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DEPARTMENT OF ECONOMICS

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Japanese growth and stagnation: a Keynesian perspective

by

Takeshi Nakatani and and Peter Skott

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Japanese growth and stagnation: a Keynesian perspective*

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Abstract

This paper uses a modified Harrodian model to understand both the long period of rapid Japanese growth and the recent period of stagnation. The model has multiple steady-growth solutions when the labour supply is highly elastic, and government intervention, we argue, took the Japanese economy onto a high-growth trajectory. Labour constraints began to appear around 1970, and a combination of high saving rates and slow population growth account for the stagnation of the 1990s. This combination produces a structural liquidity trap and threatens the sustainability of attempts to ensure near full employment through fiscal policy or by running a persistent trade surplus.

JEL classification: E12, E63, O53

Key words: Japan, growth, stagnation, liquidity trap, public debt, multiple equilibria

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1 Introduction

The Japanese economy has been stagnating since 1990. This stagnation is all the more striking in the light of the Japanese economic performance from 1950-1990 when the average per capita growth rate was the highest in the OECD; in 1950-1970 it stood at 8.4 percent, it was 3.3 percent and 3.4 percent in the 1970s and 1980s, respectively, but then dropped to an average of only 0.9 percent from 1990 to 2001 (Maddison 2003)

The problems of the 1990s have been investigated from both supply and demand side perspectives. Demand side explanations have focused on inadequate fiscal and monetary policies in combination with the slowdown of investment following the over-investment during the bubble period in the late eighties. These explanations gain support from the observations that by the mid 1980s a large accumulated government debt led to a decline in government expenditure and that by the mid 1990s the economy had fallen into a liquidity trap with the interest rate close to zero and conventional monetary policy virtually impotent (Krugman 1998).

Supply-side explanations by contrast emphasize structural changes like the slowdown of productivity growth and demographic changes which produce a decrease in natural rate of growth (Morana 2004). Some writers have blamed weaknesses of the financial system for the productivity slowdown while Hayashi and Prescott (2002) attribute the slowdown to mistaken government policies that subsidize inefficient firms and declining industries. These explanations suggest that structural reforms of the financial system or changes in industrial policy are essential if Japan is to regain its high growth of labour productivity. A different type of structural problem has been analysed by Cowling and Tomlinson (2000). They relate the problem of inadequate Japanese domestic investment to the increasingly global activities of Japanese multinational enterprises whose shift of production and investment activities to locations outside Japan has had detrimental consequences for the Japanese domestic economy.

This paper combines demand and supply side aspects to give an account of Japanese growth and stagnation. Our overall framework is broadly (post) Keynesian, with a focus on the medium and long-run interaction between investment, pricing and production, and aggregate demand. But a pure demand side explanation cannot, we believe, explain either the fast growth of the earlier period or the fifteen years of stagnation since 1990. Moreover, one should not ignore the links between the demand side and the structural changes that have taken place after the 1980s.

The Japanese economy was characterized by large amounts of hidden unemployment and underemployment from the Meiji restoration until the late 1960s. Throughout this period the labour supply to the modern sector was highly elastic, and our model implies that in this kind of dual economy there will be multiple steady growth paths. The elastic labour supply permitted fast growth to take place, but active policy intervention played a crucial role in making it happen: in the absence of intervention the economy could have followed a very different, slow-growth trajectory.

The general regime changed as labour constraints began to appear around 1970. The growth rates of the previous period exceeded the 'natural rate of growth', and a decline in the rate of growth, therefore, was inevitable. Since the early the 1990s, however, the growth rate has dropped below the natural rate, and this stagnation can be explained by a combination of high saving rates and slow population growth. This combination, we argue, produces a structural liquidity trap and threatens the sustainability of attempts to ensure continued near-full employment through fiscal policy or by running a persistent trade surplus. Thus, the proximate problem of the Japanese economy in the 1990s may be one of aggregate demand, but the demand deficiency is structural.

The paper is in 5 sections. Section 2 outlines our theoretical framework. Unlike most of the post Keynesian literature we do not use a Kaleckian framework along the lines of, among others, Rowthorn (1981), Dutt (1984), Taylor (1985) and Marglin and Bhaduri (1990). Instead, our starting point is Harrodian, and section 2.1 presents a simple benchmark model. In section 2.2 this model is extended - following Skott (1989, 1989a) - to include explicit pricing/production decisions and labour market conditions. The implications of the model are explored in sections 2.3-2.4 which analyse labour-constrained and unconstrained regimes, respectively. The application of the analysis to the Japanese economy is discussed in section 3. The traditional neoclassical solution to the Harrodian conundrum becomes relevant in section 4 which looks at the potential use (and limitations) of monetary policy, fiscal policy and net exports to sustain full employment in an economy with a low natural rate of growth. Section 5, finally, presents a few concluding remarks.

2 Theoretical framework

2.1 A Harrodian benchmark

Consider a closed, one-sector economy with two inputs, labour and capital. Assume that the production function has fixed coefficients and that there is no labour hoarding. If Y, K and L denote output and the inputs of capital and labour, respectively, these assumptions imply that

$$Y = \nu L \leq \sigma^{\max} K \tag{1}$$

where the parameters ν and $\sigma^{\max}$ represent labour and capital productivity when the factors are fully utilised.

Unlike the level of employment, the capital stock cannot be adjusted instantaneously. The desired rate of utilisation of capital therefore will be less than one if firms want the flexibility to respond to short-run fluctuations in demand, and the desired output-capital ratio (σ^*) accordingly is less than the 'technical maximum' $\sigma^{\max}$. A standard Harrodian investment function relates the change in the rate of accumulation to the difference between the actual output-capital

ratio (σ) and the desired ratio, that is,

$$\frac{d}{dt}\hat{K} = \lambda\left(\sigma - \sigma^*\right), \lambda > 0 \tag{2}$$

where $\hat{K}$ is the rate of accumulation.

Following the post Keynesian tradition, we assume that all wage income is spent while firms/capitalists save a fraction s of gross profits (Π). Algebraically, total saving S can then be written

$$S = s\Pi. \tag{3}$$

The assumption of differential saving rates, but not the simplifying assumption of zero saving out of wages, is critical for our analysis; Kaldor's 'neo-Pasinetti' theorem provides a theoretical rationale for the assumption (Kaldor 1966, Skott 1981), and the assumption also has strong empirical support (e.g. Marglin 1984, Poterba 1987).

For simplicity we assume for the moment that prices are set as a constant markup on unit labour cost. Hence, the share of gross profits in gross income (π) is constant, that is,

$$\pi = \frac{\Pi}{Y} = \mu \tag{4}$$

The assumption of a constant markup will be relaxed in section 2.2.

The equilibrium condition for the product market, finally, is given by

$$S = I \tag{5}$$

where

$$I = \frac{dK}{dt} + \delta K \tag{6}$$

is gross investment and δ the rate of depreciation.

Both the capital stock and the rate of accumulation are predetermined in the short run, and the equilibrium condition (5) serves to determine the levels of output and employment. Substituting (3), (4) and (6) into (5) and rearranging, the output-capital ratio in short-run equilibrium is given by

$$\sigma = \frac{\hat{K} + \delta}{s\mu}. \tag{7}$$

The rate of accumulation and the capital stock cease to be predetermined once we move beyond the short run, and the dynamics of the system can be examined by substituting equation (7) into (2):

$$\frac{d}{dt}\hat{K} = \lambda(\frac{\hat{K} + \delta}{s\mu} - \sigma^*). \tag{8}$$

Equation (8) has a stationary solution given by

$$\hat{K}^* = s\mu\sigma^* - \delta = g_w. \tag{9}$$

This stationary solution for the rate of accumulation describes a 'warranted growth rate'. It is warranted because of the consistency between expectations and outcomes. Individual firms may experience unexpected demand shocks and deviations from desired utilisation. But if the aggregate capital stock grows at the rate $\hat{K} = g_w$, the multiplier effects of investment on output imply that on average firms achieve precisely the desired rate of utilisation of capital, σ^*. Thus, in modern parlance a warranted path is a rational expectations equilibrium.

Equation (8) gives rise to the well-known problems identified by Harrod. The warranted path, first, is unstable. If, for some reason, the initial value of $\hat{K}$ falls below the stationary solution, the resulting shortage of aggregate demand will cause the output-capital ratio to be low, and a low output-capital ratio - unwanted excess capacity - leads to further reductions in the rate of accumulation. Leaving aside the instability question, there is a second problem: the warranted rate will (almost certainly) differ from the 'natural growth rate' if the parameters s, μ, δ and σ^* are independent of the forces that determine the growth rate of labour force.

2.2 The output-expansion function

A Kaldorian reconciliation of warranted and natural growth rates is based on adjustments in the profit share. Since the profit share is determined by the pricing equation, the Kaldorian mechanism calls for a reconsideration of firms' price and output decisions. In the Keynesian literature - both old and new - it is often assumed that firms set prices and that output is the fast variable which adjusts instantaneously and costlessly to match demand. In the context of the Harrod model, these assumptions inform the simple markup equation (4). We shall follow an alternative Marshallian approach and assume that price is the fast variable, that output is predetermined at each moment, and that adjustments of output are costly. This approach finds exegetical support in Keynes's own writing (Dutt and Skott (1996)) and, more importantly, there are also substantive reasons for using this approach.

First, despite the heavy emphasis in new Keynesian theory on menu costs and price stickiness, the empirical evidence in favour of price rigidity is quite weak. The study by Levy et al. (1997) of menu costs in five supermarkets, for instance, is often cited in support of menu costs and price stickiness (e.g. Romer 2001, pp. 315-316). This study found that on average 16 percent of all prices were changed each week. These frequent changes in prices were not costless but the finding that menu costs constitute a significant proportion of net profits is largely irrelevant, and it is hard to see how price changes on the scale documented by this study can be interpreted as evidence of significant price stickiness.[1]

[1] The share of menu costs in revenue or profits need not bear any relation to the importance of menu costs as an impediment to price change. With prohibitively high menu costs, for instance, there would be no price changes and the share of menu cost in revenue would be zero; negligible menu costs on the other hand may allow firms to change prices frequently as part of their marketing strategies, and the observed share of menu costs in net profits could

The real question, second, is not whether there is stickiness in prices but whether prices are more sticky than output. Undoubtedly there are menu costs, but production is subject to a production lag and changes in production also give rise to costs. Search, hiring and training costs can be substantial and, when it comes to reductions in output, firing or layoffs involve costs, both explicit costs like redundancy payments and hidden costs in the form of deteriorating industrial relations and morale.

In our judgment the production lags and adjustment costs for output are much more important than menu costs. We include the effects of these lags and adjustment costs by assuming that at each moment firms choose the rate of growth of output, rather than the level of output, and that this choice is made so as to balance the costs of changes against the benefits of moving toward a preferred level of production. These costs and benefits are determined by demand signals from output markets and cost signals from input markets.

The demand signal is captured by the profit share. The level of output is predetermined at any moment, and a rise in demand leads to an increase in the price of output. Wage contracts are cast in terms of money wages, and there is neither perfect foresight nor instantaneous feedbacks from output prices to money-wage rates. The real-wage rate and the share of profits in income therefore respond to unanticipated movements in prices: a positive demand shock generates a rise in the profit share.[2]

Demand shocks can be accommodated by changes in profits since, given the saving function (3), a rise in the profit share raises aggregate saving and reduces excess demand, as in Keynes (1930) and Kaldor (1956). Algebraically, the equilibrium condition for the product market yields the following solution for the profit share

$$\pi = \frac{\hat{K} + \delta}{s\sigma} \tag{10}$$

where $\hat{K}$ and σ are predetermined in the ultra short run.

Turning to the signals from input markets, we leave out intermediate inputs and take labour to be the only input that is variable in the short run; changes in the capital stock take longer to implement and, partly because of that, firms typically maintain excess capital capacity. As far as production decisions are concerned, the labour market therefore provides the relevant signal, and we use the employment rate as the indicator of the state of the labour market.

The rate of employment influences the costs of changing output through its effects on the availability of labour with the desired qualifications. High rates of employment increase the costs of recruitment and since the quit rate tends to rise when labour markets are tight, the gross recruitment needs associated with any given rate of expansion increase at a time when low unemployment

be very high in this case.

[2] Demand signals could also be reflected in stocks. For the aggregate economy, however, stock movements tend to amplify fluctuations in other demand components over the trade cycle and thus do not obviate the need for price adjustments. For simplicity, we therefore disregard stocks and stock movements.

makes it difficult to attract new workers. A high turnover of the labour force, on the other hand, allows firms to contract production and employment more rapidly without incurring large adjustment costs when the employment rate is high. These standard microeconomic effects may be reinforced by broader Marxian effects on the social relations of production. A high rate of employment strengthens workers vis-a-vis management, it may lead to increased shop-floor militancy, and, as the threat of redundancy loses its edge, increased monitoring and additional managerial input may be needed in order to prevent shirking and to extract the same amount of work effort. Managerial resources will thus be tied up in the day-to-day running of the firm.

The rate of growth of production responds to the signals from both goods and labour markets. It is positively related to the profit share (π) and negatively related to the employment rate (e). Algebraically, we get a generic 'output expansion function'[3]

$$\hat{Y} = h(\pi, e); h_\pi > 0, h_e < 0. \tag{11}$$

This output-expansion function replaces the pricing equation (4). The shape and position of the function will depend on the structural characteristics of the economy; the sectoral composition and the degree of competition, for instance, will play a role, and Japanese-style indicative planning and industrial policy may also shift the function. A static counterpart to equation (11) can be obtained by setting $\hat{Y} = 0$. The equation then defines the profit share as an increasing function of the employment rate. A short-run equilibrium relation of this kind could be derived from profit maximisation if firms have monopsony power and the (perceived) elasticity of labour supply to the individual firm is decreasing as a function of the aggregate rate of employment.

The negative feedback effect from employment to the growth rate of output mirrors the homeostatic mechanism in Goodwin's (1967) classic formalisation of a Marxian growth cycle. Goodwin's model excludes Keynesian effective demand problems, but the same basic feedback effects tend to stabilise the Harrodian system: when combined with Harrodian local instability, the Marxian reserve-army mechanism may generate bounded endogenous fluctuations around the warranted growth path (Skott 1989, 1989a; Flaschel and Skott 2006). The cyclical fluctuations are not the focus of the present paper, but the stabilising effects are important since they imply that the warranted path may provide a good approximation to the medium and long-term trends in output.

2.3 Labour-constrained growth

It follows from equation (2) that the output-capital ratio is constant and equal to σ^* along a steady growth path,

$$\frac{Y}{K} = \sigma^*. \tag{12}$$

[3] The behavioral foundations of the function are discussed in greater detail in Skott (1989, chapter 4).

Since the accumulation rate is given by

$$\hat{K} = s\pi\sigma^* - \delta, \tag{13}$$

the growth rate $g = \hat{K} = \hat{Y}$ must satisfy

$$g = h(\pi, e) = s\sigma^*\pi - \delta. \tag{14}$$

This growth rate must be equal to the natural rate n for the employment rate to be constant; that is,

$$g = n \tag{15}$$

Using (10), (12), (15) and $h_e < 0$, it follows that steady growth at the natural rate is possible if and only if

$$h(\pi^*, 0) \geq n \geq h(\pi^*, 1) \tag{16}$$

where

$$\pi^* = \frac{n + \delta}{s\sigma^*} \tag{17}$$

The second inequality in (16) will be satisfied: as e increases it becomes progressively more difficult to expand employment, and if $e = 1$ it is logically impossible for the rate of growth of employment to exceed the rate of growth of the labour force. The first inequality, however, need not be satisfied: firms may be insufficiently dynamic and, as a result, a capitalist economy may not be capable of growth at the natural rate. The likelihood of this outcome increases if π^* is small, that is, for low values of the natural rate and high saving rates.

2.4 Hidden unemployment and endogenous growth

The size of the labour force is not always a constraint on output. Moreover, the existence of hidden unemployment can make the rate of open unemployment irrelevant as an indicator of conditions in the labour market. Arguably, this is the case in many LDCs today, and it was the case during much of the early development of industrial production, in Europe as well as in Japan and elsewhere. Some writers (including Steindl (1952), Kaldor (1966, 1978) and Marglin (1984)) have therefore regarded capitalist accumulation as essentially unconstrained by the growth of the labour force.[4]

The hidden reserve army has been depleted in many economies and these economies may have become 'mature' in Kaldor's 1966 terminology. Since the analysis in section 2.2-2.3 relied on a negative feedback from the employment rate to output growth, this analysis may fit a mature economy. Its applicability to early stages of development, however, may be questioned.

As a stylised version of the 'immature' case, let us assume that large amounts of hidden unemployment render movements in the employment rate irrelevant

[4] Large parts of the development literature have taken a similar position; e.g. Lewis (1958) and Fei and Ranis (1964).

for firms' production decisions since the labour market never constrains firms' ability to get workers with the required qualifications. The growth rate of output, in this case, is determined by the demand signal – that is, by the profit share – and the output-expansion function can be written

$$\hat{Y} = h(\pi); h_\pi > 0 \tag{18}$$

Retaining the saving function (3), the steady-growth condition $\sigma = \sigma^*$ (implied by the investment function (2)), and the equilibrium condition for the product market, the set of steady-growth solutions for (π, g) is characterized by

$$h(\pi) = s\sigma^*\pi - \delta \tag{19}$$

$$g = h(\pi) \tag{20}$$

Depending on the shape of the output-expansion function, equation (19) may have no solutions, a unique solution or multiple solutions.

It seems reasonable to suppose that the adjustment costs for output are convex as a function of $\hat{Y}$, and there may also be upper and lower limits on the rate of growth, $g^{\min} \leq \hat{Y} \leq g^{\max}$. Thus, the output-expansion function will be non-linear and the growth rate will be more sensitive to variations in the profit share for intermediate values of the profit share than for very high or very low values. The non-linearity of the h-function implies that there may be multiple steady growth solutions, as in Figure 1b.[5] Outcomes with a unique solution are also possible (Figures 1a and 1c), and a case without steady-growth solutions can be obtained when the lower limit on $\hat{Y}$ is abandoned ($g^{\min} = -\infty$); this case is illustrated in Figure 1d. Essentially, the cases in 1a and 1d are identical since, with negative growth rates, there can be capitalist development in neither case.

Figure 1 about here

Figure 1b represents the most interesting case. At the two extreme equilibria we have $h' < s\sigma^*$; at the intermediate equilibrium this inequality is reversed. Not surprisingly, the inequality is closely related to stability conditions. Consider the accelerationist Harrodian specification of the full investment function, equation (2). The profit share at any moment is given by equation (10), and substituting (10) into the output-expansion function (18), we get an equation of motion for the output-capital ratio

$$\hat{\sigma} = h(\frac{\hat{K} + \delta}{s\sigma}) - \hat{K} \tag{21}$$

Equations (2) and (21) define a two-dimensional system of differential equations, and it is readily seen that the steady-growth paths associated with the

[5] Our analysis of the unconstrained regime has clear affinities with the work of Robinson (1956, 1962) and Steindl (1952), both of whom set up models with multiple steady growth paths and focus on the stable high-growth solution. As shown by Flaschel and Skott (2006), however, the focus on the high-growth solution seems misplaced in Steindl's model.

two extreme solutions are locally asymptotically stable while the intermediate solution will be unstable.[6]

This analysis has several important implications:

- The existence of multiple steady-growth paths, first, implies that countries that initially seem quite similar may follow very different growth trajectories.

- Temporary aggregate demand policy, second, may raise the long-run rate of growth. Imagine that initially the economy is at the low growth path in figure 1b. Expansionary policy can be used to reduce the average saving rate (and/or raise government demand for goods). The result is a rise in the profit share for any given growth rate or, equivalently, a downward shift in the $s\pi\sigma^* - \delta$ line in figure 1b. If the shift is large enough, the new configuration will be as in figure 1c, and a move to the high steady-growth equilibrium may get under way. Once at the high-growth path, the expansionary policy is no longer needed. Following a return to the old saving rate, the economy may now grow at the rate associated with the high solution.

- Shifts in the h- or s-functions, third, have permanent growth effects. An upward shift in the h-function or a downward shift in the s-function, for instance, will raise the steady-growth solutions for both π and $\hat{Y}$ if the initial position is at a stable steady-growth path. Shifts of this kind may result, inter alia, from changes in 'animal spirits' or competitive conditions or from government intervention.

3 Japanese growth and stagnation

Japanese GDP per capita grew at annual rates just over 2 percent between 1870 and 1940. These growth rates were not spectacular but still higher than in almost all other countries for which data are available for this period. Thus, the ratio of Japanese per capita income to that in Western Europe increased from .35 to .58 and the ratio to that of the US from .30 to .41 (own calculations from data in Maddison (2003)). The miracle years came after the second world

[6] Evaluated at a stationary point, the Jacobian of the system is given by

$$J(\hat{K},\sigma) = \begin{bmatrix} 0 & \lambda \\ \sigma(\frac{h'}{s\sigma} - 1) & -\sigma h' \frac{\hat{K}+\delta}{s\sigma^2} \end{bmatrix}$$

and

$$\begin{aligned} Tr(J) &= -h' \frac{\hat{K}+\delta}{s\sigma} < 0 \\ Det(J) &= -\lambda\sigma(\frac{h'}{s\sigma} - 1) > 0 \text{ iff } h' < s\sigma \end{aligned}$$

It follows that a steady-growth path is locally asymptotically stable if and only if $h'(\pi^*) < s\sigma^*$.

war when the Japanese per capita income grew at an annual average rate of 8.2 percent between 1945 and 1970 (Maddison (2003)).

Figure 2 about here

The sectoral composition has changed dramatically. In 1888, 70 percent of the labour force was employed in the primary sector; as late as 1955 the figure was 37 percent while by 1990 the number had dropped to 7 percent, most of whom worked only as self-employed in the primary sector (Minami 2002). Labour moved from the countryside to urban areas, and the labour supply to the modern sector has been highly elastic during most of the period. In this unconstrained regime, government intervention successfully put the economy on a high-growth trajectory, as illustrated by the high equilibrium in figure 1b. The intervention, which also affected the position of the h- and s-curves and hence the rate of growth at the high equilibrium, took many forms. Detailed descriptions have been provided by, among others, Johnson (1982), Aoki et al. (1996) and Minami (2002), and we limit ourselves to a few comments.

Heavy investment in education laid a crucial foundation for modernization. This is shown by the drastic change in the educational composition of the working age population in the thirty years after the introduction of six years mandatory education in 1907, see Table 1. The proportion without formal education decreased very rapidly, and the average educational background improved enormously as a result of the investment in education. In order to construct an industrial base, second, a number of public projects was carried out in the years after the Meiji restoration. These projects ranged from infrastructural investment to the establishment of state-owned factories in industries like shipbuilding, mining and textiles. Many of these factories were soon privatized as the emphasis shifted from direct state entrepreneurship to one in which privately owned companies were induced to follow government guidelines through a network of policies and informal ties between the private sector and the government bureaucracy.

Table 1: Educational composition of working-age population

Data source: Ministry of Education (1962)

Year	Population of working age	No formal education	Elementary education	Secondary education	Higher education
1895	2,279	1,916	357	4	2
1905	2,437	1,396	1,015	21	5
1925	3,293	659	2,447	161	26

Special institutional features of the economy have also been given credit for the strong Japanese growth performance. A labour market structure with 'lifetime employment', a seniority system and enterprise unions, for instance, may have reduced industrial conflict and facilitated innovation by reducing the fear of redundancy, while the *keiretsu* system and the policy of having several groups

make investments in the same industries may have played a role in maintaining competition under conditions of high growth and without the emergence of over-accumulation. As Johnson (1982, p. 12) notes, however, many of the specific Japanese institutions "do not make much sense at all" when taken separately. They constitute a system and have to be seen within the overall context of the Japanese "plan-oriented market economy system". MITI introduced this concept in 1974 when they started the 'Sunshine Project' (new energy technology R&D system) to develop new technologies of energy substitution; the concept was used to indicate how the government played a role in coordinating and promoting Japanese development, in producing competitive conditions among private companies, and in showing the direction in which private companies could and should proceed in order to prosper.

The high-growth period was characterized by rapid technical progress as well as high accumulation rates. This rapid technical progress was due partly to the large scope for catch-up, but catch-up is not automatic. It is facilitated by fast accumulation, and this aspect of innovation can be described by what is essentially a Verdoorn-type relation. Moreover, the deliberate efforts of the government to coordinate the acquisition and licensing of foreign technology and to shift production toward new and more advanced sectors helped to accelerate Japan's technological transformation. These activities, in the post WW2 period carried out primarily through MITI, have been at the centre of Japanese industrial policy.

To repeat, the importance of government intervention is widely acknowledged, in the case of Japan as well as in many other countries (e.g. Chang 2002). Our specific contribution here is to link the intervention to a macroeconomic model that has multiple steady growth equilibria. In this model, intervention may serve to select a 'good' equilibrium, and the growth rate at the 'good' steady growth equilibrium, moreover, will also be influenced by government policy (since the position of the curves can be affected by policy).[7]

The Japanese economy began to change from a labour surplus economy to a labour constrained economy some time in the 1960s. Minami (1973) suggested a turning point as early as around 1960, while Ohkawa and Minami (1975) stressed the existence of labour surplus in the self-employment sector after 1960. The Annual white paper on labour of 1970 was first subtitled "labour shortages and increasing wage trends" (Ministry of Labour (1970)). These emerging labour shortages together with increasing welfare demands are described as the two major domestic changes in Japan. The share of workers employed in agriculture had decreased from 31 % in 1958 to 18 % in 1968, and the increasing tightness of the labour market brought about wage increases especially for new school leavers in large or medium size firms. As shown in Figure 3a, the nominal wage rate started to increase at the faster rates in the late 1960s, showing much higher increases in large size companies compared with medium or small size companies

[7] It may seem questionable to associate the relatively low growth rates of the 1870-1940 period with the high steady state solution. The growth rates, however, refer to the economy as a whole, and the modern capitalist sector of the economy - which in this early phase constituted a small part of the economy - grew much faster than the aggregate economy.

(Figure 3b). The real wage rate also increases rapidly in the late 1960s, implying that labour saving and capital intensive technical progress became urgent for continued growth (Figure 3c).

Figures 3a-3c about here

The transition to a labour constrained regime is central to our analysis of the current Japanese problems. In a labour constrained regime the growth rates had to come down from the high rates of the miracle years, but the growth rate has fallen below the natural rate. One (imperfect) indicator is open unemployment which has increased significantly; it was just over 1 percent in the early 1970s, almost 3 percent in the late 1980s, dropped back to 2 percent in 1990 and has been hovering around 5 percent since 2001 (Figure 4). This increase in registered unemployment does not tell the whole story, however, since hidden unemployment has also been on the rise. One of the forms that it has taken is a dramatic increase in non-regular employment. Regular workers are those whose employment period is not limited or longer than one year. Traditionally the majority of workers, especially in the manufacturing sector, have been regular workers, and these workers have much higher wages and better job security than non-regular workers. The number of regular workers, however, has declined since the mid 1990s, and the share of non-regular workers, many of whom are part time workers or dispatched workers, has increased from 17.6 percent of total employment in 1987 to more than 31 percent in 2004; part time workers now account for 22.4 percent of total employment. Dispatched workers, mainly females and older persons, are sent to a client company for a contract period (indefinite or definite). These workers have a socially vulnerable position and lack employment security, and neither the client company nor the dispatching agent has legal responsibilities. The number of dispatched workers has increased from 330 thousand in 2000 to 620 thousand in 2004. Women have been disproportionately affected by these trends: over 50 percent of female employees are part timers while male part-timers account for only 8 percent of total male employment; including dispatched workers, 16 percent of all male employees are non-regular.

Figures 4 and 5a-c about here

Clearly our framework in section 2 leaves out many important elements of the Japanese experience, and in section 4 we extend the analysis to include foreign trade and fiscal and monetary policy. However, the stripped-down version of the model in section 2 may help to clarify a basic problem. The model suggests that trouble arises because the natural rate, which constrains the long-run growth rate, is low: the growth of the labour force has turned negative and is projected to remain negative for the foreseeable future, and the completion

of the technological catch-up phase implies that rates of technical progress are likely to be relatively modest. With a high saving rate, low growth translates into low profitability, and if output growth is sensitive to variations in profitability, low profitability in turn implies that it may be difficult or impossible to achieve steady growth at the natural rate. Moreover, even if steady growth is possible, high unemployment may be needed to sustain the growth rate.

The problem is illustrated graphically in Figures 6a-e. Figure 6a shows the unconstrained regime in which the h-function is invariant with respect to changes in employment (that is, we assume that there is a value $\bar{e} > 0$ such that $h(\pi, e) = h(\pi, 0) = h(\pi)$ when $0 \leq e \leq \bar{e}$; the economy is in the unconstrained regime when e falls in this range). The intersections between the s- and h-curves describe steady growth solutions, and by assumption the economy is at the high solution with a growth rate that exceeds the natural rate of growth. As the labour market tightens and the employment rate increases above $\bar{e}$, the curve describing the h-function gradually shifts down and to the right. For some employment rate $\tilde{e} > \bar{e}$ we get the configuration in Figure 6b. There are now three cases depending on value of the natural rate relative to n_1 and n_2.

Figures 6a-e about here

The natural rate in the constrained regime is indicated by the horizontal line through $g = n$ in Figures 6c-e, and steady growth at the natural rate requires that all three curves intersect at the same point. Figure 6c depicts a case with a very high natural rate ($n > n_2$). This configuration may fit other applications but seems irrelevant to the Japanese experience. In Figure 6d, the natural rate of growth falls between n_1 and n_2, and the joint intersection can be obtained at the intermediate solution to $h = s$; this intermediate solution may not be locally asymptotically stable, but in a labour-constrained regime the reserve-army mechanism may keep the economy close to this position (cf. section 2.2).[8] If the natural rate of growth is below n_1, finally, downward shifts in the h-function when the economy approaches maturity lead to the configuration in Figure 6e, and the economy falls into a recession. The h-function will start to shift upwards again as the growth rate drops below n and the reserve army of labour starts being replenished. After a while there will once again be multiple equilibria and a possibility (but no guarantee) of renewed fast growth at a rate above the natural rate. The configuration in figure 6e with a low natural rate of growth, however, does not permit continued (near-)steady growth.

Even in the case depicted by Figure 6d in which steady growth is possible, the employment rate at the steady growth path depends on the growth rate. A decline in the natural growth rate requires that the h-function shift upward

[8] Clearly, the transition from an unsustainable high solution to the sustainable intermediate steady growth path raises questions that cannot be addressed by our steady growth analysis. One scenario could involve policy intervention to avoid overheating; another scenario may have the economy staying at the high equilibrium until the shifting h-curve leaves only the low solution (Figure 1a), and the resulting collapse may then be followed (after an increase in unemployment and a leftward shift of the h-function) by expansionary policies to take the economy from the low to the intermediate solution.

and to the left; that is, a lower natural rate of growth is associated with higher unemployment. Algebraically, this result can be derived by setting $\hat{Y} = n$ and differentiating (11) totally:

$$dn = h_\pi d\pi + h_e de \tag{22}$$

Hence

$$\frac{de}{dn} = \frac{1 - h_\pi \frac{d\pi}{dn}}{h_e} = \frac{1 - h_\pi \frac{1}{s\sigma^*}}{h_e} \tag{23}$$

where the last equality in (23) follows from setting $\hat{K} = n$ in (10). Intuitively, a marginal increase in the growth rate will generate an increase in the employment rate if the output-expansion function is sensitive to variations in the profit share. Macroeconomic models generally presume that output adjusts rapidly to changes in demand. In the present model, a shock to demand is accommodated initially by a rise in the profit share, and the macroeconomic presumption therefore suggests that the value of h_π is very large (at the relevant intermediate solution) and that $\frac{de}{dn}$ will be positive.[9]

The problems of maturity can be addressed in several ways. One set of solutions aims to shift the $s(\pi)$ curve. Thus, a reduction in interest rates may affect the choice of technique and reduce the output-capital ratio σ^*. Alternatively, fiscal policy may be used to reduce saving at any given profit share or, as a third possibility, one could rely on net exports to raise demand and shift the s-function downwards.

The next section considers these options in greater detail. Our focus in this analysis, it should be noted, is not on stabilisation policy to dampen cyclical fluctuations but on the use of different policy instruments to adjust the warranted rate to the natural rate in a labour-constrained economy.

4 Policy options

4.1 Monetary policy and the neoclassical solution[10]

A reduction in the output-capital ratio σ^* would shift the s-curve downwards. The Solow model and most of mainstream growth theory are built on the assumption of continuous full employment with factor prices adjusting so as to equate the demand and supply of the various factors of production. From this perspective a binding full employment ceiling causes no problem; the puzzle, instead, is the apparent presence of large amounts of hidden unemployment in the earlier period. From a Keynesian perspective, by contrast, there is no reason to believe that markets automatically induce appropriate adjustments in capital intensity. The crux of the Keynesian argument is precisely that "there may exist no expedient by which labour as a whole can reduce its *real* wage

[9] The comparative statics would be different at a high equilibrium with $n > n_2$ (Figure 6c). At this high equilibrium, growth is insensitive to variations in profits and an increase in the natural growth rate therefore requires an increase in the reserve army of labour.

[10] The analysis in this and the next subsection draws on Skott (2001).

to a given figure by making revised *money* bargains with the entrepreneurs" (Keynes 1936, p. 13). The choice of technique is determined by relative factor cost, and if the real wage does not adjust to clear the labour market, there is no incentive for firms to change their choice the technique.

The Keynesian analysis does not show that changes in technique are impossible but only that the adjustment does not happen automatically as a result of changes in money wages. Instead, the adjustment could be accomplished through changes in the real interest rate. It is not obvious that interest rates will in fact adjust appropriately, but let us consider a scenario in which policy-makers successfully manipulate interest rates - and thereby the value of σ^* - so as to generate a designated level of near-full employment when the economy follows the steady growth path described by equations (14)-(15). Changes in interest rates may also affect saving rates. Empirically, however, these effects seem weak - perhaps because income and substitution effects offset each other - and in this subsection we take the saving rate as given.

As a simple benchmark, assume that the designated employment rate is achieved if the profit share remains at the value it had during the unconstrained period of fast growth; that is, assume that

$$h(\pi^u, e^*) = n \tag{24}$$

where $\pi^u = \frac{g^u+\delta}{s\sigma^*}$ is the profit share and g^u the growth rate in the unconstrained regime; $g^u > n$. In the constrained regime the profit share is given by

$$\pi = \frac{n+\delta}{s\sigma^c} \tag{25}$$

and the requirement that $\pi = \pi^u$ implies that

$$\frac{\sigma^c}{\sigma^*} = \frac{n+\delta}{g^u+\delta} \tag{26}$$

If, say, $g^u = 7\%, n = 2\%$ and $\delta = 8\%$, the output-capital ratio must fall by 33%; other plausible combinations imply that an even larger fall in σ may be needed.

To evaluate the implications for the required interest rate, we need to look at the choice of technique. Let w and p be the money wage rate and the price of output and let r and δ denote the (risk adjusted) real rate of interest and the rate of depreciation. Cost minimisation then requires

$$\min_{L,K} \quad wL + (r+\delta)pK \tag{27}$$

$$s.t. \qquad F(K,L) = Y_0$$

where Y_0 is the chosen level of output. The first order condition implies that

$$w - (r+\delta)p\frac{\eta_L}{\eta_K}\frac{K}{L} = 0 \tag{28}$$

where η_L and η_K are the elasticities of output with respect to labour and capital, respectively.

The price of capital goods, p, may be exogenous to the individual firm when it decides the optimal technique. In equilibrium, however, the price must be equal to the price chosen by the producers of capital goods, and in a one-good model this price is equal to the general price level. By definition,

$$p = \frac{1}{1-\pi} w \frac{L}{Y} \tag{29}$$

Substituting (29) into (28), we get

$$\sigma = (r+\delta)\frac{\eta_L}{\eta_K}\frac{1}{1-\pi} \tag{30}$$

where, by assumption, the profit share must be kept unchanged.

In the Cobb-Douglas case, the elasticities η_L and η_K are constant and a 33% reduction in σ requires that $r+\delta$ also fall by 33%. The risk-adjusted real rate of interest is equal to the sum of the real interest rate and the risk premium, $r = \rho + \theta$. As a simple numerical example, an initial real rate of interest ρ of 3%, a risk premium θ of 4% and a depreciation rate δ of 8% imply that the required real rate interest would fall to -2%.

With a more general production function, the ratio $\frac{\eta_L}{\eta_K}$ will not be constant. Thus, with a CES production function, $Y = (\alpha L^{-\rho} + \beta K^{-\rho})^{-1/\rho}$, it can be shown that[11]

$$d\log\frac{\eta_L}{\eta_K} = \frac{1}{1-\pi}\frac{\varepsilon-1}{\varepsilon} d\log\sigma$$

where $\varepsilon = \frac{1}{1+\rho}$ is the elasticity of substitution. Since, using (30),

$$d\log(r+\delta) = d\log\sigma - d\log\frac{\eta_L}{\eta_K}$$

it follows that the required reduction in r is higher the lower is the elasticity of substitution. This result is quite intuitive: if the two factors are poor substitutes

[11] From the definition of the elasticity of substitution and the assumption of cost minimisation it follows that

$$\begin{aligned}\frac{d\log(\eta_L/\eta_K)}{d\log(L/K)} &= \frac{d\log(w/(r+\delta))}{d\log(L/K)} + 1 \\ &= (-\frac{1}{\varepsilon} + 1)\end{aligned}$$

With a constant-returns production function we also have,

$$\frac{d(Y/K)}{d(L/K)} = \frac{\partial Y}{\partial L}$$

and cost minimisation therefore implies that

$$\frac{d\log\sigma}{d\log(L/K)} = \frac{d\log(Y/K)}{d\log(L/K)} = \frac{d(Y/K)}{d(L/K)}\frac{(L/K)}{(Y/K)} = \frac{\partial Y}{\partial L}\frac{L}{Y} = (1-\pi)$$

Combining the expressions for $(d\log(\eta_L/\eta_K))/d\log(L/K)$ and $d\log\sigma/d\log(L/K)$, the result now follows.

then large changes in relative factor prices are required in order to generate any given change in the output-capital ratio. Empirically, most studies suggest that the elasticity of substitution is below unity.[12] If, say, $\varepsilon = 0.4$ and $\pi = 0.25$, the benchmark values above imply that r must fall to -7.6%.[13]

As indicated by this analysis, the required real interest may become negative if the natural rate of growth is low. A negative real rate of interest, in turn, implies positive rates of inflation ($\hat{p}$) if the nominal rate of interest is bounded above some lower limit, $i \geq i_0 > 0$. Thus, at the long run equilibrium:

$$\hat{p} = i - \rho \geq i_0 - \rho^{req} \tag{31}$$

In a Japanese context this analysis points to the presence of a 'structural liquidity trap'. Following Krugman (1998) it has become commonplace to argue that Japan has fallen into a liquidity trap in the 1990s. Nominal rates of interests are at or near zero, and as a result traditional monetary policy has lost its effectiveness. The low interest rates (see Figure 7) were designed in part to alleviate the problems associated with the non-performing loans of the private banks, and the economy may have turned the corner on the bad-debt problem; it remains in a slump, however, and lacking the interest instrument, the central bank has been using policies of quantitative easing policy to stimulate the economy.

Figure 7 about here

The liquidity trap is usually seen as a consequence of the demand shocks that hit the economy after the collapse of the bubble economy and the accumulation of non-performing loans: the combination of these shocks eliminated inflation and as price deflation became the rule from the mid 1990s policy makers became unable to reduce real rates of interest sufficiently. Our analysis, however, suggests that the successful use of monetary policy to keep the economy at a steady growth path may require inflation rates that are strictly positive and quite high. In other words, a reliance on monetary policy to generate sufficient aggregate demand to keep the economy at near-full employment may constrain

[12] Tokutsu (1992) estimates the elasticities using a two stage multi-sector CES production function. He finds that the elasticity between capital and energy is 0.358 and that between intermediate input, energy plus capital and labor is 0.434 on average.

[13] The logarithmic change must be three times the logarithmic change in σ. By assumption, σ drops by 33%. Hence, $\Delta \log \sigma = \log \frac{2}{3}$, $\Delta \log(r+\delta) = 3 \log \frac{2}{3}$ and

$$\begin{aligned}
\rho^{req} &= \left(\frac{r^{req}+\delta}{r+\delta}\right)(r+\delta) - (\theta+\delta) \\
&= \exp\left(\log(\frac{r^{req}+\delta}{r+\delta})\right)(r+\delta) - (\theta+\delta) \\
&= \exp\left(3\log\frac{2}{3}\right)(r+\delta) - (\theta+\delta) \\
&= \frac{8}{27}0.15 - 0.12 = -\frac{68}{9}
\end{aligned}$$

the feasible time-paths of inflation: high inflation may be needed to maintain high employment when the saving rate is large and the natural growth rate is low.[14]

Inflation, in this analysis, does not emanate from wage demands in the labour market. For the sake of the argument, let us assume that there is a well-defined *NAIRU.* When the rate of unemployment is at this *NAIRU* there will be no tendency for the rate of inflation to change, and the standard argument presumes that the level of the inflation rate at the *NAIRU* will be indeterminate. Our analysis demonstrates that this standard indeterminacy presumption may be wrong when aggregate-demand issues are included in the analysis. The designated position of near-full employment may correspond to the *NAIRU,* but in order to keep the economy in steady growth using monetary policy, positive inflation is needed. Thus, the existence of a well-defined *NAIRU* does not ensure that the level of aggregate demand can be consistent with the *NAIRU* at any value of the inflation rate.[15]

4.2 Fiscal policy and the balance of payments

As indicated above, a fall in the saving rate may help raise the employment rate. Adjustments in the saving rate happen automatically in Ramsey-type models that assume full employment. The relevance of these models for most purposes seems questionable, but the saving rate could be influenced, instead, through fiscal policy. This in fact has been happening. The government has run large deficits in the 1990s, the public debt has been exploding (Figure 8), and saving rates have come down over the last the ten years. The gross saving rate, which fluctuated between 32 and 34 percent in the 1980s and early 1990s, has declined to a level of about 26 percent in 2002 and 2003 (OECD 2005).[16]

Figure 8 about here

A surplus on the balance of payments provides another outlet for high saving. Indeed, the natural solution for an aging economy with a high saving rate and a

[14] The constrained steady growth path satisfies

$$s\sigma\pi - \delta = n$$

Thus, for given n, δ and π, a high saving rate implies a low output capital ratio, and a low output capital ratio in turn will only be optimal if the cost of capital is low. The saving rate did not appear in equation (26) and the subsequent benchmark calculations since these focused on the required *change* in σ for a given change in the growth rate.

[15] This need for inflation to sustain a high rate of employment is quite distinct from and independent of criticisms that question the existence of a well-defined *NAIRU* (e.g. Cross (1995), Skott (1997), (2005)).

[16] There has also been a significant decrease in the household saving rate to 2.8 percent in 2004. The seventh consecutive year-on-year decrease of the household saving rate is attributable to, firstly, the aging population, i.e. the share of the younger generation with a high saving rate decreases and the share of the older generation with a low saving rate increases, and secondly the decrease of disposable income due to stagnant wage earnings as well as increases in taxes and the social insurance premium.

declining population would be to run a balance of payments surplus. A declining population means that it may be hard to find profitable investment opportunities in the home economy - this is what lies behind the analysis of monetary policy and the choice of technique in section 4.1 - and by running a balance of payments surplus, the investment can take place abroad instead.[17]

The Japanese economy did gradually increase its dependence on foreign trade in the 1980s and 1990s. Exports rose steeply, there has been a persistent trade surplus since 1980 (see Figure 9), and after the Plaza accord in 1985 direct foreign investment also became increasingly important.[18] The political constraints on balance of payments, however, became clear in the mid 1980s when surging exports were criticized as a beggar-thy-neighbour policy, and after the Plaza accord expansionary monetary and fiscal policies were used to raise domestic demand; the expansionary monetary policy was maintained even when the bubble became apparent in the late eighties, and the official discount rate was not increased until the middle of 1989, when its was raised from 2.5 to 3.5 %.

Figure 9 about here

In order to analyse fiscal policy and open-economy issues we need to extend the model by including taxes (T), government consumption and debt (G and B), net exports (Z) and foreign assets (F) explicitly. To simplify the exposition we assume that the government deficit is financed by issuing debt with a constant real rate of interest (ρ) and that the return on foreign assets is the same as that on government debt (it would be straightforward to allow for differences in the rates of return, but this complication adds little of substance). Given these assumptions, the changes in government debt and foreign assets are determined by

$$\dot{B} = \rho B + G - T \tag{32}$$

$$\dot{F} = \rho F + Z \tag{33}$$

By assumption workers spend what they earn. Interest income on government debt and foreign assets therefore accrues to firms/capitalists, and we shall assume that they apply the same saving rate to their combined interest and profit income. Assuming also that all taxes fall on wage income, the equilibrium condition for the product market can be written:

$$s(\pi\sigma^* + \rho f + \rho b) = g + \delta + \rho f + \rho b + x \tag{34}$$

[17] Net exports may exacerbate other countries' problems. Japan was a winner in this zero sum game and suffered a rather mild recession, especially in the second oil shock, compared to other OECD countries.

[18] In order to maintain its export competitiveness even with a tripled yen valuation, firms strengthened the pressure on labor movements during the annual SHUNTO labor offensives. The SHUNTO offensives had previously been an effective tool for raising wages but since the early 1980s labour's demands have been largely defeated. The growth rate of nominal wages was high in the 1970s, 18.5 percent in first five years and 8 percent in the second half due to soaring oil prices; the wage increases dropped to just over 5 percent in the 1980s, about 3 percent in the 1990s and 0.9 percent after 2000 (Ministry of Health, Labour and Welfare 2005). The movements in real and nominal wages are shown in Figure 3c.

where $f = F/K, b = B/K$ and $x = (Z + G - T)/K$.

Under constrained steady growth, we must have $g = n$, and for any given initial debt and asset ratios, b and f, equation (34) yields a trajectory for the required value of x. Algebraically,

$$x = s\pi^*\sigma^* - (1-s)\rho(b+f) - n - \delta \tag{35}$$

where π^* is the profit share associated with the desired employment rate e^*, that is, π^* solves $n = h(\pi^*, e^*)$.

The solution for $x(t)$ depends negatively on the ratio $b(t) + f(t)$. This ratio changes endogenously over time, and the sustainability of the trajectory requires that the movements in $b(t) + f(t)$ be bounded asymptotically; a boundedness condition for the government debt ratio is standard, and political constraints rule out unbounded movements in the foreign asset ratio. In fact, even if the asset dynamics are stable, the movements will still be unsustainable if the stationary solution is unacceptably large.

Using (32), (33) and (35), the movements in $b(t) + f(t)$ are described by

$$\begin{aligned} \dot{b} + \dot{f} &= \frac{\dot{B} + \dot{F}}{K} - (b+f)\hat{K} \\ &= (s\rho - n)(b+f) + (s\pi^*\sigma^* - n - \delta) \end{aligned} \tag{36}$$

This differential equation has a stationary solution at

$$(b+f)^* = \frac{n + \delta - s\pi^*\sigma^*}{s\rho - n} \tag{37}$$

The solution will be unstable if $s\rho > n$ and stable if the inequality is reversed. By assumption $s\pi^*\sigma^* > n + \delta$ (otherwise there would be no policy problem in the first place) and the stationary value of $b + f$ will be negative in the unstable case. It follows that if $n < s\rho$ and if the initial position is one with $b + f = 0$, a configuration which fits the Japanese case, the private sector's net position vis-a-vis the government and the foreign sector will be increasing without limit. Sustainable trajectories may, but need not, emerge if $s\rho < n$. Sustainability requires not only that the denominator of the right hand side of (37) be negative; if $n - s\rho$ is small, the stationary solution for $b + f$ may be unacceptably high.

The stability criteria have been derived on the assumption of constant interest rates. In order to persuade wealth-owners to hold an increasing share of their wealth in government bonds and foreign assets, the return on these assets may have to increase relative to the return on real capital. The return on real assets is constant along the steady growth path (it is given by $\pi^*\sigma^* - \delta$), and an increasing relation between the asset ratios and the interest rate ($\rho = \varphi(b+f), \varphi' \geq 0$) merely reinforces the instability conclusion. Allowing for taxes on property income, on the other hand, would tighten the conditions for instability. Thus, it is straightforward to show that if all property income is taxed at a constant rate τ and if variations in government consumption and net exports are used

to maintain product market equilibrium at the target rate of employment, then instability obtains iff $s(1-\tau)\rho > n$.[19]

The analysis in this subsection illustrates the dilemmas of the Japanese economy. As the economy approached maturity and the growth rate decreased in the 1970s and 1980s, a high profit share was maintained by running government deficits and a surplus on the balance of payments. Political constraints, however, imposed limits on the acceptable movements in government debt and the net foreign position; consequently, neither the fiscal nor the open economy solution to the lack of effective demand was sustainable. It should be noted, perhaps, that in the Japanese case the fiscal problem is unrelated to the reduced efficacy of domestic Keynesian policies in an open economy. Increased imports dilute the expansionary effect of deficit spending, but if the size of the trade surplus in the medium run is limited by binding political constraints, the additional imports will relax this constraint and permit a weakening of the exchange rate and an expansion of exports, leaving net exports unchanged. Thus, in this respect the Japanese situation is far removed from that of low-saving countries in which the need for continuous capital inflows may generate speculative movements and economic instability.

5 Conclusion

This paper has told a story about the Japanese growth miracle and the subsequent stagnation of the 1990s. Our macroeconomic framework indicates how active government intervention in the form of both demand policy and industrial policy served to pick out a high-growth trajectory during the period of elastic labour supply. The overall regime started to change by the late 1960s. The social and economic constraints on growth increased as the labour supply became less elastic, the scope for importing technologies and catchup was reduced, and environmental and energy concerns became more pressing. In the face of these problems, Japan succeeded for a while in maintaining respectable growth rates by increasing public spending and advancing into foreign markets. The limitations of these remedies were exposed in the 1990s after the collapse of the bubble boom.

The current economic dilemmas, we have argued, arise from the unsustainability of solutions based on monetary and fiscal policy or foreign trade. The stagnation of the 1990s may be due to a lack of aggregate demand, but the demand problem does not derive from temporary shocks. It is a structural problem that is caused by a combination of high saving rates and a very low natural rate of growth, a combination which also generates a 'structural liquidity trap'. A sustainable recovery therefore requires 'structural policies', albeit not necessarily of the kind advocated by many supply-side economists.

The Japanese-style management system - characterized by a seniority system, life-time job security and enterprise unions - may have been advantageous

[19] Schlicht (2006) uses a stable, closed economy version of this kind of analysis to examine the implications of the constraints on public debt in the Maastricht Treaty.

during the period of fast growth. In a slow-growing economy, however, the system may be unworkable and undesirable. Thus, the internal and external challenges may call for adjustments in the Japanese economic structure, and in fact the first two of the above characteristics of Japanese-style management system have been gradually eroded since the 1980s. Today, one third of all new employees change their jobs within three years, and non-regular workers like part-timers or dispatched workers now make up 16 percent of male and 50 percent of female employment. These structural changes and their interaction with the demand side should be taken into consideration in the analysis of the current policy dilemma. But many of the structural reforms that are currently being advocated, and in some cases implemented, seem ill-considered. A foundation of stable and sustainable domestic demand is a necessary requirement for a return to prosperity and high employment, and neo-liberal attempts to curtail social welfare expenses and raise the consumption tax rate will tend to reduce domestic consumption. Our framework suggests that an expansion of the welfare state may be more promising: improvements in the provision of social insurance may reduce the saving rate, for instance, while improved child care may increase both fertility and the participation rate of women.

It is beyond the scope of the present paper to consider these structural policy issues in any detail, but we hope to return to them in future work. The aim of this paper has been more limited. We have provided a sketch of what we believe may be a useful overall frame for an understanding of the Japanese experience. It is merely a sketch. The focus on steady states, for instance, meant that we could not analyse the dynamics of the transition from the unconstrained to the constrained regime. This transition, moreover, is complicated by the fact that at about the same time Japan had to deal with a number of other problems, domestically as well as internationally; environmental pollution became important and internationally Japan faced steep increases of energy prices in the 1970s and the tripled yen evaluation from 360 yen per dollar to 140 yen in the twenty years from the late 1960s until the late 1980s.[20] The bubble of the 1980s and its after-effects also complicate matters when it comes to explaining the events of the 1990s. We have largely ignored financial matters, and the absence of financial stocks and explicit stock-flow relations makes it difficult to address these issues in a satisfactory way on the basis of this version of the model.[21]

To end on a more positive (but speculative) note, some of the basic elements in our account of Japanese growth and stagnation may have other applications. Germany is an obvious candidate, but these other applications must be left for future research.

[20] Some of these unfavorable developments, including the increase in oil prices, were common to all advanced countries. Japan, however, was affected strongly because of its dependence on foreign energy resources and the shortage of foreign exchange reserves at the time.

[21] Financial aspects and explicit stock-flow relations are included in Skott (1989).

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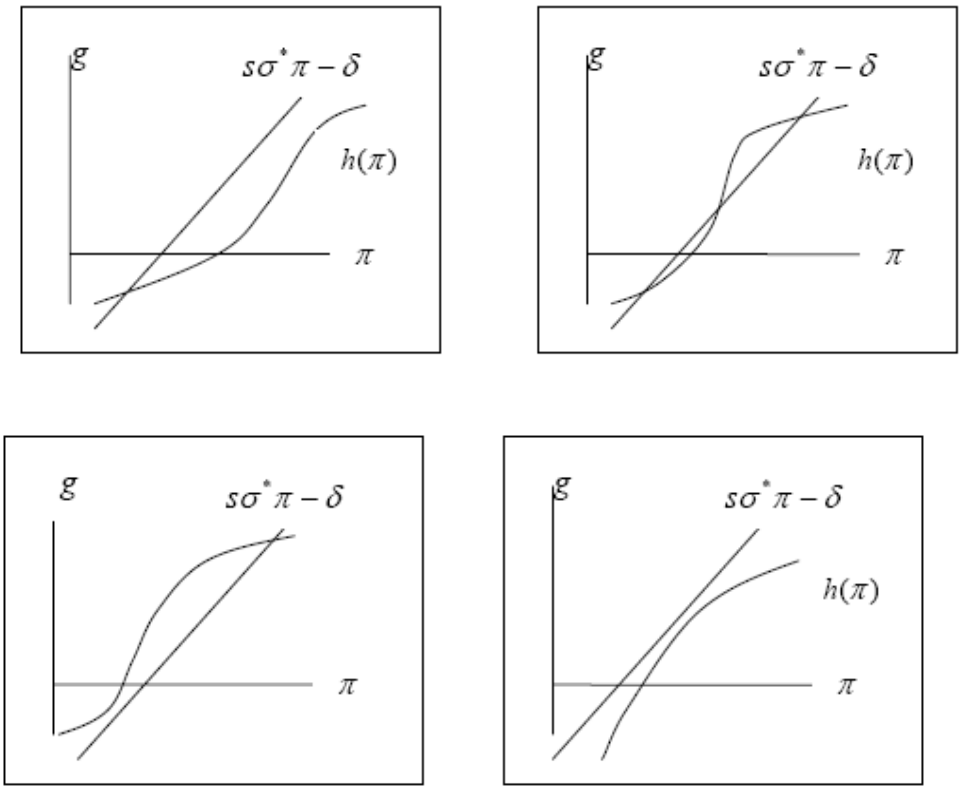
Figure 1


g
$s\sigma^*\pi - \delta$
$h(\pi)$
π
g
$s\sigma^*\pi - \delta$
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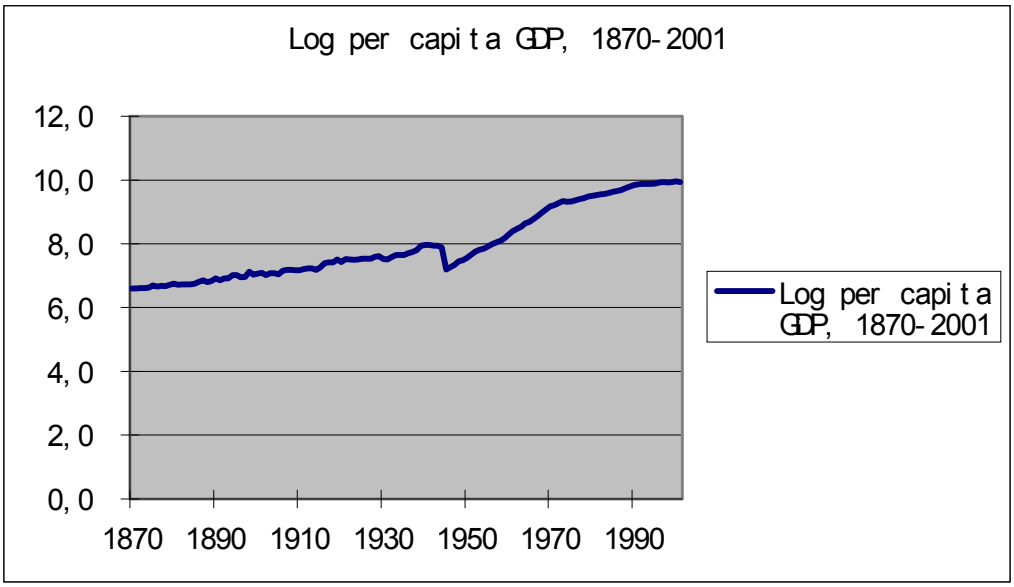


Figure 2
Data source: Maddison (2003).

Figure 3a: Average Monthly Contract Cash Earnings (in thousands of yen) of General Workers by Sex, 1954–2003.

Data source: Statistics and Information Department, Minister's Secretariat, Ministry of Health, Labour and Welfare.

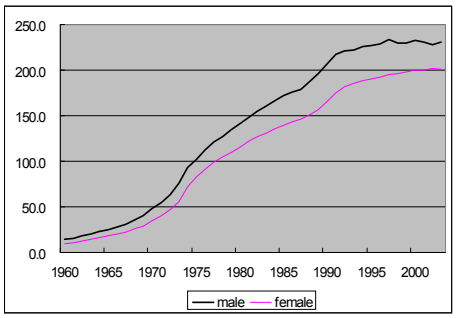


Figure 3b: Monthly Cash Earnings of General Workers by Size of Enterprise (1967–2003)

Data source: Statistics and Information Department, Minister's Secretariat, Ministry of Health, Labour and Welfare; Bank of Japan.

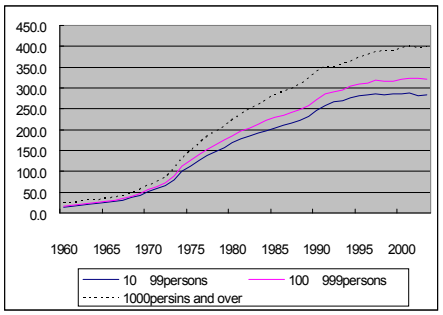


Figure 3c: Consumer Price, Nominal Wage and Real Wage

Data source: Ministry of Health, Labour and Welfare; Bank of Japan

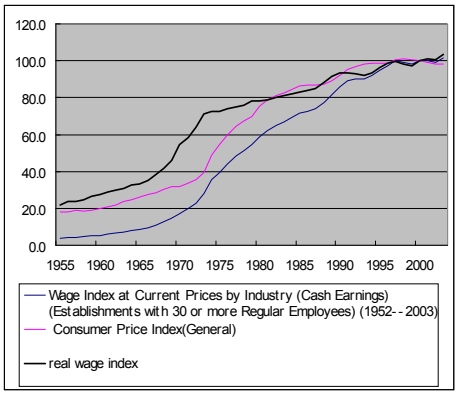
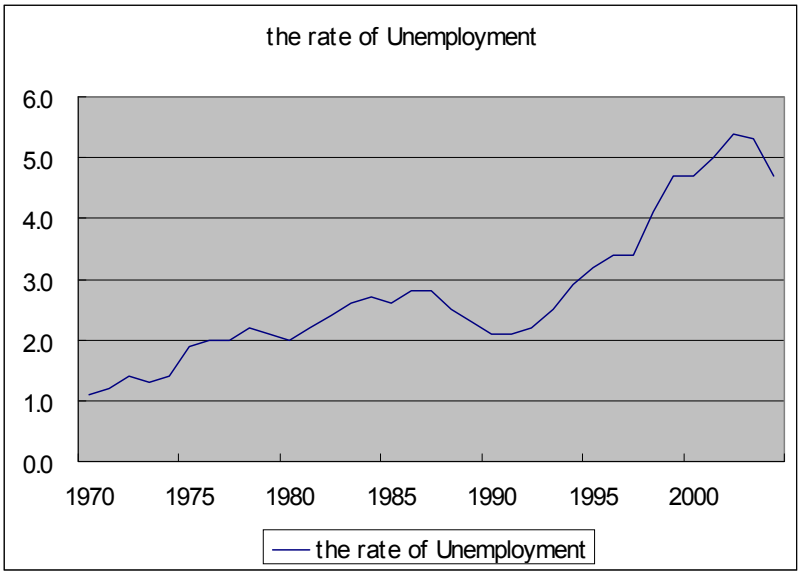


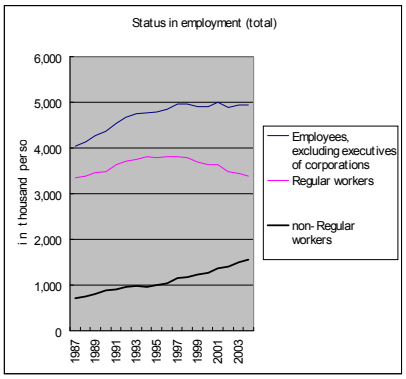
Figure 4: Unemployment

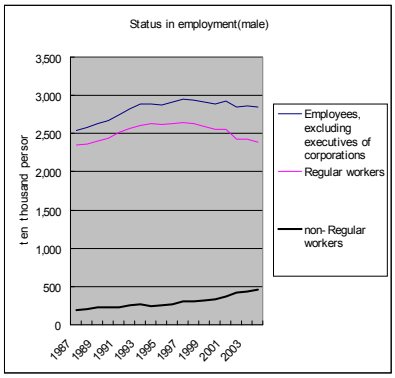
Data source: Statistics Bureau, Ministry of Internal Affairs and Communications "Labour Force Survey"

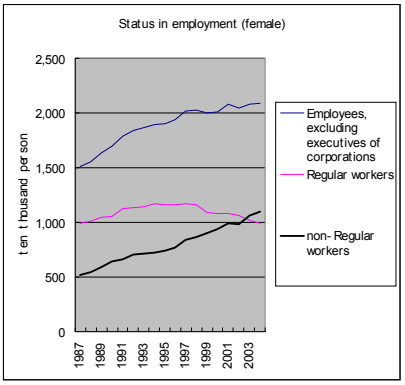


Figures 5a-c: Employment status

Data source: Statistics Bureau,Report on the special survey of the labour force survey, Ministry of Health, labour and Welfare







Figures 6a-e

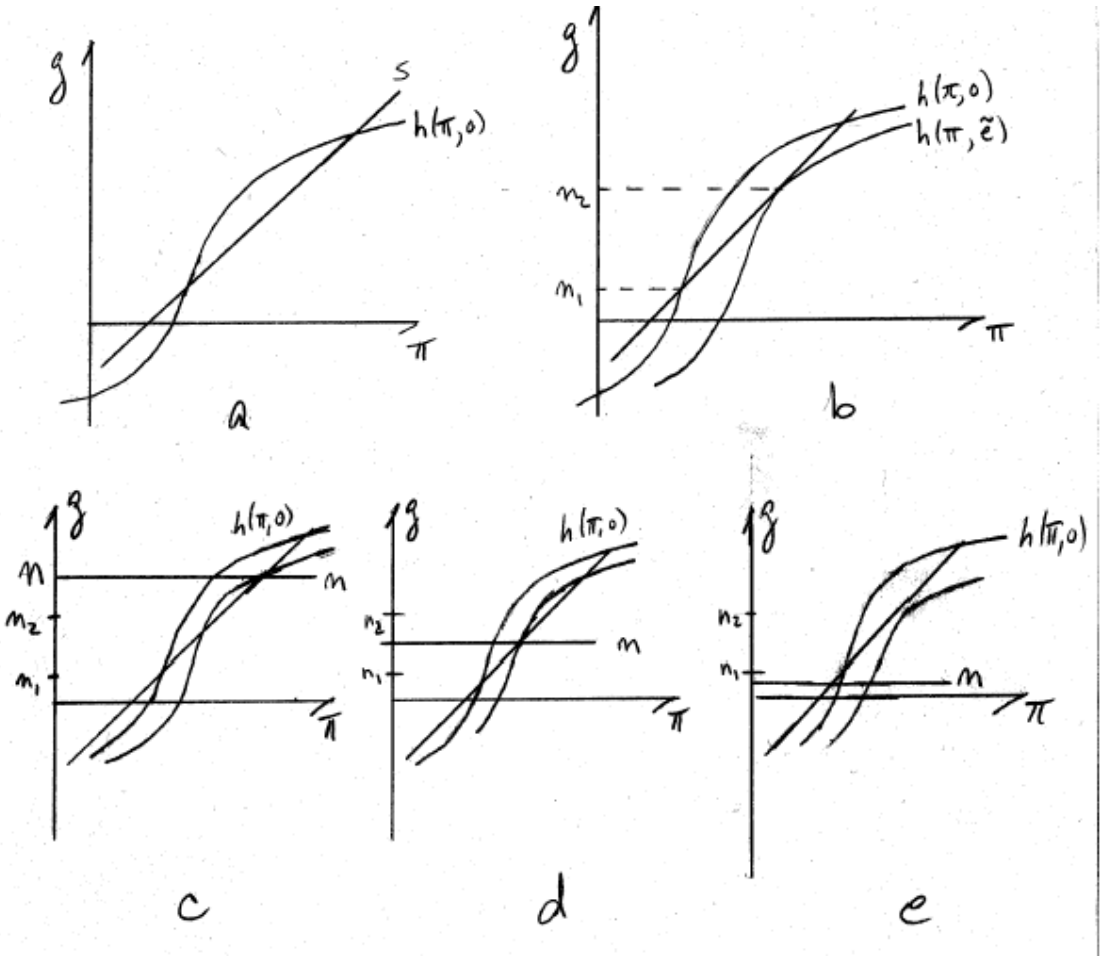
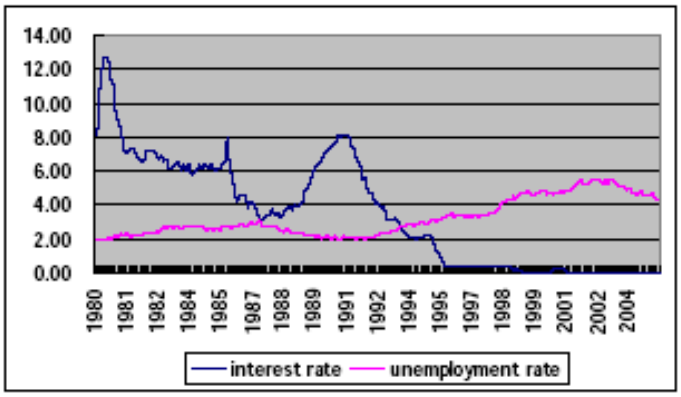

g
s
h(π,0)
π
a
g
h(π,0)
h(π,ẽ)
m2
m1
π
b
g
h(π,0)
m
m2
m1
π
c
g
h(π,0)
m2
m
m1
π
d
g
h(π,0)
m2
m1
m
π
e

Figure 7


14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1980
1981
1982
1984
1985
1987
1988
1989
1991
1992
1994
1995
1997
1998
1999
2001
2002
2004
interest rate
unemployment rate

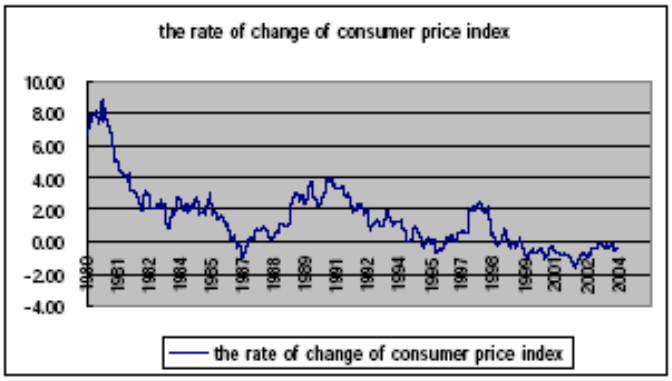

the rate of change of consumer price index
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
1980
1981
1982
1984
1985
1987
1988
1989
1991
1992
1994
1995
1997
1998
1999
2001
2002
2004
the rate of change of consumer price index

Figure 8
Reproduced from OECD Economic Outlook, No 76 (2004).

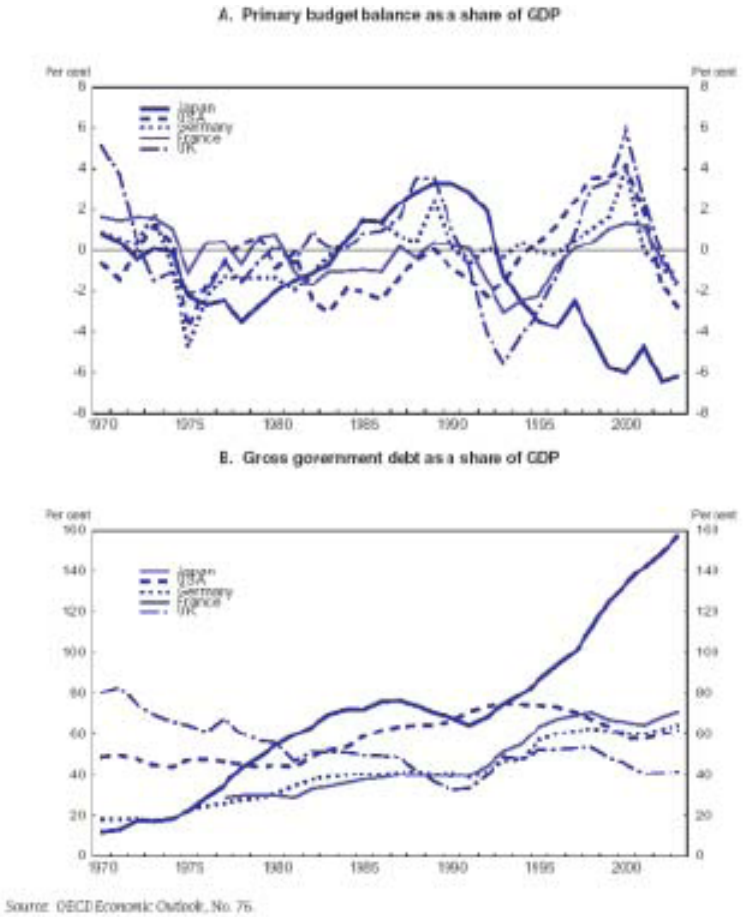
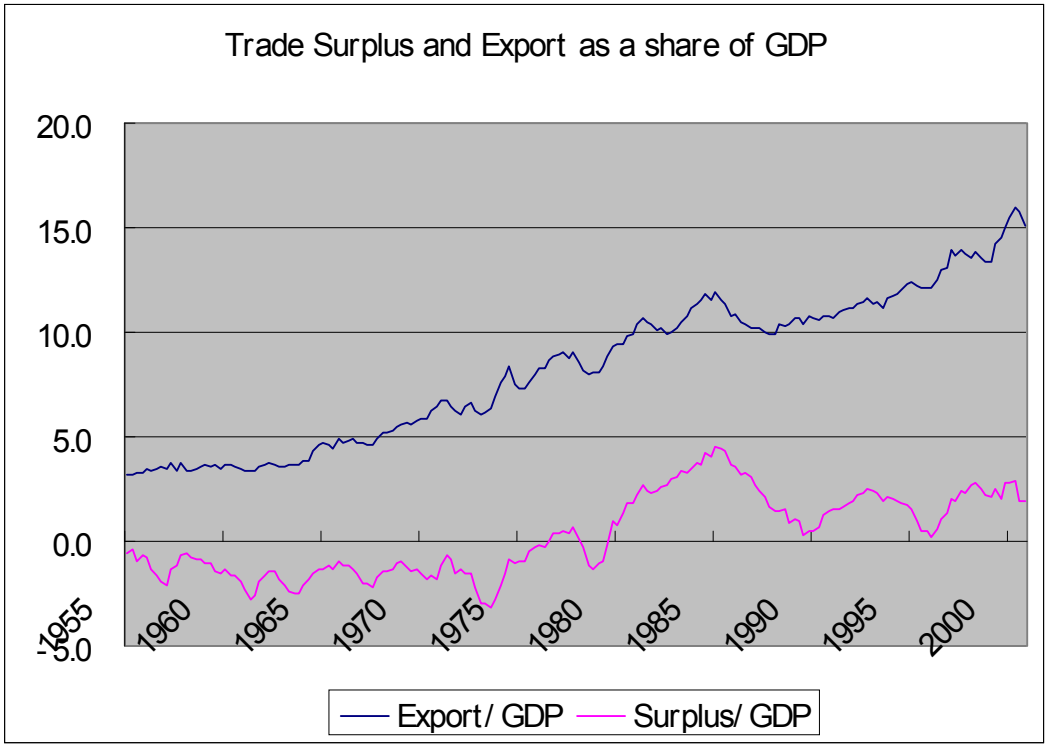


Figure 9


Trade Surplus and Export as a share of GDP
20.0
15.0
10.0
5.0
0.0
-5.0
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Export / GDP
Surplus/ GDP