growth rate (g_T) at which the trade balance is in equilibrium:

(3.3) $td = m.(g - g_T)$

where m is a positive parameter since an increase in the growth rate has, through the effects of a higher rate of capacity utilization on exports and imports, a positive effect on the trade deficit. The value of m will be assumed to be greater than f so that an increase in the growth rate raises the excess of the trade deficit over net foreign investment, thus increasing the rate of growth of the stock of debt. This is in agreement with Mexico's historical experience so far, though it is conceivable that with a growing share of foreign investment the assumption may be violated in the future.

Let g^* be the growth rate at which the trade deficit is just equal to the flow of net foreign investment. From (3.2) and (3.3), setting td = ù, this growth rate can be obtained as a function of g_T and g_F:

(3.4) $g^* = (m.g_T - f.g_F) / (m - f)$

which shows that g^* is greater than g_T if g_F is sufficiently low. Indeed, if this is the case, when the economy grows at the rate g_T it will attract a positive net inflow of foreign investment. The rate at which td equals ù will thus greater than g_T.

Substituting (3.2) and (3.3) into (3.1) and using (3.4), we can solve for the steady state value of the debt capital ratio (setting M^ = 0) corresponding to each level of the growth rate:[10]

(3.5) $M = (m - f). (g - g^*)/ (g - r^*)$

which yields a locus of stationary debt ratios, the off-locus behavior of M being governed by equation (3.1).

As shown by equation (3.5), the shape of the locus of stationary debt ratios depends critically on whether g^* is greater or less than r^*.[11] When the interest rate on external debt is relatively low and/or competitiveness is relatively high (in the sense that the economy generates large trade deficits at relatively high growth rates), the condition $g^* > r^*$ is fulfilled and the locus has a positive slope (see figure 3.1). Low debt-high growth combinations are stable in this case and g and M are positively related as the debt growth effects of a higher rate of growth are stabilized (at

[10] As shown in the appendix, g_T, and thus g^*, are a function of the debt-capital ratio. In a more general formulation, the interest rate, r^*, would also be a function of M, on account of an increasing risk premium as M increases. We leave aside both of these influences of M on g^* (which, in fact, tend to cancel out) as well as the effects of M on r^*.

[11] Solving (3.5) for g, and differentiating with respect to M:

$dg/dM = (g^* - r^*). M_c / (M - M_c)^2$ where $M_c = (m - f) > 0$, on the assumption (see above) that $m > f$.

low levels of M, below $M_c = m - f$) by a higher level of the debt capital ratio. In contrast, high debt-low growth combinations are unstable: when the debt ratio is high ($M > M_c$), the debt accumulation process becomes unstable at low growth rates. Indeed, the locus in this region ($M > M_c$) should be interpreted as showing the minimum values of the growth rate that are required to prevent the debt ratio from continually increasing (or, what is the same, it shows for each growth rate, the maximum value of the debt capital ratio beyond which M continually increases). The locus here shows the boundaries of a region of overindebtedness (or of high debt and low growth) in which the stabilizing mechanisms that are present in the high growth region have broken down.

Figure 3.1

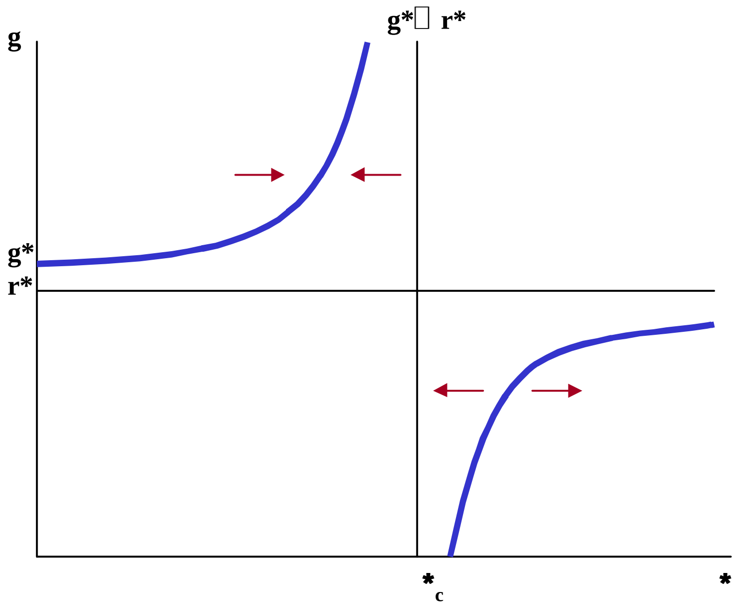
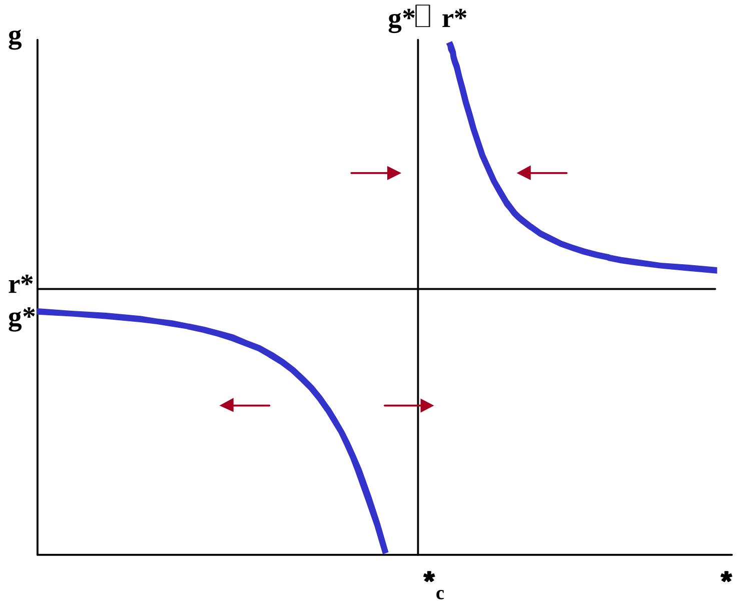


Figure 3.2



When $r*$ is greater than $g*$, due to a high external interest rate and/or low competitiveness, the locus becomes negatively sloped with two regions of low-debt-low growth combinations and high debt-high growth combinations (see figure 3.2). In this case, the low growth-low debt combinations become unstable. The debt ratio and the growth rate are now negatively related since an increase in the debt ratio, given the relatively high external interest rate, requires now a fall in the growth rate to reduce the trade deficit and stabilize the value of M. Because the economy tends to produce relatively large trade deficits at low growth rates (below r*), the maximum amount of debt (beyond which the process of debt accumulation becomes unstable) is now much smaller, at each level of the growth rate, than in the previous case. Overindebtedness now becomes the normal state of affairs. Interestingly, in this case high growth-high debt combinations are now stable: an economy can now reach a high debt steady state but only provided that its growth rate is high enough (in relation to r*, and therefore well above g*) so as to eventually stabilize the growth of the debt capital ratio.

Capital accumulation

So far the rate of capital accumulation has been taken as given. More precisely, the savings-investment locus of stationary growth rates has been assumed to be horizontal in (g, M) space. The equation of this locus is now derived and shown, in general, to generate a downward-sloping locus in (g, M) space.

The endogenous growth rate can be derived, in Harrodian fashion, from an investment function together with the condition of equality between the growth of aggregate demand and productive capacity. As shown in the appendix, this growth rate and the associated value of the profit rate (simultaneously determined) have the same property: the investment forthcoming at that profit rate generates an increase in aggregate demand that just matches the addition to productive capacity of that investment:

$$(3.6)\quad g = (1/(S - a.B)).\ (S.g_c - a.r^*.(S + B.(1\text{-}z).M))$$

where $\Omega = z.\pi.(1 - h) + h.\pi + n$
z = profits savings rate
π = profit share (in output)
h = foreign share in the capital stock
n = (net) propensity to import
g_c = autonomous rate of capital accumulation
a = profitability coefficient in the investment function

Given M, the economy will converge to this growth rate provided that the goods market is stable. The condition for stability is similar to that encountered in Keynesian demand-driven growth models. This is : $\Omega - a.\pi > 0$ (so that the "IS" locus in r*, g space slopes indeed downwards). The economic interpretation is well known: the leakages out of the circular flow of income and expenditure must be greater than the effects of income on induced investment. Indeed, the size of the leakages in this case are given by the propensity to save out of domestic income ($z.\pi.(1 - h)$), profit remittances on foreign capital ($h.\pi$), and the (net) propensity to import (n). $a.\pi$, on the other hand, is the "propensity to invest", the derivative of investment with respect to output in the investment function. If this condition is not fulfilled, Harrod's knife edge problem is not avoided.

As shown by equation (3.6), the endogenous growth rate is an inverse function of the debt-capital ratio on account of the negative effects of a higher M on net national income and domestic consumption (given r*). If, in addition to this effect, a higher M raises r* on account of an increasing risk premium, g falls as M increases as a result of the negative effects of a higher r^* on investment (operating through the profitability coefficient a in the investment function). Even if this last effect is neglected (as we have done in the case of the $\hat{M} = 0$ locus), the first effect implies that the locus of stationary growth rates (given M) will be downward sloping in (g, M) space and thus that the steady state values of M and g will be simultaneously determined.

Two major implications follow from this more general formulation. The first is that paths of increasing debt accumulation will now feature declining rates of growth over time. The second refers to the case in which $r^* > g^*$. For, in this case, a high debt-high growth equilibrium may not exist if the two loci intersect beyond feasible levels of M (of less or equal to 1).[12] Starting from a point in the region of overindebtedness, the economy will move over time on a path of increasing indebtedness and declining growth rates, without ever reaching a high debt equilibrium.

Debt and growth in the Mexican economy: An interpretation

The performance of the Mexican economy in the years leading to the current crisis suggests that the economy was on such a path of increasing indebtedness and sluggish growth. As illustrated by figure 3.4, the nature of the problem was that the value of g^* fell below r^*. The same had happened in the early 1980s. The source of the problem, however, was quite different then. In the early 1980s, it was the sharp increase in international interest rates (with r^* raising above g^* as a result) that put the economy in a situation of overindebtedness. In the recent period, foreign interest rates were comparatively low and declining (up to early 1994). Now, it was a fall in g^* which led to a situation in which r^*, despite being low, turned out to be higher than g^* putting the economy again in a region of overindebtedness and leading eventually to a new crisis. Why did g^* fall?

A major development was the sharp decline in the private savings rate (of around 7 percentage points of GDP) that took place between 1988 and 1993.[13] Through its effects on the trade deficit (see appendix), this contributed to a fall in g_T, the growth rate required to keep the trade balance in equilibrium, and thus to the fall in g^*. The process of structural reforms and macroeconomic adjustment of the past eight years had two relevant effects (one negative and one positive) on this outcome. The joint effects of currency overvaluation and trade liberalization had, in addition to the evolution of domestic savings, a negative effect on g_T. Figure 3.3 illustrates the decline in g_T by showing the large current account deficits that the economy was generating at very low growth rates since 1991-92, despite debt relief and declining external interest rates up to early 1994.

At the same time, foreign investment liberalization did have a positive effect on the net inflows of foreign investment at each level of the growth rate (thus reducing g_F, see Ros, 1995a). These inflows were not large enough to counteract the effects of the fall of g_T on g^* and, thus, to prevent the continuous increase in the debt-capital ratio. The net balance was a sharp fall in g^* that then fell below r^* probably well before the increase in interest rates in early 1994. In any case, this

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[12] A value of one can be assumed to be the maximum value of the debt-capital ratio, on the assumption that foreign lenders will not finance a private sector financial deficit that arises from an excess of consumption over income. The maximum value will in fact be less than one in the presence of foreign investment. In practice, a foreign credit run is likely to take place well before the debt-capital ratio reaches this value at which nationals have fully mortgaged the domestic capital stock.

[13] See Ros (1995a, 1995b) on the subject and the existing literature. This development is poorly understood but it is likely to be related to a profit squeeze created by the combination of trade liberalization and currency overvaluation to which we refer later.

increase further contributed to put the economy fully on a path of slow growth and increasing indebtedness. With a growth rate above g^* and below r^*, the economy generated trade and current account deficits that, given the amounts of external debt, produced a continuous increase in the debt-capital ratio (path g_L in figure 3.4).

With a sufficiently high growth rate, the economy could have moved, in principle, to a new steady state with moderate growth and very high debt levels (path g_H in figure 3.4). It is very unlikely, however, that the required demand policies (in the absence of devaluation or a change in trade policies) would have been feasible. The reasons are that the full capacity growth rate was itself very low (as a result of the decline in the private savings rate) and, with a downward-sloping locus of stationary growth rate, a full capacity growth path would have featured a declining growth rate over time as higher interest payments abroad further crowded out domestic savings. As a consequence, the resulting level of debt in the high debt equilibrium was itself probably too high. Lenders would probably have refused to finance the high debt equilibrium. An exercise, presented in Ros (1994), showed that under optimistic assumptions on the foreign interest rate and the future evolution of the capital output ratio, a 5 per cent growth rate would not have prevented a rapid and continuous increase in the debt-output ratio over the next 15 years.

The crisis, with all its adverse consequences on living standards and income distribution in the short run, may have nevertheless substantially altered the long-term outlook. The size of the real devaluation and the response of exports and imports so far to the exchange rate adjustment suggest that g^* may now be above r^*. This, if correct, has important implications. Demand policies that were previously inviable may now become feasible since a full capacity growth trajectory may no longer imply a path of increasing debt and declining growth rates but rather one of declining indebtedness and recovering growth. Debt-capital ratios that were previously unsustainable if the economy grew at full capacity may now be stabilized at moderately high levels (see path $g_{H'}$ in figure 3.5).

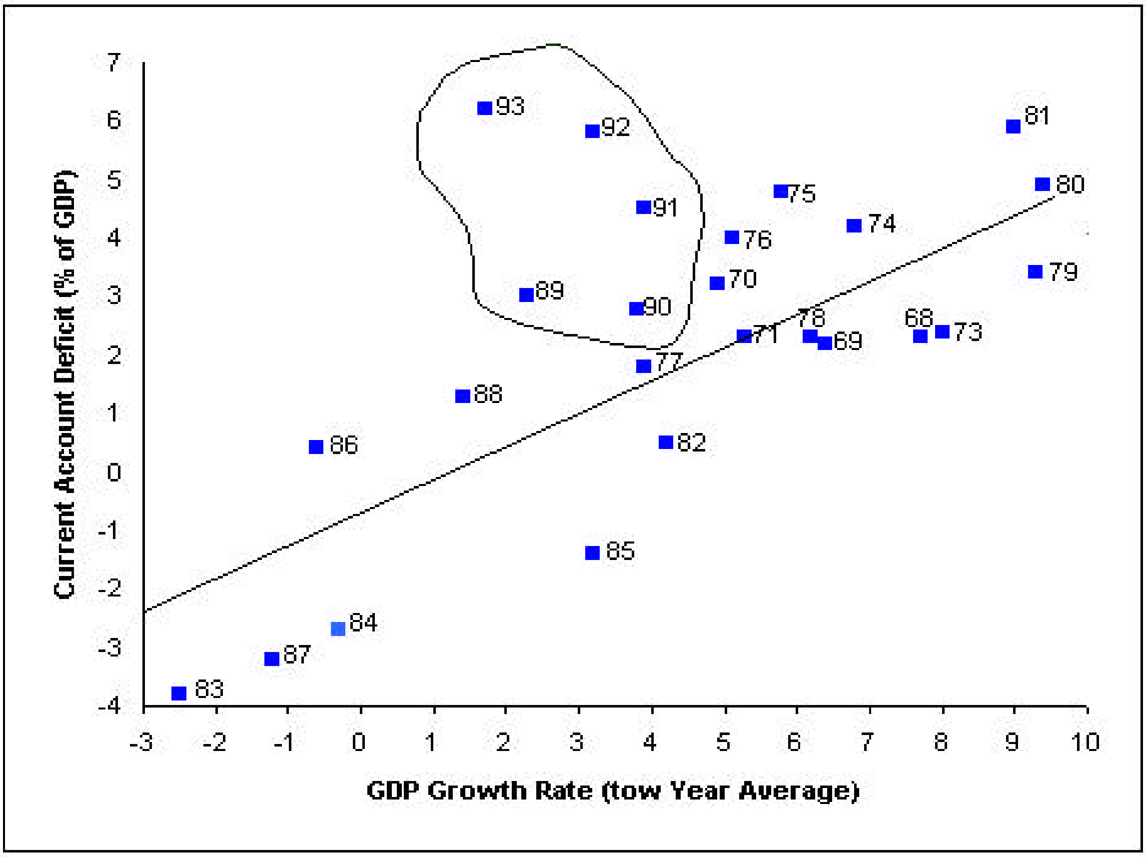
Is the suggestion that g^* has recovered and may now be above r^* correct? It is hard to know at this stage. Two factors, however, lend some credibility to the scenario depicted by figure 3.5. The first is that, given its large size, the real devaluation must have contributed to a partial reversal of the factors underlying the fall in g_T in recent years: the currency overvaluation since the early 1990s and the profit squeeze that may have played a major role in the fall of the private savings rate. The higher real exchange rate may also contribute in the medium term to an increase in foreign direct investment (and a decline in g_F) through its effects on both profitability and the relative profitability of the traded goods sector.[14] The second factor has already been alluded above: as compared with the early 1980s, foreign interest rates remain low. In this setting of a higher g^* (as a result of higher g_T and lower g_F) and a low r^*, policies that ensure full capacity and a high real exchange rate can be successful, if consistently pursued, in promoting a sustained recovery of growth in the Mexican economy. Or, at least, the chances for success are greater than in the 1980s.

Success, however, only means that such a path would be financially sustainable in the sense of reconciling faster growth with declining debt-capital ratios. Social sustainability is a very different matter. Not only because the restoration of higher levels of g^* would have been achieved at a high cost in terms of real wages and living standards. But because such a path is likely to fall short of the socially required rate over the next few years, given the currently high levels of this rate and

[14] Some evidence in favor of this hypothesis is provided in Ros (1995a) which shows positive (although small) effects of the real exchange rate on foreign direct investment.

the newly accumulated backlog of unemployment and underemployment during the present crisis. The assumptions underlying the scenario are therefore not warranted. If, for social reasons, the large real devaluation proved to be unsustainable or foreign interest rates were to increase (as a result of a higher risk premium related to a lack of social sustainability), those assumptions would be falsified by events. A scenario of more radical departures from pre-crisis policies (including a possible repudiation of NAFTA) would then become more credible.

Figure 3.3



Source: INEGI, Estadísticas Históricas de México, Banco de México, Indicadores Económicos.

Figure 3.4

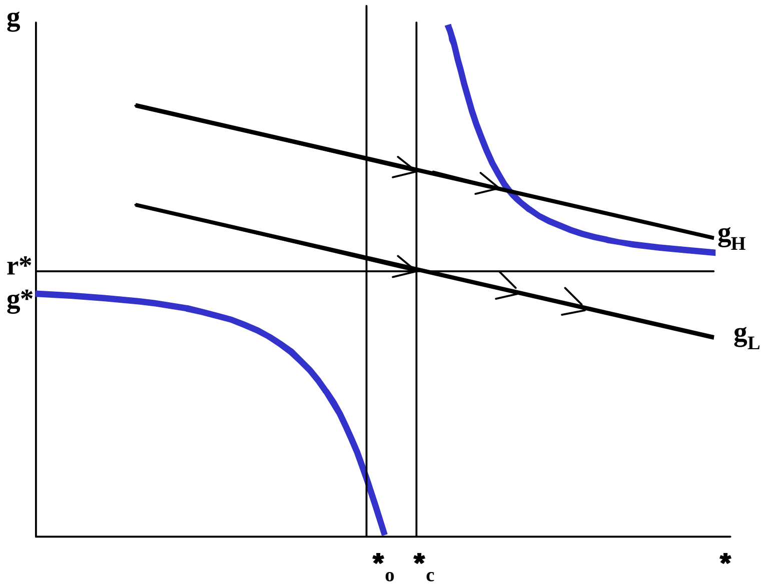
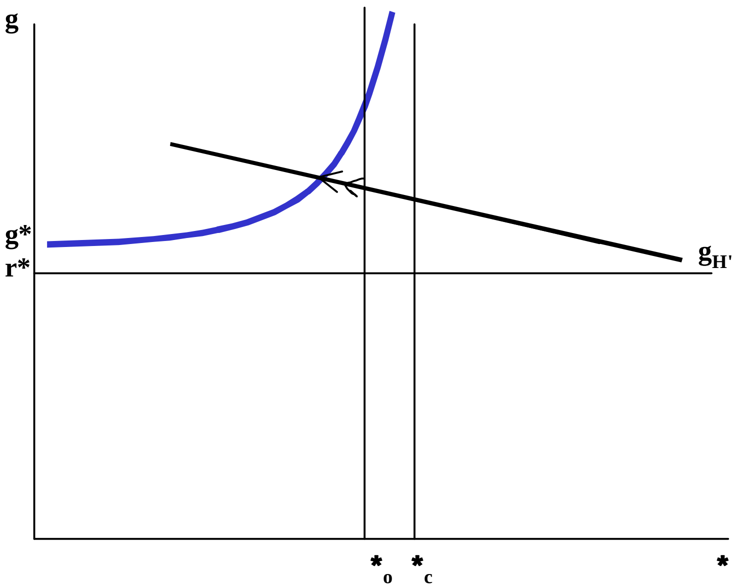


Figure 3.5



Appendix

The key equations of the model are the investment-savings balance (A.1), the financing of the current account deficit (A.2), and the capital accumulation function (A.3). As stated in the text, the model stands on two legs. One is Domar's debt growth equation (3.1 in the text): as shown below, this is derived from (A.2). The other is Harrod's warranted growth rate: this is derived from (A.1) and (A.3) together with the behavioral functions specified below, that are solved for g and r simultaneously.

(A.1) $g = s + td + r.h + r^*.M$

(A.2) $td + r.h + r^*.M = i_F + D\hat{}.M$

(A.3) $g = g_c + a.(r - r^*) \qquad a > 0$

r is the domestic profit rate assumed, for simplicity, to be the same on national and foreign owned capital; r^* is the interest rate on external debt, g is the rate of growth of the capital stock (depreciation ignored), and $D\hat{}$ is the rate of growth of the stock of external debt. All other variables are expressed as a fraction of the capital stock.[15]

Equation (A.1) states thus the equality between investment and the sum of domestic savings (s) and the current account deficit, this last being the sum of the trade deficit (td), profits on foreign capital (the profit rate times the share of foreign capital in the capital stock, h),[16] and interest on external debt ($r^*.M$, M being the debt-capital ratio).

Equation (A.2) shows that the current account deficit is financed by a flow of foreign direct investments (i_F) and a flow of net external indebtedness. The last term in the RHS of (A.2) is indeed: $D\hat{}.M = (\Delta D/D).(D/K) = \Delta D/K$.

Equation (A.3) expresses the accumulation of capital as a linear function of the difference between the domestic profit rate and a (risk adjusted) international interest rate (which is assumed to be equal to the interest rate on external debt). g_c is thus an "autonomous" growth rate, the rate (positive or negative) that would take place when $r = r^*$.

The domestic savings function is derived under the following simplifying assumptions: i) classical savings functions on wages and profits (a zero propensity to save out of wages and a positive savings rate out of national profits net of interest paid on external debt); ii) external debt is used to finance investments by nationals (foreign investment being fully financed through equity).[17] Under these assumptions:

(A.4) $s = z. (r.(1 - h) - r^*.M)$

where z is the savings rate out of (net) profits and $(1 - h)$ the nationals share in the capital stock.

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[15] Assuming a fixed potential output-capital ratio, there will be a one-to-one relationship with the behaviour of the same variables normalized by potential output.

[16] All profits on foreign capital are treated as remittances, i.e. as a negative item in the current account balance. Reinvested profits by foreign companies enter thus as a negative item in the current account and as a positive item (as part of foreign investment) in the capital account balance.

[17] This assumption is already implied by the specification of equations (A.1) and (A.2), given the treatment of profits on foreign capital as giving rise to profit remittances (rather than interest payments).

The trade deficit is expressed as a function of u, the output-capital ratio (in turn a function of capacity utilization, see footnote #):

$$(A.5)\ td = t_o + n.(u - v) \qquad n > 0$$

where v is the full capacity value of u (i.e. the potential output-capital ratio), and n can be derived from the parameters of the import and export functions, being affected also by the real exchange rate. t_o is thus the trade deficit at full capacity (corresponding to $u = v$). Its value can be derived from (A.1) and (A.4):

$$(A.6)\ t_o = g_o - r_o.(z(1 - h) + h) - r^*.(1 - z).M$$

where r_o is the full capacity value of the profit rate (see below) and g_o is (using (A.3)):

$$(A.7)\ g_o = g_a + a.(r_o - r^*)$$

An increase in r_o has positive effects on the trade deficit at full capacity (operating on investment, i.e. through g_o and negative effects (operating through full capacity savings). These negative effects depend on the profit savings rate (z) and the foreign share in the capital stock (h). An increase in r^* has negative effects on t_o: the higher interest payments reduce domestic net profits and thus domestic consumption (out of profits). The strength of this effect depends on the debt-capital ratio. In addition, the increase in r^* has negative effects on investment (operating through g_o) which further reduce the full capacity trade deficit.

The growth rate of the foreign capital stock ($K\hat{}_F$) is determined by an accumulation equation similar to (A.3):

$$(A.8)\ K\hat{}_F = g_{Fc} + a_F .(r - r^*)$$

and since $K\hat{}F$ (ignoring depreciation) is: $K\hat{}_F = I_F/K_F = i_F/h$, (A.8) can be rephrased as:

$$(A.8')\ i_F/h = g_{Fc} + a_F .(r - r^*)$$

Assuming a given profit share (π) in total output, the profit rate can be expressed as:

$$(A.9)\ r = B.u$$

We are now ready to derive the equations given in the text. The Domar equation giving the growth of the debt-capital ratio (equation 3.1) is simply a rearrangement of (A.2). Solving (A.2) for $D\hat{}$, using the definition of N as $i_F - r.h$ and then substracting g from both sides of the equation:

$$(3.1)\ D\hat{} - g = M\hat{} = (td - N)/M + (r^* - g)$$

The net foreign investment function (equation 3.2) is derived as follows. As stated in the text, g_F is the growth rate at which foreign profits are just equal to gross foreign investment. g_F is thus such that: $K\hat{}_F = r$ (given the assumption of a common profit rate). Substituting this condition into (A.8), this equation can be solved for the value (r_F) of the profit rate that will generate a zero net foreign investment:

$$(A.10)\ r_F = (g_{Fc} - a_F.r^*)/(1 - a_F)$$

Using (A.3) and (A.10), the value of g_F is thus:

(A.11) $g_F = g_a + (a/(a_F - 1)).\ (r^* - g_{Fc})$

Provided that $a_F > 1$, g_F is a positive function of r^* and a negative function of g_{Fc}. Indeed, an increase in r^* has a negative effect on foreign investment and thus increases the growth rate required to generate the same volume of foreign investment. An increase in the autonomous rate of foreign investment (g_{Fc}) has the opposite effect: a lower growth rate is needed to maintain the same volume of foreign investment.

Substituting from (A.8) into the definition of $N = h(K^{\wedge}_F - r)$, and using (A.3) to eliminate r:

(A.12) $N = (h.(a_F - 1)/a).\ (g - (g_c + (a/(a_F - 1)).(r^* - g_{Fc}))$

which, using (A.11), is readily recognized as equation (3.2) in the text:

(3.2) $N = f.(g - g_F)$ where $f = h.(a_F - 1)/a$

Equation (3.3) is derived as follows. Let u_T be the value of u at which trade is balanced. Setting $td = 0$ in (A.5), u_F must be such that:

(A.13) $0 = t_o + ⁚.(u_T - v)$

Substracting (A.13) from (A.5) and using (A.9), the trade deficit can be expressed as:

(A.14) $td = (n/B).\ (r - r_T)$

Using (A.3), $r - r_T$ can be expressed as:

(A.15) $r - r_T = (1/a).(g - g_T)$

where $g_T = g_a + a.(r_T - r^*)$ and $r_T = p.u_T$

Substituting (A.15) into (A.14) yields equation (3.3):

(3.3) $td = m(g - g_T)$ where $m = n/(a.B)$

The determinants of g_T can be looked at as follows. Solving (A.13) for u_T and using (A.9):

(A.16) $r_T = B.(v - t_o/n)$

Using (A.3) and the definition of m, and substituting from (A.16) into (A.3):

(A.17) $g_T = g_a + (r_o - r^*) - t_o/m$ where $r_o = B.v$

Or, using (A.7):

(A.17') $g_T = g_o - t_o/m$

which shows g_T as a positive function of the full capacity growth rate and a negative function of the full capacity trade deficit.

Substituting from (A.6) to eliminate t_o in (A.17):

(A.18) $g_T = g_o.(m - 1) / m + (z(1 - h) + h).r_o/m + r^*.(1 - z).M / m$

This equation shows g_T as a positive function of the debt-capital ratio. This is due to the negative effects of M on national income and spending: given r^* an increase in the debt-capital ratio reduces domestic consumption at any given level of capacity utilization. The degree of capacity utilization (and thus the corresponding growth rate) consistent with balanced trade will thus be higher. g_T is also a positive function of the savings rate ($z.\pi$): a fall in the savings rate increases the trade deficit at any given level of capacity utilization, and a decline in capacity utilization (and thus in g) is required to restore trade balance.

Provided that $m < 1$, the sign of the coefficients on g_o (and thus g_c) and on r^* are also unambiguous.[18] An increase in g_c reduces g_T. This is because an increase in autonomous investment tends to increase the trade deficit at a given level of capacity utilization. The value of u (and g) consistent with balanced trade is thus smaller as a result.[19] The effects of r^* on g_T are unambiguously positive (even more so if we take into account the indirect effects operating through g_o). An increase in r^* reduces the trade deficit at any given level of capacity utilization. This is because of the negative effects of r^* on domestic consumption (given M) and on investment (through the investment function). The value of u consistent with balanced trade, and the corresponding growth rate, will thus be higher.

Finally, the endogenous value of the rate of capital accumulation (for a given level of M) is derived from the condition that the desired rate of accumulation (given by A.3) satisfies the goods market equilibrium as stated by (A.1). The resulting rate of growth is Harrod's warranted rate since it satisfies the equality between the growth of productive capacity (given by the growth of the capital stock and the value of v) and the growth of aggregate demand. The associated value of the profit rate (simultaneously determined), and the corresponding value of capacity utilization (u), have the same property: the investment forthcoming at that profit rate generates an increase in aggregate demand that just matches the addition to productive capacity of that investment.

Substituting from (A.4) and (A.5) (using A.9) into (A.1), leaves r as the only unknown on the RHS of (A.1) (taking h and M as given). Using (A.3) to eliminate r from (A.1) and solving for g yields equation (3.6) in the text:

(3.6) $g = (1/(S - a.B)). (S .g_c - a.r^*.(S + B.(1-z).M))$

where $S = z.B .(1 - h) + h.B +$:

Given M, the economy will converge to this growth rate provided that the goods market is stable. As stated in the text, the condition for stability is similar to that encountered in Keynesian demand-driven growth models. This is : $\Omega - a.\pi > 0$ (so that the "IS" locus in r^*, g space slopes indeed downwards). The economic interpretation is well known: the leakages out of the circular flow of income and expenditure must be greater than the effects of income on induced investment.

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[18] We can safely assume m to be less than one. As can be seen from figure 3.3 in the text, the historical relationship between the current account deficit (as a fraction of GDP) and the output growth rate is close to unity: A one percentage point increase in the growth rate leads to a less (but close) to one percentage point increase in the current account deficit (in the short run with a given stock of debt, largely as a result of the increase in the trade deficit). This implies that with an output-capital ratio of less than one, the trade deficit as fraction of the capital stock (our variable td) will clearly increase by less than one percentage point.

[19] Despite the positive effects of g_c on g at a given level of u (see equations A.3 and A.9). This is because m is being assumed to be less than one.

Indeed, the size of the leakages in this case are given by the propensity to save out of domestic income ($z.\pi.(1 - h)$), profit remittances on foreign capital ($h.\pi$), and the (net) propensity to import (μ). $a.\pi$, on the other hand, is the "propensity to invest", the derivative of investment with respect to output in the investment function. If this condition is not fulfilled, Harrod's knife edge problem is not avoided.

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