Third Arrow Reforms and Japan's Economic Performance

Akihito ASANO

Department of Economics
Sophia University

Rod TYERS

Business School
University of Western Australia, and
Research School of Economics
Australian National University

For presentation at the
18th Annual Conference on Global Economic Analysis
Melbourne, Australia
17-19 June 2015

Key words:
Regulation, oligopoly, services, price caps, privatisation, general equilibrium, industrial reform

JEL codes:
C68, D43, D58, F41, F47, L13, L43, L51, L80

Corresponding author:
Rod Tyers
Winthrop Professor of Economics
UWA Business School
M251, Crawley, WA 6009
Australia
rod.tyers@uwa.edu.au

* The research toward this paper is funded via a grant from the Australia-Japan Foundation and Akihito Asano's travel to Australia to facilitate the work was funded by a BHP travel grant via the UWA Business School. Thanks are due to Jenny Corbett for her partnership in resourcing this project. Thanks for research assistance are due to David Sami and Kazuki Tomioka at the UWA and for arduous assistance with the analysis of the data on listed firms to Shogo Hanashiro at Sophia University. All technical analysis for the paper is performed using the Gempack modelling software.

Third Arrow Reforms and Japan's Economic Performance

Abstract

Clear progress has been made in economic reform under the "Abenomics" first arrow (monetary policy) and measurable progress has also been made under the second (taxation reform). The third, which emphasises reforms to labour markets, company tax and competition, particularly in the hitherto highly protected services sector, has been more politically difficult and slower to emerge. This paper explores the gains that are possible from these three elements of the third arrow program. Economic rents and industry concentration levels are first identified from Nikkei firm specific data and used to construct an economy-wide model that represents oligopoly behaviour and its regulation explicitly. The analysis finds that modest gains in both efficiency and growth are available from increases in Japan's labour supply and reductions in company tax rates, while substantial gains are possible from active competition policy that embodies pricing surveillance and price cap regulation, particularly in services. Central to resurgent growth in Japan are improvements such as these to efficiency in home industries that raise home rates of return and facilitate the rebalancing of Japan's large home and foreign asset portfolio toward home investment and capital growth.

1. Introduction

The recent arrest of Japan's stagnation since the early 1990s is commonly attributed to the economic reforms undertaken during the Abe governments, commonly referred to as "Abenomics" (IMF 2014a). These comprise three "arrows":[1] the first referring to expansionary monetary policy, the second to addressing government debt through taxation reform and the third to more fundamental reforms of the real economy. This final arrow emphasises reforms to labour markets, company tax and competition policy, particularly with respect to the hitherto highly protected services sector. It has been more politically difficult that the first two and slower to emerge, despite being required for a sustainable recovery (IMF 2014b). There are three essential elements: the accommodation of increased female participation, reduced company taxation and competition policy reforms that will improve domestic production efficiency. While these are important in any economy, they are particularly significant in Japan because of its idiosyncratically large asset holdings overseas that can readily be rebalanced into the home economy in the form of investment that requires no profit repatriation, making domestic economic performance unusually sensitive to domestic efficiency.

[1] This refers to the Japanese historical reference concerning the ease with which a single arrow can be broken by hand, compared with the resilience of three together.

Raising labour force participation and hence labour supply is relatively straight-forward to analyse, as is reduced company taxation. But the effects of both are, arguably, to raise home output volumes. If new entries and associated recurrent fixed costs are modest and pricing is competitive this will raise production efficiency and demand from at home and abroad. Much therefore depends on the efficiency-generating elements of the third arrow reforms. It has long been understood that Japan's services sector has been comparatively inefficient (Clark 1978, Kay and Clark 2005, Fukao 2010) and that this stems in part from strategic behaviour by mandated and structural oligopolies. It is also well understood that oligopoly pricing can stifle innovation and the Schumpeterian growth process, allowing rents that favour single sections of the community while raising costs to others and fostering an emphasis on strategic behaviour (Aghion et al. 2013, Blanchard and Giavazzi 2003). Even where oligopolies are subject to pricing surveillance and price-cap regulation, such industries exhibit information asymmetries and regulatory capture (Menezes 2009, Nepal et al 2014). This behaviour by service oligopolies might therefore be expected to have contributed to slower growth in Japan during its "lost decades".

This paper explores the gains that are possible from the third arrow suite of reforms by first identifying economic rents and industry concentration levels from Nikkei firm specific data and then using an economy-wide model that represents oligopoly behaviour and price-cap regulation explicitly.[2] The analysis estimates the efficiency gains associated with labour market and taxation reforms and those that remain possible from allowing free entry and exit, including foreign ownership, while at the same time more carefully monitoring and regulating the pricing behaviour of "natural" and mandated monopolies and oligopolies. In doing so it assesses the potential for a period of economic expansion driven by such reforms that could see the end of Japan's comparative stagnation. A brief review of Japan's recent performance and its dependence on the links between oligopoly and growth performance is offered in the section to follow. Section 3 then describes an empirical analysis of rents and concentration in Japan's manufacturing and service industries. The economy-wide model used is presented in Section 4, followed by its use in an analysis of reform alternatives and their implications for Japanese performance in Section 5. Conclusions are offered in Section 6.

[2] The model is in the spirit of Harris (1984) and a development of more elemental oligopoly models used by Tyers (2005 and 2014). It represents a novel approach to the analysis of reforms in the Japanese economy (Tyers and Corbett, 2012).

2. Imperfect Competition and Economic Performance in Japan

There is now little debate over the assertion that competition and its attendant efficiency is an essential source of successive innovation and hence real growth (Schumpeter 1911, 1942).[3] This idea is central to modern research on economic performance (Segerstrom et al. 1990, Aghion and Howitt 1992, Aghion et al. 2013) yet all economies harbour industries that are oligopolistic and where sustained rents engender strategic behaviour that detracts from growth-enhancing innovation (Grossman and Helpman 2014). In Japan, consistent with these theories, growth has been slow for more than two decades and rents are considerable (as we show in the section to follow). During this period aggregate productivity has stagnated, with continued very slow growth in services and a marked slowdown in manufacturing, as implied by Figure 1. We might ask, however, how it is that Japan, which has been a high-saving country, has not financed sufficient new investment to overcome these forces.

The answers are two-fold. First, household saving has been declining due to demographic contraction, though this has been offset to some extent by high levels of retained earnings by corporations, or corporate saving. Second, during the low-growth decades, Japanese saving has financed considerable investment abroad, as is clear from Figure 2. According to the national accounts about four per cent of national income is invested abroad each year. In particular, high growth in neighbouring China has drawn Japanese investment away from the domestic economy to the extent that the revenues earned by Japan's most iconic corporations come primarily from abroad and the collective share of foreign output of Japanese firms has risen to a fifth (IMF 2014a: Figure 2). In association with this there has been a substantial expansion in the proportion of Japanese wealth that is held abroad, as suggested by Figure 3.[4]

The large share of Japanese wealth that is held abroad is of particular importance for the potential level of domestic growth because it means that improvements in home efficiency can attract a portfolio rebalancing that raises domestic investment considerably, both expanding and modernising the domestic capital stock. Of course it is true that any economy can enjoy an investment response to home productivity improvements. But, idiosyncratically in the Japan's case, the capital expansion would be largely domestically owned and so not demand capital income repatriation. This makes doubly important the intent of third arrow

[3] The core idea is "creative destruction", by which is meant that innovation is induced by competitive forces and that, while any single innovation confers rents in the short run, subsequent competitive innovations "destroy" those rents, maintaining efficiency (Schumpeter 1942: 82-83).

[4] Indeed, the evidence from Figure 3 suggests that, stagnation notwithstanding, Japan's rate of accumulating wealth did not slow. Rather, investment was redirected abroad, slowing output at home along with the growth of non-capital income.

reforms to improve home efficiency. Our approach to estimating the potential for further growth is to model the whole Japanese economy in a manner that represents both its oligopoly structure and the potential for changes in its external balance.

An important contribution to economy-wide approaches with explicit representation of imperfect competition is that by Blanchard and Giavazzi (2003). They offer an elemental general equilibrium model to investigate the combined effects of product market and labour market regulation. Their closed economy model incorporated non-collusive oligopoly behaviour in the goods market with rents being partially distributed via bargaining in the single factor (labour) market. In this context, one route to more competitive behaviour is to find some mechanism to raise the elasticity of substitution between oligopolistically produced varieties. In the short-run they find that the increased competition is beneficial because it forces firms to lower their mark-up, leading in turn to reduced capital returns but a higher real wage.

In the long run, however, there is exit by firms and reduced product variety. In this case no pure profits are left to erode and there are no long run benefits. If, instead, the government attacks barriers to entry which, in the absence of mandated oligopoly include recurrent fixed costs, the effects are unambiguously welfare improving in the short and long runs. There is an increase in the number of firms, a higher elasticity of demand, a lower mark-up and thus lower unemployment and a higher real wage. While it is not made clear how a government might alter the elasticity of substitution or entry costs, this research signals an improvement over prior studies of competition policy through its characterisation of market structure in an economy-wide context and it is in this spirit that the research presented in this paper has been undertaken.

As in most open economies, overall economic performance is very sensitive to the relativities between home production costs and export prices, and hence to the country's real exchange rate. A standard definition has the real exchange rate as the common currency ratio of the home and foreign GDP price levels:

$$(1) \qquad e_R = \frac{P_Y}{\left(\dfrac{P_Y^*}{E}\right)} = E\,\frac{P_Y}{P_Y^*} \ ,$$

where both the real and nominal exchange rates, e_R and E, are expressed according to the financial convention, so that an appreciation is a rise in value. The real exchange rate is sensitive to both the performance of the non-traded services sector and the government's fiscal position, the latter because the government's expenditure is primarily on domestic, non-traded services and because those services weigh heavily in indices of home costs and prices.[5] Improvements in services productivity, as Parham (2013) suggests took place in Australia during the "golden age" of the 1990s, therefore have major overall economic effects by reducing domestic costs relative to prices abroad and hence by stimulating exports and investment. This can be seen from the simple Salter diagram graphics in Figure 4.[6] Employing the abstraction that goods and services are either tradable or not, the effect of improved productivity in non-traded services is to shift the production possibility frontier to the right, reducing the price of non-traded services relative to tradables, whose price is fixed abroad, and hence depreciating the real exchange rate.

A way of thinking about Figure 4, which embodies the oligopoly behaviour central to this study, is to consider privatisation and competition policy as reducing oligopoly rents and therefore raising intermediate and final demand for services. As prices approach unit costs there is an allocative efficiency gain, along with reduction in those costs due to the capture of scale economies. The initial excess profits had been achieved by supplying less service output. The policy change therefore facilitates the rightward shift in the production possibility frontier shown in the figure without any requirement for associated technical change. In what follows this underlying behaviour is represented in a more detailed numerical model.

3. Rents and Concentration in Japanese Manufacturing and Services

The objective here is to charaterise the oligopolistic nature of the Japanese economy. We use as our source the Nikkei NEEDS *FinancialQUEST* data resource, choosing the years 2004 – 2014. The data are drawn from financial statements (profit and loss statements and cash flow statements) for all listed firms, and from stock market data (market capitalisation). It covers 2776 firms in 20 sectors. The data are used to derive two sets of information essential to our subsequent analysis, namely the levels of pure profits (economic rents) enjoyed in each

[5] The influence of government expenditure has been referred to as the "Froot-Rogoff" effect, following Froot and Rogoff (1995) and, more recently, Galstyan and Lane (2009). Of course, in the short run fiscal expansions can also appreciate real exchange rates by raising home bond yields and drawing foreign investment, thus switching demand into the home economy (Mundell 1963 and Fleming 1962).
[6] The diagram is widely used but stems from the classical article, Salter (1959).

industry and the corresponding degree of concentration in each. We are also interested to represent the level of retained earnings (corporate saving) in each industry.

The accounts are first used to derive the levels of gross capital payments after depreciation. These payments are then sub-divided between interest payments on corporate debt, company tax, distributed earnings (dividends) and retained earnings. Also drawn from the accounts are the net and gross levels of outstanding debt. From these it is a simple matter to derive the rate of corporate saving out of capital income net of company tax and depreciation. As represented by these data, the implied corporate saving rate averages at about two thirds of this income. If this corporate behaviour is reflective of all firms it implies that corporate saving near a tenth of GDP, an average rate that is above the corresponding levels in other advanced economies.[7]

To obtain the pre-tax level of pure profits in each industry we first divide total capital income after depreciation by the total of the industry's capitalisation and its net outstanding debt in the previous year to obtain a gross rate of return. Rents are then indicated by the difference between this rate of return and that demanded by the market, which we estimate as the interest rate demanded by the firms' creditors. This, in turn, is the firm's annual gross interest payment divided by its gross debt. The difference between the two rates thus obtained is the over-market yield. It is shown for 2004 and 2014 in Figures 5 and 6, confirming some stability through time and across industries, except for the electricity sector, which was hardest hit by the 3/11 tsunami. We then convert the over-market rate of return into a share of total capital income (net of depreciation but gross of interest and tax). For the firms in our sample, this share is quite high, averaging at two thirds. Like corporate saving, if this proportion is representative of all firms, then total rents are also substantial nationally, rising through time either side of the GFC with a benchmark level around 13 per cent of GDP (Figure 7).

Finally, the Nikkei data allow us to examine industry concentration, at least for the listed firms. Here we report concentration in total sales, the cumulative distributions of which are summarised in Figure 8. Despite the large size of Japan's economy, most industries are dominated by relatively few firms. Apart from the collectives "other manufacturing" and "recreation", in which two thirds of the revenue is earned by 58 and 50 firms respectively, the

[7] We suspect this high level of retained earnings reflects idiosyncratic contrasts between Japan's rates of company tax, capital gains tax and the taxation treatment of deceased estates, along with its comparatively weakly regulated corporate governance (Aoyagi and Ganelli 2014). This is not an issue that our modelling can readily address, though we suspect the lowering of company tax rates will reduce corporate saving rates.

remaining industries have two thirds of their revenue captured by less than 25 firms. In some key sectors the concentration is very high. Two thirds of the revenue is earned by six firms or less in "energy", "electronics", "transport equipment", "textiles", "electricity", "gas" and "telecommunication". In translating these findings into our economy-wide analysis we are constrained to make the strong assumption that the listed firms in our sample are representative of all firms in the Japanese economy.[8]

4. An Oligopoly Model of the Japanese Economy

The model is structured in the spirit of Blanchard and Giavazzi (2003) in that it emphasises oligopoly rents and the effects on these of industry policies. While their treatment of regulation is directed to entry restrictions, here the regulatory armoury extends to privatisation, pricing surveillance and price-cap regulations. Like that of Balistreri and Markusen (2009), the model separates subnational product differentiation from that between home and foreign products and, with generally higher elasticities of substitution between home products than internationally, it yields important relationships between industry policy, the terms of trade and the real exchange rate. The links between foreign ownership, trade policy, domestic market structure and "x-efficiency" (Markusen 2004, Markusen and Stahler 2011) are not directly explored in this model though efficiency gains from increased lengths of run ("scale") in the presence of fixed costs are an important behavioural element. Financial capital that is either domestically or foreign owned can flow into the economy in the long run but there is no endogenous distinction between FDI as green-field investment or acquisition. Unlike prior works of this type, our model embodies an elemental financial market that motivates cross border financial flows and changes in the working capital stock in long run closures.

Importantly for the results obtained, the oligopoly behaviour is embedded within a multi-sector general equilibrium structure which offers a complete representation of inter-industry flows. Most oligopolistic (network) services have tended to be comparatively little exported and primarily used as domestic intermediate inputs. This means that, while distortionary pricing by oligopolies has modest direct effects (on final product mark-ups) it has very

[8] No complete dataset on private (unlisted) firms is available and so no clear sense of the bias involved in this assumption can be gleaned. Anecdotal evidence highlights some large private firms that are very profitable while at the same time the large listed manufacturers rely extensively on small private firms to supply components and these are likely to be competitive, earning little more than market rates of return.

substantial indirect effects (via mark-ups on intermediates) that build on one another economy-wide. A key consequence of this is that, when initial mark-ups are large, more competitive pricing yields effects on overall economic activity that are very much greater than the neoclassical gains in allocative efficiency from changes in taxes, tariffs or even the terms of trade. This is the more so in long run closures where improvements in efficiency encourage enlargement of the capital stock, representing a rebalancing of Japan's portfolios away from foreign toward domestic productive assets.[9]

3.1 Overview of model structure

The scope of the model is detailed in Table 1. Firms in all industries are oligopolistic in their product pricing behaviour with the degree of price-setting collusion between them represented by conjectural variations parameters that are set to account for the degree of regulatory surveillance. Each firm bears fixed capital and labour costs, enabling the representation of unrealised economies of scale. In making this representation, it is recognised that some industries are comparatively competitive, generating low pure profits and carrying low fixed costs. This is represented in the model via parameterisation (larger firm numbers and lower fixed costs per firm), rather than distinct behavioural assumptions.

Home products in each industry are differentiated by variety via CES nests and output is Cobb-Douglas in variable factors and intermediate inputs. While firms are oligopolists in their product markets they have no oligopsony power as purchasers of primary factors or intermediate inputs.[10] A complete system of inter-industry flows is included so as to represent the dependence of tradable industries on inputs from abroad and from the heavy manufacturing and services sectors. The economy modelled is "almost small", implying that it has no power to influence border prices of its imports but its exports are differentiated from competing products abroad and hence face finite-elastic demand.[11] The main reason that the

[9] In an application of a more elemental but similar model to Australia, Tyers (2015) shows that, in general equilibrium, widespread distortions due to collusive oligopoly pricing can reduce real GDP by as much as a third in the long run. Large effects from cuts to oligopoly rents stem from the closer association of costs and prices. Since export demand is comparatively elastic, the resulting declines in costs raise the (variable) capital stock and this facilitates expanded export and output volumes. The output changes then yield a further set of efficiency gains, which come from scale effects: longer production runs in the presence of recurrent fixed costs.

[10] Imports in each industrial category are seen as homogeneous, differentiated from home products as a group, so that import varietal diversity never changes. Since all home varieties are exported there is no movement on the "extensive margin" of the type that is evident in the models of non-homogeneous export industries by Melitz (2003) and Balistreri et al. (2007).

[11] The effective numeraire is the import product bundle. Consumer and GDP price indices are constructed for real aggregations, following the practice in national modelling since Dixon et al. (1982) and Harris (1984).

"almost small" assumption is so common in national modelling is that countries specialise in their exports far more than they do in their imports.

The consumer price index is constructed as a composite Cobb-Douglas-CES index of post-consumption-tax home product and post-tariff import prices, derived from the aggregate household's expenditure function. This formulation of the CPI aids in the analysis of welfare impacts. Because collective utility is also defined as a Cobb-Douglas combination of the volumes of consumption by generic product, proportional changes in overall economic welfare correspond with those in CPI-deflated GNP.[12]

Government expenditures comprise those directly on goods and services and CPI-indexed transfers to households. Expenditure on goods and services is also via nested CES preferences and government revenue stems from a tax system that includes both direct (income) taxes levied separately on labour and capital income and indirect taxes, including those on consumption, imports and exports.[13] A capital goods sector is included which translates investment expenditure into product and service demands, again using a nested CES preference structure. The level of total investment expenditure has Q-like behaviour, being influenced positively by home rates of return on installed capital and negatively by a financing rate obtainable from an open "bond market" in which home and foreign bonds are differentiated. Savings are sourced from the collective household at a constant rate and from corporations at industry-specific rates applying to the magnitudes of after tax accounting profits earned.[14] Foreign direct investment and official foreign reserve accumulation are both represented, to complete the external financial accounts.[15]

---

[12] When the utility function is Cobb-Douglas in consumption volumes, the expenditure function is Cobb-Douglas in prices. If the consumer price level, P^C, is defined as a Cobb-Douglas index of prices, the equivalent variation in income can be expressed in terms of the proportional change in this index. Thus, following any shock, the income equivalent of the resulting changes to income and prices is:

$$\Delta W = Y_1 - Y_0 + EV\left(P_0^C, P_1^C, Y_1\right) = Y_1 - Y_0 - Y_1 \frac{\Delta P^C}{P_1^C} \ ,$$

which can be expressed in proportional change form as:

$$\frac{\Delta W}{W} = \frac{Y_1\left(1 - \frac{\Delta P^C}{P_1^C}\right) - Y_0}{Y_0} \cong \frac{\Delta Y}{Y_0} - \frac{\Delta P^C}{P_1^C} \ .$$

This is, approximately, the proportional change in real GNP.

[13] Income taxes are approximated by flat rates deduced as the quotient of revenue and the tax base in each case. Capital income tax rates vary by industry in which the income is earned.

[14] For this the Nikeii data is again used to determine the allocation by firms of after tax profits as between dividends and retained earnings.

[15] Hereafter the capital, financial and official sub-accounts of the balance of payments will be referred to as the "capital account".

3.2 Short run macroeconomic behaviour

Short run model closures fix productive capital use in all industries but allow investment that would affect production in the future. Central is the open economy capital market which is built around the market clearing identity that includes inward and outward private financial flows. Thus:

$$(2) \qquad I(r^{ce},r) = S_D\left(Y_{DH},\pi,G\right) + FI_{Inward}\left(r,r^*,\hat{e}_R^e\right) - FI_{Outward}\left(r,r^*,\hat{e}_R^e\right) ,$$

where r is the home real financing rate (bond yield), r^* is the real (after foreign tax) yield on bonds abroad (home and foreign assets being differentiated and so offering different yields), π is accounting profit and $\hat{e}_R^e$ is the expected proportional change in the real exchange rate, defined in (1). Total domestic saving is the sum of saving by households, corporations and government: $S_D = S_H\left(Y_{DH}\right) + S_C\left(\pi\right) + \left(T - G\right)$, where Y_{DH} is home household disposable income. The household saving rate is assumed fixed, so that $S_H = s_H Y_{DH.}$ Retained earnings, or corporate saving, S_C, is assumed to remain a fixed proportion of pre-tax accounting profit at rates that are industry specific, calibrated separately for each industry.

The rate r^{ce} is the expected average net rate of return on installed capital, which takes the following form at the industry level:

$$(4) \qquad r_i^{ce} = \frac{P_i^{Ye} MP_i^K}{P^K} - \delta_i ,$$

where P^K is the current price of capital goods,[16] P^{Ye} is the product price level expected to prevail upon gestation and δ is the rate of depreciation. An average of the sector-specific rates, r_i^{ce}, is taken that is weighted by value added in each industry to obtain the economy-wide level r^{ce}. Investment expenditure, I, is then determined by:

$$(5) \qquad I = P^K I_0 \left(\frac{r^{ce}}{r}\right)^{\varepsilon_V} .$$

This relationship is representative of "Q" theory in the sense that the numerator embodies the present value of assets while the denominator represents current financing costs. It constrains the investment response to a change in either the rate of return or the financing rate, offering a reduced form representation of either gestation costs or expectations over short run

[16] This is a composite of the prices of all products acquired for investment.

consequences of installation for the rate of return. Note that there is no adjustment for the domestic company tax rate, since it is assumed that all elements of domestic firms' portfolios generate income subject to the same tax rate.

In our comparative static analysis inward and outward financial flows are motivated by changes in the level of an interest parity function that incorporates the difference between the home and foreign real bond yields and real exchange rate expectations. Two relationships are used to allow for reversals of the direction of net flow in response to shocks, differences in policy obstructions as between inward and outward flows and the recognition that outward flows are portfolio management decisions at home while inward flows are divided between home and foreign portfolio decisions. Inward flows take the form:

$$(6) \qquad FI_{Inward} = FI^{0}_{Inward} \left(\frac{\overline{r}^{ce} / \overline{\tau}_K + \hat{e}^{e}_{R}}{r*} \right)^{\varepsilon_{FI}}, \quad \varepsilon_{FI} > 0,$$

where FI^{0}_{Inward} is the initial inflow level, $\overline{r}^{ce}$ is the average expected rate of return on home capital, weighted across industries by gross revenue and $\overline{\tau}_K$ is the average tax rate on capital income, also weighted across industries by gross revenue. Correspondingly, outward flows are:

$$(7) \qquad FI_{Outward} = FI^{0}_{Outward} \left(\frac{r / \overline{\tau}_K + \hat{e}^{e}_{R}}{r*} \right)^{\varepsilon_{FO}}, \quad \varepsilon_{FO} < 0,$$

where, the more liberal the capital account the larger is the magnitude of the elasticity ε_{FO}. Note that the home yield driving these flows is the interest, or financing, rate and not the expected rate of return on home capital, as in (6). This reflects our assumption that outward investment is rebalancing away from assets that earn the home yield on average, while inward investment is primarily FDI, which is motivated by longer run expectations about rates of return.[17]

The capital market clearing identity (2) then determines the home real interest rate and the magnitude of the external financial deficit ($FI_{Outward} - FI_{Inward} = S_D - I$). This is then equal in magnitude to the current account surplus [$X - M + N$, where N is net factor income from

[17] This assumption turns out to be influential in the results obtained, raising the possibility that changes in home efficiency can raise both inflows and outflows at the same time.

abroad[18]]. The model is essentially Walrasian in that shocks originating in saving and investment, and hence in external flows, cause home (relative to foreign) product prices (and hence the *real* exchange rate) to adjust sufficiently to clear home markets and preserve the balance of payments.[19]

3.3 Total capital use in the long run

While the home capital stock is fixed in the short run, flows such as those represented in (6) and (7) cause an eventual change in the level of home capital use in long run closures. Behaviour is then required to determine the level of total home capital use on the one hand (K^T) and the Japanese owned component of it on the other ($K^D=K^T-K^F$). The level of K^D is significant for Japan since its considerable external holdings, mentioned earlier do not justify the assumption that it is constant in the long run. Total capital use in the long run is set to equate a fixed external (after tax) rate of return on capital to home after tax "market" yields, defined *net* of pure profits. This ensures that capital moves to equate *market* after-tax rates of return at home and abroad while allowing oligopoly behaviour to generate rents in the home economy.

(8) $$\frac{R_i/\tau_i^K}{P_K} - \delta = r^* \ ,$$

where the home capital rental rate is $R_i = P_i^P \, MP_i^K \left(K^T\right)$, τ_i^K is the power of the industry-specific capital income tax rate. These relationships ensure that reductions to the rate of capital income taxation see falls in the required pre-tax rate of return demanded domestically and increases in capital use. The home-owned share of this capital use responds in the long run as follows:

(9) $$K_D = K_D^0 \left(\frac{RGNP}{RGNP_0}\right)^{\varepsilon_{KDY}} \left(\frac{K^T}{K_0^T}\right)^{\varepsilon_{KDT}} , 1 > \varepsilon_{KDY}, \varepsilon_{KDY} > 0 \ .$$

This relationship allows long run accumulation of home-owned capital to respond to rises in real home income as well as to chase returns in the manner of the overall level of capital use.

[18] As modelled, *N* comprises a fixed net private inflow of income from assets abroad and fixed aid to the government, less endogenous repatriated earnings from foreign-owned physical capital.
[19] The parameters in equations (6) and (7) are tabulated in Appendix 3, available on application from the authors.

Of course, changes in K_D do not change capital use in the economy but they do change repatriated capital income and therefore affect the levels of GDP and the real exchange rate.[20]

3.4 Oligopoly in supply

Firms in each industry supply differentiated products. They carry product-variety-specific fixed costs and interact on prices. Cobb-Douglas production drives variable costs so that average variable costs are constant if factor and intermediate product prices do not change but average total cost declines with output. Firms charge a mark-up over average variable cost which they choose strategically. Their capacity to push their price beyond their average variable costs without being undercut by existing competitors then determines the level of any pure profits and, in the long run, the potential for entry by new firms. Excessive entry is possible in the sense of Mankiw and Whinston (1986) when shocks favour profitability but pure profits are constrained by free entry. Production runs contract and average fixed costs rise. The analysis presented here, however, emphasise cases in which the number of firms remain exogenous.

Each firm in industry i is regarded as producing a unique variety of its product and it faces a downward-sloping demand curve with elasticity ε_i (< 0). The optimal mark-up is then:

$$(10) \qquad m_i = \frac{p_i}{v_i} = \frac{1}{1+\dfrac{1}{\varepsilon_i}} \qquad \forall i \quad ,$$

where p_i is the firm's product price, v_i is its average variable cost and ε_i is the elasticity of demand it faces. Firms choose their optimal price by taking account of the price-setting behaviour of other firms. A conjectural variations parameter in industry i is then defined as the influence of any individual firm k, on the price of firm j: $\mu_i = \partial p_{ij} / \partial p_{ik}$.

These parameters are exogenous, reflecting industry-specific free-rider behaviour and the power of price surveillance by regulatory agencies. The Nash equilibrium case is a non-collusive differentiated Bertrand oligopoly in which each firm chooses its price, taking the prices of all other firms as given. In this case the conjectural variations parameter μ is zero. When firms behave as a perfect cartel, it has the value unity. It enters the analysis through the varietal demand elasticity, formulated in Appendices 1 and 2.

[20] Values for the two elasticities in equation (9) are tabulated in Appendix 3, available on application from the authors.

Critical to the implications of imperfect competition in the model is that the product of each industry has exposure to five different sources of demand. The elasticity of demand faced by firms in industry i, ε_i, is therefore dependent on the elasticities of demand in these five markets, as well as the shares of the home product in each. They are final demand (F), investment demand (V), intermediate demand (I), export demand (X) and government demand (G). For industry i, the elasticity that applies to (8), above, is a composite of the elasticities of all five sources of demand.

$$\varepsilon_i = s_i^F \varepsilon_i^F + s_i^V \varepsilon_i^V + s_i^I \varepsilon_i^I + s_i^X \varepsilon_i^X + s_i^G \varepsilon_i^G, \qquad \forall i \tag{11}$$

where s_i^j denotes the volume share of the home product in market i for each source of demand j. These share parameters are fully endogenous in the model and the elasticities depend on component elasticities of substitution and the conjectural variations parameters μ_i.

Thus, the strategic behaviour of firms, and hence the economic cost of oligopolies, is affected by collusive behaviour on the one hand and the composition of the demands faced by firms on the other, both of which act through the average elasticity of varietal demand. The collusive behaviour enters through conjectural variations parameters, μ_i , and composition through the demand shares s_i^j. Of course, the capacity firms have to reduce their prices also depends on the fixed cost burden carried by each industry and hence on firm numbers.

To study the effects of price-cap regulation a Ramsey mark-up, m_i^R is formulated as:

$$m_i^R = \frac{afc_i + v_i}{v_i}, \quad \forall i \ , \tag{12}$$

where afc_i is average fixed cost and v_i is average variable cost in industry i. Compromise mark-ups can be simulated by altering the parameter φ_i in an equation for the "chosen" mark-up:

$$m_i^C = (\varphi_i - 1) m_i^R + (2 - \varphi_i) m_i \quad \forall i \ . \tag{13}$$

Thus, when $\varphi_i = 1$, $m_i^C = m_i$, thus maximising oligopoly profits, and when $\varphi_i = 2$, $m_i^C = m_i^R$, eliminating pure economic profits altogether.

3.5 The database and its representation of broad economic structure

The flow data for the current model originates from the GTAP Version 7 global database for 2007.[21] It combines detailed bilateral trade, transport and protection data characterizing economic linkages among regions, together with individual country national accounts, government accounts, balance of payments data and input-output tables which enable the quantification of inter-sectoral flows within and between regions. Factor shares and input output coefficients from these 2007 data are combined with national accounts and balance of payments data to construct the complete social accounting matrix. Key structural elements are evident from Table 2.

Factor shares of value added in each industry are important in interpreting the results. They are listed in Table 3. These data confirm that factor intensity is highly variable across industries with several manufacturing industries and the network services very capital intensive, while production labour dominates in agriculture and textiles. These relative intensities drive the distribution of output changes and factor rewards in response to reform shocks and so are central in explaining heterogeneity across industry effects.

3.6 Calibration of pure profits and oligopoly parameters

The flows represented in the database do not reveal details of intra-sectoral industrial structure. To represent oligopolistic behaviour, additional information is required on effective firm numbers, pure profits, fixed costs and minimum efficient scale for each industry. With the support of the Nikkei Database[22] on listed firms in Japan these variables are calibrated in the following manner. First, pure profits are required as a share of total revenue in each industry. This is needed to complement the flow database by splitting capital payments between market and over-market returns. It is also a starting point for calibrating industry competitive structure. Second, rough estimates are required of strategically interacting firm numbers in each industry and their corresponding conjectural variations parameters. Again, the Nikkei data provide numbers and sizes of listed firms the concentration of which is suggested in Figure 8. Most Japanese industries are dominated by a few firms, even if the total numbers are large. It is very likely the bigger firms that most influence prices, as discussed in Appendix 3.

Third, to complete the formulation of industry demand elasticities, values of elasticities of substitution between home product varieties on the one hand, and between generic home and

---

[21] Documentation on the GTAP 7 Data Package may be viewed at: <http://www.gtap.agecon.purdue.edu/databases/>.

[22] Nikkei NEEDS database through Financial QUEST.

foreign products on the other, are required for each industry. These are initially drawn from the estimation literature.[23] Preliminary industry demand elasticities are then calculated for each source of demand (final, intermediate, investment, government and export). Initial shares of the demand facing each industry are then drawn from the database to enable the calculation of weighted average demand elasticities for each industry. Preliminary mark-up ratios are deduced from these, via (10). The initial elasticities and mark-up ratios for each industry are listed in Table 4.[24] This completes the initial demand side calibration. Work on the supply side begins with the application of mark-up ratios to deduce the initial level of average variable cost in each industry. Then the proportion of pure profits in total revenue is deducted from the mark-up to arrive at fixed cost revenue shares.[25] Total recurrent fixed cost in each industry then follows. At this point these results are reviewed and, where conflicting information is available on shares of recurrent fixed costs in total turnover, the calibration is recommenced with new initial elasticities.[26] The initial levels of pure profits, the shares of fixed and variable costs and industry scale are listed in Table 5.

Importantly for the interpretation of later results, the five sources of demand facing firms in each industry are not equally elastic. As detailed in Appendix 3, export and final demand are the most elastic and intermediate demand the least.[27] It is further evident that, where exports dominate demand firms face larger elasticities and charge smaller mark-ups. Consistent with these observations, pure profit shares of total revenue tend to be smaller for export-oriented industries and larger for the network services.

3.7 The closures used

In the experiments to be presented both long and short run closures are used. The details of these are indicated in Table 6. In essence, long run closures have total capital use, and its distribution between industries, endogenous with foreign capital being supplied elastically at a common external, after-tax rate of return. Labour supplies are fixed and wages endogenous.

---

[23] Summaries of this literature are offered by Dimaranan and McDougall (2002) and at http://www.gtap.purdue.edu/databases/.

[24] These elasticities appear large in magnitude at first glance because they do not represent the slopes of industry demand curves for generic goods. Rather, they are the elasticities faced by suppliers of individual varieties and are made larger by inter-varietal substitution.

[25] Fixed costs take the form of both physical and human capital costs using the rule of thumb (based on estimates by Harris and Cox, 1983) that physical capital has a fixed cost share of 5/6.

[26] The actual calibration process is yet more complex than this because the elasticities of intermediate demand depend on intermediate cost shares, which depend on the variable cost share. It is therefore necessary to calibrate iteratively for consistency of elasticities and shares.

[27] Export demand is found to be more elastic because of the larger number of substitutable product varieties available abroad while intermediate demand is relatively inelastic because of firms' reluctance to alter arrangements for intermediate input supply which may depend on location or "just in time" relationships.

By contrast, short run closures keep total capital use, and its industrial distribution, fixed while allowing production labour use to vary given an exogenous real wage set at its initial level. The fiscal policy closure is the same in all experiments, simply maintaining a constant fiscal surplus throughout, even where company tax rates are reduced.

5. Analysis of Reforms

Three types of analysis are undertaken. The first is labour market expansion of the type that might be expected from greater female labour force participation or increased immigration. The second concerns the government's commitment to reducing capital income tax rates, which are inefficient in the neoclassical sense because of the high elasticity of capital supply to the economy. Finally, we investigate reforms to competition policy that are designed to transform rents into productive economic activity. In each case we examine the short run effects and, as detailed in Table 6, the effects under long run closures with fixed firm numbers (oligopoly) and with free entry and exit.[28]

5.1 Labour force expansion

Because of uncertainty about the scale of increased participation that might be expected from changes in labour market policy we illustrate the potential effects by expanding the supply of both production and professional (skilled) labour by five per cent. The balance of this shock across skill levels accords with evidence that a large proportion of potential female participants is professionally trained (Steinberg and Nakane 2012; Kinoshita and Guo 2015) and that it is unlikely that any new immigration will supply less than professionally trained workers. The results are summarised in Table 7. They show that a rising supply of labour is expansionary overall, as expected. Less anticipated, however, is the result that the associated declines in real consumption wages are either non-existent or very small. This arises at both lengths of run because the additional labour raises the expected yield on new investment and so either expands investment (short run) or the capital stock (long run). It also occurs because there is an efficiency dividend, due in the short run and the long run oligopoly case to increased production scale in both tradable products and less tradable services and in the long run free entry case to reduced capital rents and more competitive pricing.

[28] We tabulate and discuss the aggregate effects of each reform but, for economy of presentation, we do not detail the effects on individual sectors. These are available in detailed appendices that can be supplied on application to the authors.

Capital owners are substantial gainers in the short run. The investment influx appreciates the real exchange rate and reduces export competitiveness, contracting the current account surplus.[29] The real skilled wage therefore falls slightly. The welfare of employed production workers is not impaired, however, though the assumption of a fixed real production wage ensures that only half the additional supply is actually employed. The long run oligopoly case allows the short run burst of investment to settle and the working capital stock to enlarge. This is the main source of greater real output and aggregate welfare. So long as this does not foster new entries, the key effects are substantial increases in scale and reductions in the fixed cost burden on GDP. The improved efficiency reduces costs and depreciates the real exchange rate, fostering export growth and enlarging the current account surplus. Capital returns and rents increase while worker welfare is reduced only marginally. When free entry is allowed, the increase in rents is dissipated, though this occurs in part because the new entries raise the recurrent fixed cost burden but also in part because pricing is more competitive. Because fixed costs are intensive in both production and professional labour, and because the new entries detract little from the real depreciation, the expansion is almost as large as in the oligopoly case but it secures net increases in real consumption wages for both production and professional workers.

5.2 Reduced company tax rates

The post-concession tax rates on net capital income in our Nikkei sample of listed firms vary between 30 and 45 per cent of accounting profits after depreciation. These are modelled as powers (with τ_K ranging between 1.30 and 1.45) and these powers are reduced across the board by five per cent. The effects of this shock are summarised in Table 8. Importantly, we do not assume that the consequence of this is merely a rise in the fiscal deficit or even a reduction in government expenditure on goods and services. Instead, it is assumed that this reduction in company tax is paid for by raising the power of the consumption tax rate, so that there is no change in the fiscal deficit. This tax mix switch causes a widening of the gap between the consumer and producer price levels, raising the cost of living. The results show that the power of the consumption tax would need to rise by around eight per cent and this substantial change necessarily impairs welfare by the measures applied. Of course, partially

[29] It is notable here that both financial inflows and outflows increase. This stems from the assumptions embodied in (6) and (7). Increased home production raises both household and corporate saving, which reduces the home financing rate. Home portfolios therefore rebalance away from home bonds. The additional labour raises expected returns, however, and this motivates new investment inflows from abroad, combined with the return of some foreign Japanese holdings.

offsetting this in the short run is an influx of mostly externally financed investment, attracted by higher after-tax returns.

In the long run the capital stock expands because the tax reform ensures that financial arbitrage yields lower pre-tax rates of return on capital. In all cases there is growth in real GDP, though the purchasing power of GNP over home consumer goods and services is reduced, along with real consumption wages of both production and professional workers. In all cases the reduced tax burden and in the long run the greater capital stock sees reduced capital rental rates and therefore lower production costs, supporting real depreciations that expand exports. The level of government revenue expands in each case, transfers (pensions) are held constant relative to the consumer price level, thus raising government expenditure on goods and services. This suggests scope for fiscal savings to address Japan's high level of net government debt.

The effects on efficiency are mixed. In the short run mark-ups rise and scale falls overall while the level of pre-tax pure profits rises (though by less than real GDP). There is therefore no efficiency dividend. In the long run oligopoly case the expanded capital stock ensures that production and "scale" levels rise, reducing average costs, even though pricing is less competitive in the services sector. With free entry the expansion of firm numbers by a quarter ensures that pricing is more competitive but fixed costs rise and the real depreciation is more modest and exports grow less. Pure profits fall significantly as does the overall rate of return on capital, which is inclusive of pure profits. Home capital owners earn nearer to market returns on their capital and they, along with home workers, pay more for home products after consumption tax.

Although the precise relationship between the tax system and corporate saving in Japan is not explored here, we examine the possibility that reduced company tax rates might be associated with direct changes in incentives along with corporate governance reforms (Aoyagi and Ganelli, 2014) that substantially reduce retained earnings. The effects of this combination are summarised in Table 9. While the reduced corporate saving inverts Japan's current account, in the long run the increased domestic expenditure that results from consumption expenditure being governed by the lower household saving rate boosts real output in most industries and real GDP. The larger increases in output raise additional government revenue which then demands only modest increases in the consumption tax rate. This means that labour demand rises while at the same time the cost of living rises only modestly, and so welfare gains accrue to both production and professional workers. Thus, overall, the combination of taxation and corporate governance reforms offers substantial real growth in Japan's economic activity, with reduced corporate saving rates allowing a further boost in output that extends to real gains to workers.

5.3 Competition policy reforms

Three experiments are offered to illustrate policy approaches to eliminating the considerable oligopoly rents identified in Section 3. In the first instance we imagine tighter pricing surveillance. We then consider price cap regulation that reduces the gap between oligopoly prices and average costs. Finally, since it is widely understood that there is scope for considerable improvements in productivity in Japan's services that might be realised as a consequence of competition policy and the associated foreign investment this sector receives.

Tighter pricing surveillance would be consistent with implementation of trade practices law designed to limit collusive pricing by firms. The effects of this are indicated by reductions in the conjectural variations parameter that links pricing by one firm in an oligopoly to pricing by others. Recall that this parameter varies between zero, representing non-collusive (Nash) oligopoly and unity, representing cartel behaviour. Here we consider surveillance that reduces the values of this parameter by 20 per cent across the board. The results are summarised in Table 10. They show consistent increases in real GDP and the welfare measures in the short and long runs. Capital owners have reduced pure profits, but real GNP and real consumption wages all rise. Thus, overall gains are accompanied by some redistribution of benefits in favour of workers. As with the earlier experiments, the efficiency gains that stem from tighter surveillance raise capital returns and lead to increased investment and a reduced current account surplus in the short run. In the long run capital stock levels are larger and the additional efficiency ensures lower real exchange rates and better export performance, hence expanded current account surpluses. The efficiency gains stem from more competitive pricing (reduced mark-ups) and increased production scale. In the long run with free entry sees firms exit, enlarging the scale gains and reducing the collective fixed cost burden.

A common extension of trade practices law in most advanced economies is price cap regulation, which fixes prices so as to control the margin between prices and average costs. In the experiment carried out this is achieved by shocking up the parameter φ_i in equation (13) by 20 per cent, thereby reducing the margin of prices over average costs by this proportion. The results are summarised in Table 11. Their form is similar to the results from tighter pricing surveillance in that there is more competitive pricing and improved industrial scale, which collectively raises investment returns and, in turn, encourages investment in the short run and larger capital stocks in the long run. In the short run the investment surge appreciates the real exchange rate but, in the long run, the reduced costs depreciate the real exchange rate and the current account surplus is larger. Here, the shock is not simply to the conjectural variations parameter (which influences chosen mark-ups) but directly to the price-average cost margins. The effects for the same proportional shock are therefore larger. Free entry in the long run offers particularly strong results, aided by the consolidation of production amongst firm numbers reduced by almost a third, with the most extensive consolidations in the service industries: telecommunications, finance, business services and recreation.[30]

In a final experiment we examine the implications of combining tighter price cap regulation with improved technical efficiency in services. This implies that the more competitive environment, combined with the infusion of new physical capital, encourages improvements in "x-efficiency" within the services industries. The effects from the 20 per cent reduction in price-average cost margins and rises in technical efficiency of five per cent across the board are summarised in Table 12. They show very large expansions in real GDP and in the measures of economic welfare, both in the short and long runs. Capital owners gain least as returns rise on greater capital volume but pure profit margins decline. Workers enjoy improvements in real wages by nearly a quarter in the long run.[31] Importantly, the impact of the improvements in services productivity is larger than that of the forced competitive pricing. Indeed, the comparison of the results in Tables 11 and 12 suggests the elasticity of real GDP to services productivity has a value of about two, while the corresponding elasticity for real wages is near three.

6. Conclusion

Third arrow reforms, which emphasise reforms to labour markets, company tax and competition policy, may have been slow to emerge but this analysis shows that they have considerable potential to trigger a period of substantial real expansion of the Japanese economy. Considerable pure profits are shown to be evident across the economy, and most particularly in the notoriously inefficient services sector. Reforms, simulated using an

[30] Industry level results are in Appendix 4, available on application from the authors.
[31] The short run results are unrealistic in that the real production wage is held constant in the face of these substantial shocks and production employment is required to expand by 15 per cent.

economy-wide model that represents oligopoly behaviour, are shown to offer considerable expansion, most particularly those that address competition policy and that raise productivity in the services industries.

The expansion of the labour force, either through increased participation by women or immigration, is shown to be unsurprisingly expansionary overall but efficiency dividends and new investment cause the expected declines in real consumption wages to be small or non-existent. The additional labour raises industry scale and therefore efficiency, boosting the expected yield on home physical capital and encouraging the rebalancing of the collective portfolio toward the home economy. Reducing inefficient capital income taxes and rebalancing the tax system toward more efficient consumption taxation is also shown to offer improved efficiency, again triggering rebalancing of Japan's financial portfolio toward home investment. This stimulates substantial real growth in Japan's economic activity and improvements in real worker incomes, which would be further boosted were the tax reforms combined with changes to corporate governance requirements to reduce the rate of corporate saving rates.

Enhanced oligopoly pricing surveillance, to reduce collusion amongst large firms, is also shown to yield consistent increases in real GDP and the welfare measures in the short and long runs. These are still larger if oligopoly pricing is regulated so as to reduce the price to average cost margin in all industries. In both cases, capital owners enjoy returns that are expanded by capital increases but constrained by reduced pure profits. Nonetheless, real GNP and real consumption wages all rise. The efficiency gains stem from the reduced mark-ups and increased production scale. In the long run firms exit, enlarging the scale gains and reducing the collective fixed cost burden. As for the other reforms, this attracts new investment and more extensive capital use. In the short run the investment surge appreciates the real exchange rate but, in the long run, the reduced costs depreciate the real exchange rate and exports, raising the current account surplus. Free entry in the long run offers particularly strong results, aided by the consolidation of production amongst fewer firms, with the most extensive consolidations in the service industries: telecommunications, finance, business services and recreation.

A final experiment that assumes expanded investment in services leads to technical efficiency gains shows that the effects are potentially very large indeed. Indeed, because of the pervasive use of services as intermediate inputs in all industries, the implied elasticity of real GDP to services productivity has a value of about two, while the corresponding elasticity for real wages is near three. Clearly, a key policy priority must be finding ways to improve services productivity and competitiveness.

References

Aghion, P., U. Akcigit and P. Howitt (2013), "What do we learn from Schumpeterian growth theory?", Harvard University, February.

Aghion, P. and P. Howitt (1992), "A model of growth through creative destruction", *Econometrica*, 60: 323-351.

Aoyagi, C. and G. Ganelli (2014), "Unstash the cash! Corporate governance reform in Japan", IMF Working Paper 14/140, Washington DC, August.

Balistreri, E.J., R.H. Hillberry and T.J. Rutherford (2007), "Structural estimation and solution of international trade models with heterogeneous firms", presented at the 10 Annual Conference on Global Economic Analysis, Purdue University, July.

Beaudry, P. and Portier, F. (2007), 'When can changes in expectations cause business cycle fluctuations', *Journal of Economic Theory*, 135, 458–77.

Clark, G. (1978), "Modern nation preserves outdated attitudes: the key to Japan's economic ills is to correct the inefficiency of its tertiary industry", *The Japan Times*, 23 January.

Kay, C. and T. Clark (2005), *Saying Yes to Japan: How Outsiders are Reviving a Trillion Dollar Services Market*, New York: Vertical Inc, May.

Coleman, W. (2008), "Gauging economic performance under changing terms of trade: real gross domestic income or real gross domestic product?" *Economic Papers*, **27**(4), 101-116, December.

Cooper, R.J., K.R. McLaren and A.A. Powell (1985), "Short-run macroeconomic closure in applied general equilibrium modelling: experience from ORANI and agenda for further research", in J. Whalley and J. Piggott (eds), *New Developments in Applied General Equilibrium*, Cambridge University Press: 411-440.

Dimaranan, B.V. and McDougall, R.A., 2002. *Global Trade, Assistance and Production: the GTAP 5 data base*, May, Center for Global Trade Analysis, Purdue University, Lafayette.

Dixon, P.B., Parmenter, B.R. and J. Sutton (1978), "Some causes of structural maladjustment in the Australian economy", *Economic Papers*, January: 10-26.

Dixon, P.B., Parmenter, B.R., Sutton, J. and Vincent, D.P. (1982), *ORANI, a Multi-Sectoral Model of the Australian Economy*, North Holland, Amsterdam.

Dixon, P.B. and Rimmer, M.T. (2002), *Dynamic General Equilibrium Modelling for Forecasting and Policy: a Practical Guide and Documentation of MONASH*, Contributions to Economic Analysis 256, North-Holland Publishing Company; xiv-338.

Dixon, P.B. and Rimmer, M.T. (2004), "The US economy from 1992 to 1998: results from a detailed CGE model", *Economic Record*, **80** (Special Issue), September, S13-S23.

Fukao, M., 2010, “Service sector productivity in Japan: the key to future economic growth”, Research Institute of Economy, Trade and Industry, IAA, Discussion Paper 10-P-007, August.

Grossman, G.M. and E. Helpman (2014), "Growth, trade, and inequality", NBER Working Papers 20502, Cambridge MA: National Bureau of Economic Research, Inc.

Gunasekera, H.D.B. and R. Tyers (1990), "Imperfect Competition and Returns to Scale in a Newly Industrialising Economy: A General Equilibrium Analysis of Korean Trade Policy", *Journal of Development Economics*, 34: 223-247.

Harris, R.G. (1984), “Applied general equilibrium analysis of small open economies with scale economies and imperfect competition”, *American Economic Review* 74: 1016-1032.

Harris, R.G. and D. Cox (1983), *Trade, Industrial Policy and Canadian Manufacturing*, Toronto: Ontario Economic Council.

Harrison, J., J.M. Horridge, M. Jerie and K.R. Pearson (2013), *GEMPACK Manual*, Centre for Policy Studies, Melbourne, www.monash.edu.au/policy/gpmanual.htm.

Hertel, T.W., (1994), “The ‘pro-competitive effects’ of trade policy reform in a small, open economy”, *Journal of International Economics*, 36: 391-411.

Horridge, M. (1987), “The long term costs of protection: experimental analysis with different closures of and Australian computable general equilibrium model”, PhD dissertation, University of Melbourne.

IMF (2014a), *Japan: 2014 Article IV Consultation Report*, International Monetary Fund Country Report 15/236, Washington DC, July.

IMF (2014b), “Japan’s bumpy growth path puts premium on structural reforms”, *IMFSurvey Magazine*, 31 July.

Ianchovichina, E., J. Binkley and T.W. Hertel (2000), “Procompetitive effects of foreign competition on domestic mark-ups”, *Review of International Economics*, 8(1): 134-148.

Johansen, Leif (1960). *A Multi-Sectoral Study of Economic Growth*, North-Holland (2nd enlarged edition 1974).

Jones, R.W. (1971), “The three-factor model in theory, trade and history”, in J. Bhagwati et al. (eds), *Trade, Balance of Payments and Growth*, Amsterdam: North Holland.

Kinoshita, Y. and F. Guo (2015), “What can boost female labor force participation in Asia?”, IMF Working Paper 15/56, Washington DC, March.

Krueger, A.O. (1977), *Growth, Distortions and Patterns of Trade Among Many Countries*, Princeton N.J., International Finance Series.

McKinnon, R. and Liu, Z. (2013), *Modern Currency Wars: The United States Versus Japan*, ADBI Working Paper, October, 437, Asian Development Bank Institute.

Melitz, Marc J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71(6), 1695-1725.

Menezes, F.M. (2009), "Consistent regulation of infrastructure businesses: some economic issues," *Economic Papers*, 28(1): 2-10, March.

Mundell, R.A., 1963. "Capital mobility and stabilisation policy under fixed and flexible exchange rates", *Canadian Journal of Economics and Political Science*, 29: 475-485.

Nepal, R., F.M. Menezes and T. Jamasb (2014), "Network regulation and regulatory institutional reform: revisiting the case of Australia", School of Economics Discussion Paper 510, University of Queensland, March.

Schumpeter, J.A. (1911), *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*, second publication Harvard University Press 1934, now available from New Jersey: Transaction Publishers, 1983.

______ (1942), *Capitalism, Socialism and Democracy*, now available from London: Routledge, 1976, 437pp.

Segerstrom, P., Anant, T., and Dinopoulos, E. (1990), "A Schumpeterian model of the product cycle", *American Economic Review*, 88: 1077-1092.

Sieper, E., (1982), *Rationalising Rustic Regulation*, Centre for Independent Studies, Sydney.

Steinberg, C. and M. Nakane (2012), "Can women save Japan?", IMF Working Paper 12/248, Washington DC, October.

Tomioka, K. (2015), "Foreign investment, inequality and stagnation in Japan", draft honours thesis, University of Western Australia Business School.

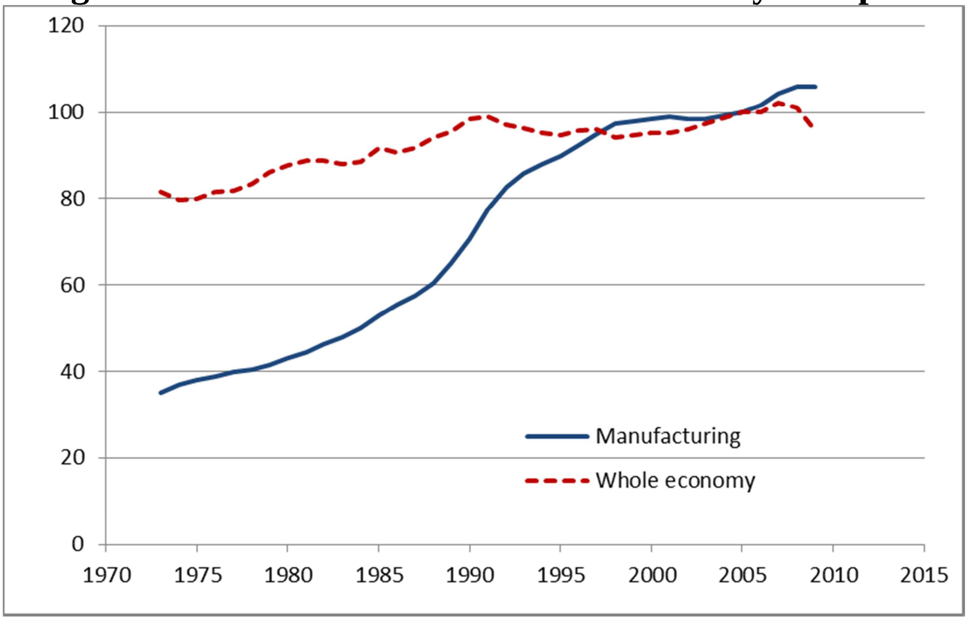
Tyers, R. (2005), "Trade reform and manufacturing pricing behaviour in four archetype Asia-Pacific Economies", *Asian Economic Journal* 19(2): 181-203, 2005.

Tyers, R. (2012), "Japan's economic stagnation: causes and global implications", *The Economic Record*, 88(283): 459-607, December.

Tyers, R. (2014), "Looking inward for transformative growth", *China Economic Review*, 29: 166–184.

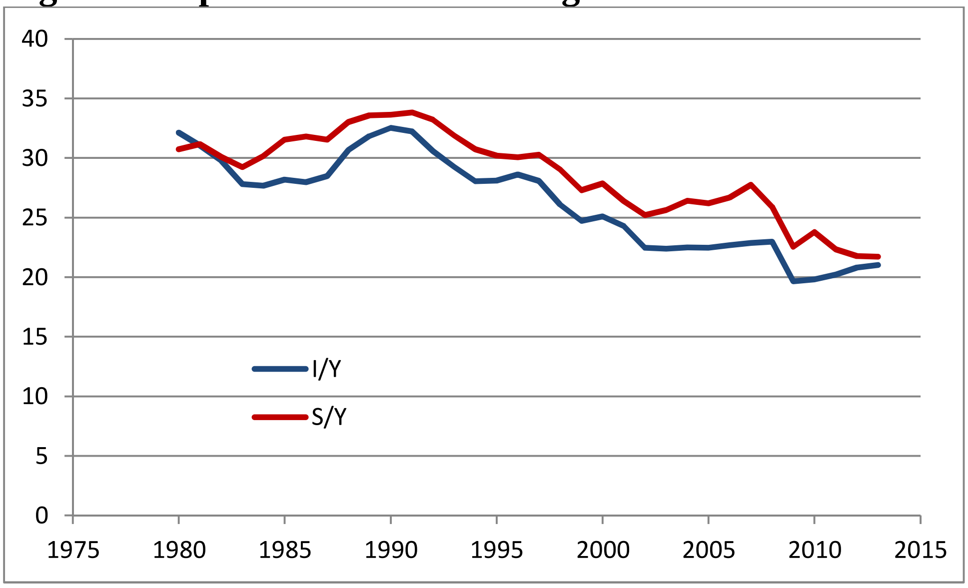
Tyers, R. and J. Corbett (2012), "Japan's Economic Slowdown and its Global Implications: A Review of the Economic Modelling", *Asian-Pacific Economic Literature*, 26(2): 1-28, November (Survey journal: ABDC rank = C, JIF = 0.250).

Figure 1: Measured Total Factor Productivity in Japan[a]



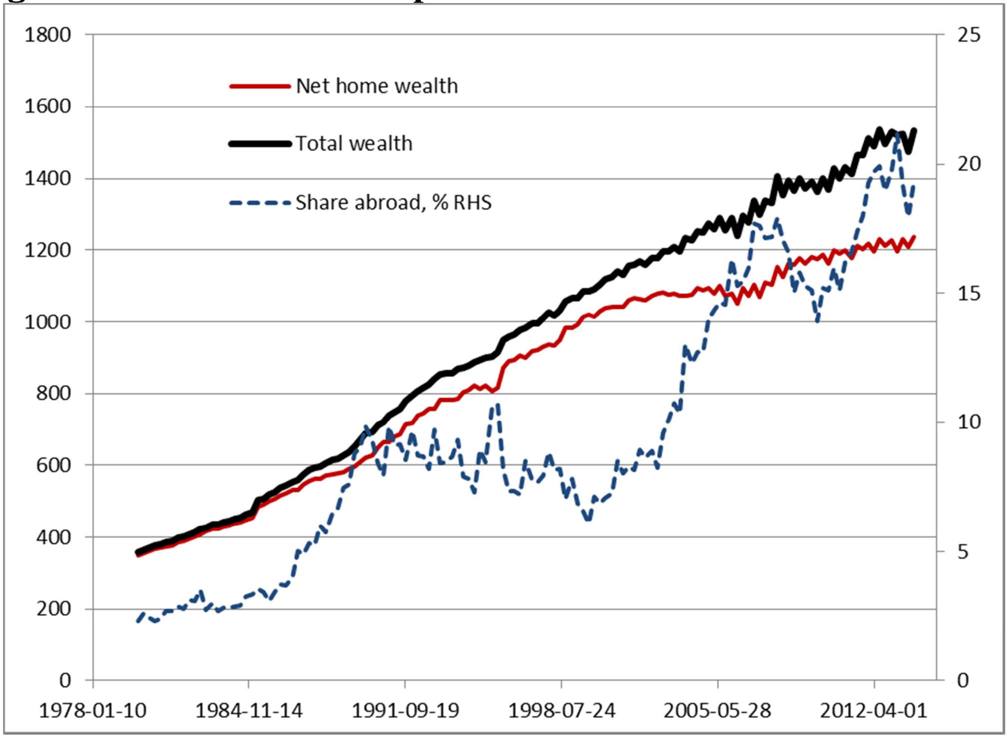
a These are indices of Japanese total factor productivity, 2005=100. Sectoral value-added productivity figures are constructed from less aggregated industry data using Törnqvist indices with value added weights.
Source: EU KLEMS database (http://www.euklems.net/, March 2008).

Figure 2: Japanese Domestic Saving and Investment as % GDP



Source: International Monetary Fund, World Economic Outlook Database, May 2015

Figure 3: The Growth of Japanese Domestic and International Wealth[a]



a This shows approximations to the values of non-housing wealth held within Japan, net of foreign holdings, and total wealth held by Japanese both at home and abroad. It is derived by combining a nominal series for the national capital stock (tangible private assets) with 1) private factor income outflows divided by the Japanese corporate bond yield to indicate foreign holdings in Japan, 2) private factor income inflows divided by the US corporate bond yield, to indicate foreign holdings by Japanese, and 3) official foreign reserves of the Bank of Japan.

Source: Tomioka (2015).

Figure 4: Services Productivity and the Real Exchange Rate

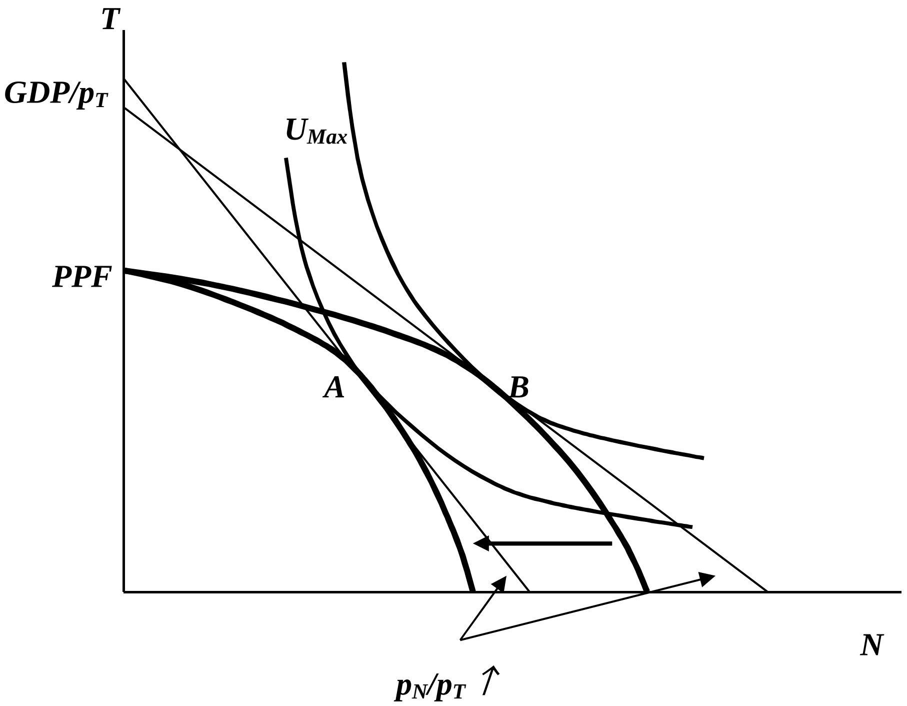
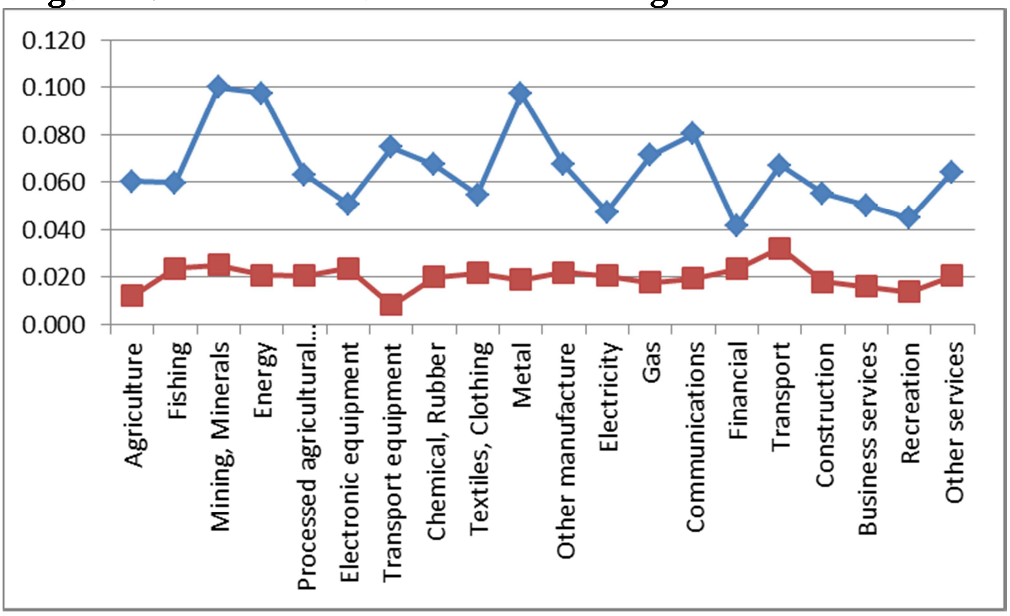
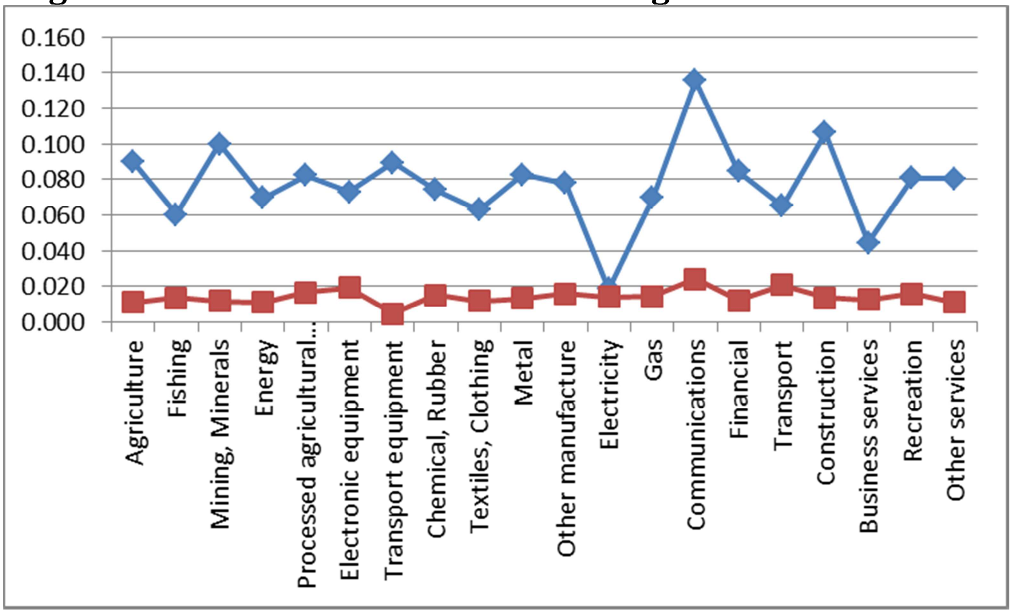


Figure 5: Rate of Return and Borrowing Rate in 2007



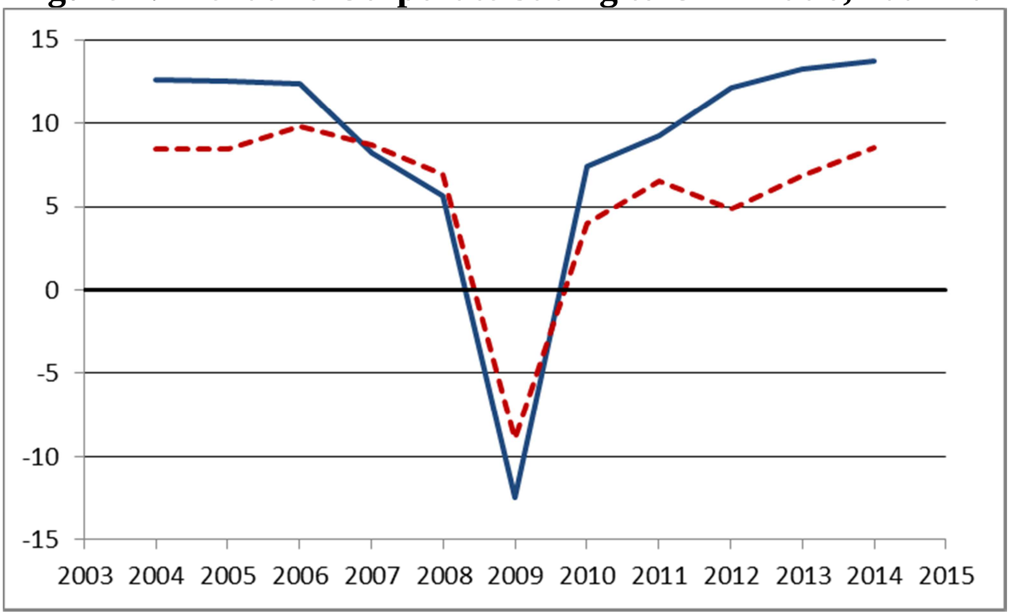
Source: Calculated from the Nikkei NEEDS *FinancialQUEST* data on listed firms.

Figure 6: Rate of Return and Borrowing Rate in 2014



Source: Calculated from the Nikkei NEEDS *FinancialQUEST* data on listed firms.

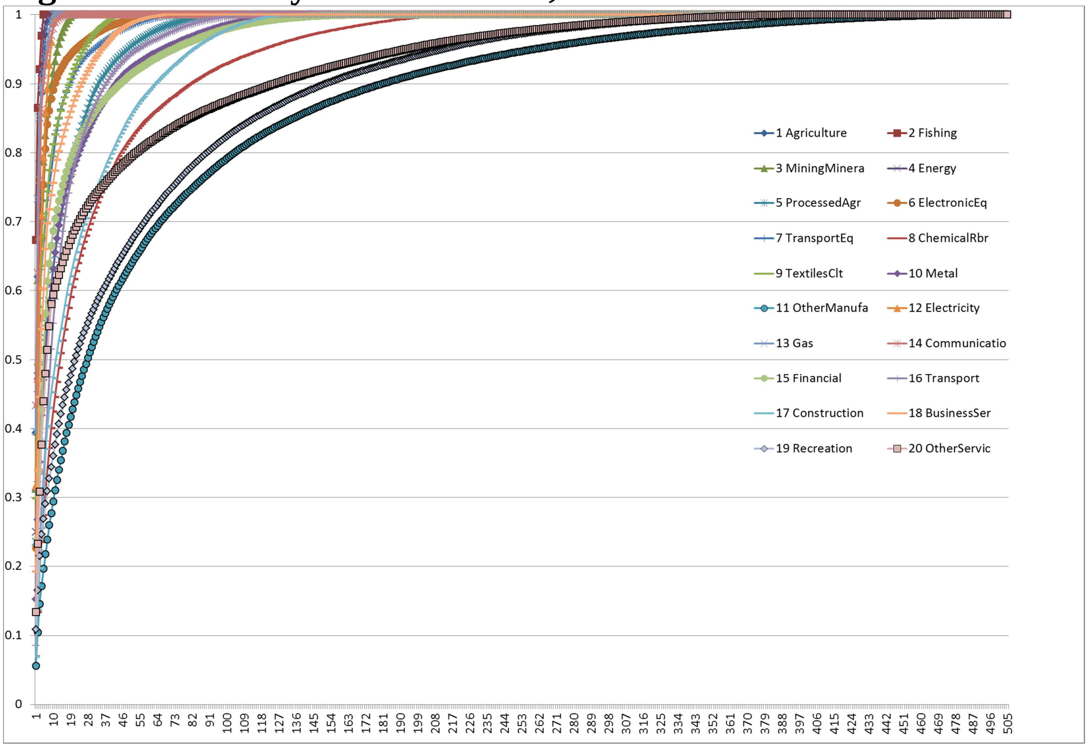
Figure 7: Rent and Corporate Saving to GDP Ratio, 2007-2014[a]



a Corporate saving is displayed as the broken line.

Source: Pure profits as a proportion of capital income gross of tax is calculated for the full sample of firms from the Nikkei NEEDS *FinancialQUEST* data. This proportion is then applied to operating surplus (net of depreciation) from the national accounts for the years shown to obtain total rent, which is then divided by GDP.

Figure 8: Industry Concentration, 2007[a]



a This shows the proportion of total sales revenue in each industry group that is supplied by the top firm numbers shown on the horizontal axis.
Source: Calculated from the Nikkei NEEDS *FinancialQUEST* data on listed firms.

Table 1: Model structure

Regions	Japan Rest of world
Primary factors	Natural resources (mineral, energy deposits) Arable land Skilled (professional) labour Unskilled (production) labour Physical capital
Sectors	1 Agriculture 2 Fishing 3 Mining and minerals 4 Energy 5 Processed agriculture 6 Electronic equipment 7 Transport equipment 8 Chemicals and rubber 9 Textiles and clothing 10 Metals 11 Other manufactures 12 Electricity 13 Gas 14 Communications 15 Financial services 16 Transport 17 Construction 18 Business services 19 Recreation 20 Other services

Source: Aggregates from the GTAP VII database.

Table 2: Economic Structure

Per cent	Share of GDP^{FC}	Share of total exports	Export share of output	Net exports over output
1 Agriculture	1.06	0.06	0.34	-22.51
2 Fishing	0.16	0.04	1.77	-16.90
3 Mining and minerals	0.64	1.06	8.88	-18.80
4 Energy	0.07	0.63	2.09	-101.22
5 Processed agriculture	2.71	0.42	0.83	-12.86
6 Electronic equipment	2.18	19.56	32.84	14.61
7 Transport equipment	2.02	22.01	28.45	23.39
8 Chemicals and rubber	2.39	11.17	17.62	6.86
9 Textiles and clothing	0.26	1.32	19.02	-56.41
10 Metals	2.59	6.18	8.72	2.68
11 Other manufactures	4.82	28.08	28.32	13.55
12 Electricity	1.55	0.00	0.00	0.00
13 Gas	0.01	0.00	0.00	-28.68
14 Communications	2.23	0.14	0.48	-0.46
15 Financial services	5.34	0.77	1.25	-1.17
16 Transport	4.44	2.38	3.31	-2.98
17 Construction	6.11	0.97	1.03	0.08
18 Business services	22.21	2.01	0.77	-0.77
19 Recreation	3.59	0.37	0.98	-2.41
20 Other services	35.63	2.83	0.72	-0.34

a GDP^{FC} is GDP at factor cost, which is the sum of value added in each industry.
Source: Model database (social accounting matrix), derived from the GTAP global database for 2007.

Table 3: Factor Intensities by Industry[a]

	Physical capital	Production labour	Skilled labour	Arable land	Natural resources
1 Agriculture	33.0	47.5	1.6	17.2	0.7
2 Fishing	37.9	18.4	0.3	0.0	43.4
3 Mining and minerals	44.5	33.2	20.4	0.0	1.9
4 Energy	66.7	19.7	11.9	0.0	1.7
5 Processed agriculture	49.6	33.6	16.8	0.0	0.0
6 Electronic equipment	22.6	45.9	31.5	0.0	0.0
7 Transport equipment	22.9	46.6	30.6	0.0	0.0
8 Chemicals and rubber	49.7	31.7	18.6	0.0	0.0
9 Textiles and clothing	14.8	67.8	17.4	0.0	0.0
10 Metals	40.3	37.9	21.8	0.0	0.0
11 Other manufactures	32.1	41.9	25.9	0.0	0.0
12 Electricity	72.5	15.4	12.0	0.0	0.0
13 Gas	57.3	24.9	17.8	0.0	0.0
14 Communications	58.6	23.3	18.1	0.0	0.0
15 Financial services	53.7	27.3	19.0	0.0	0.0
16 Transport	30.3	41.8	27.8	0.0	0.0
17 Construction	14.1	53.0	32.9	0.0	0.0
18 Business services	67.8	17.7	14.4	0.0	0.0
19 Recreation	49.7	29.0	21.3	0.0	0.0
20 Other services	30.7	43.1	26.2	0.0	0.0

a These are factor shares of total value added in each industry, calculated from the database. Shares sum to 100 per cent horizontally.
Source: Model database (social accounting matrix), derived from the GTAP Database 2007.

Table 4: Initial Demand Elasticities and Mark-ups[a]

	Final	Govt	Investment	Intermediate	Export	Average demand elasticity	Industry mark-ups, %[b]
1 Agriculture	-7.1	-5.4	-4.1	-7.0	-15.0	-7.0	1.17
2 Fishing	-7.4	-5.2	-3.6	-6.0	-12.3	-6.4	1.19
3 Mining and minerals	-4.7	-4.8	-2.8	-4.0	-15.0	-5.0	1.25
4 Energy	-12.0	-6.9	-7.3	-15.0	-15.0	-14.2	1.08
5 Processed agriculture	-7.2	-5.2	-3.6	-5.0	-13.7	-6.6	1.18
6 Electronic equipment	-10.3	-10.7	-5.3	-6.0	-13.1	-8.8	1.13
7 Transport equipment	-15.9	-10.4	-5.3	-9.0	-17.5	-11.7	1.09
8 Chemicals and rubber	-9.4	-5.0	-3.8	-5.5	-14.3	-7.3	1.16
9 Textiles and clothing	-15.4	-11.9	-5.9	-11.0	-13.4	-11.9	1.09
10 Metals	-5.1	-5.0	-3.5	-6.0	-14.9	-6.8	1.17
11 Other manufactures	-14.0	-13.9	-6.5	-6.0	-14.3	-8.7	1.13
12 Electricity	-2.9	-3.9	-2.2	-3.5	-5.8	-3.3	1.43
13 Gas	-2.9	-3.7	-2.2	-3.0	-6.2	-2.9	1.52
14 Communications	-3.0	-3.9	-2.2	-3.0	-6.4	-3.0	1.50
15 Financial services	-7.0	-7.6	-3.8	-5.0	-9.1	-5.6	1.22
16 Transport	-8.0	-8.4	-4.2	-3.0	-10.2	-4.8	1.27
17 Construction	-11.1	-9.3	-7.4	-10.0	-11.4	-7.8	1.15
18 Business services	-5.9	-4.1	-1.9	-1.5	-8.8	-3.2	1.45
19 Recreation	-4.3	-4.7	-2.0	-2.0	-12.4	-4.1	1.32
20 Other services	-5.6	-4.8	-2.0	-2.0	-13.6	-4.3	1.30

a All these variables are endogenous in the model. Initial (base) values are provided here.
b Industry mark-ups are of producer prices over average variable costs.
Source: Elasticities are calculated via the equations in the appendices, based on elasticities of substitution defined in Appendix 1. Those elasticities of substitution, in turn, are calibrated via the iterative approach described in the text with starting values from an established literature that includes surveys cited by Harris and Cox (1984) and Dimaranan and McDougall (2002).

Table 5: Calibrated Pure Profit and Cost Shares, and Industry Scale

Per cent of industry turnover	Pure profit[a]	Fixed cost[a]	Variable cost[a]	Scale[b]
1 Agriculture	13.3	1.0	85.7	100
2 Fishing	12.1	3.5	84.4	72
3 Mining and minerals	14.0	6.0	80.0	40
4 Energy	3.9	3.1	93.0	90
5 Processed agriculture	12.5	2.6	84.8	97
6 Electronic equipment	3.1	8.3	88.6	32
7 Transport equipment	3.5	5.1	91.4	54
8 Chemicals and rubber	9.3	4.4	86.3	59
9 Textiles and clothing	2.3	6.1	91.6	45
10 Metals	8.1	6.7	85.2	38
11 Other manufactures	7.4	4.1	88.5	64
12 Electricity	19.0	10.9	70.1	19
13 Gas	18.0	16.4	65.6	12
14 Communications	24.8	8.6	66.6	23
15 Financial services	14.4	3.3	82.3	74
16 Transport	6.9	14.1	79.0	17
17 Construction	4.4	8.4	87.1	31
18 Business services	27.5	3.4	69.1	62
19 Recreation	20.8	3.5	75.7	65
20 Other services	13.8	9.6	76.7	24

a The final three columns of the table are calibrated. First, elasticities are estimated, from which mark-up ratios are calculated. The pure profit shares of total revenue are then used to deduce the fixed cost residual.
b Scale is defined as the ratio (in %) of the gross quantity produced and minimum efficient scale, which in turn, is the level of output where unit fixed cost is 3% of unit variable cost. The 3% is arbitrary and agriculture (farms) have average scale exceeding this, yielding 100%. The results are suggestive of relative scale only.
Source: Pure profit proportions are adapted from the Nikkei NEEDS Database through Financial Quest.

Table 6: Closures Used

<u>Long run</u>

Capital is internationally and sectorally mobile at a fixed external rate of return[a]
Fiscal policy is constrained to retain constant the 2006-7 deficit
Employment fixed, all factor rewards endogenous

Oligopoly

Fixed numbers of firms, *n*
Endogenous pure profits

Free entry and exit

Chamberlinian oligopoly: *n* endogenous, pure profits exogenous

<u>Short run</u>

Fixed real production wage and endogenous production employment
Capital use is fixed and industry-specific, so rates of return differ by industry
Fiscal policy is constrained to retain as constant the 2006-7 deficit
Real production wage fixed and production employment flexible

Oligopoly

Fixed numbers of firms, *n*
Endogenous pure profits

a The total stock of physical capital varies in the long run and the home-owned share of it depends on corresponding long run changes in domestic real income and the share of wealth that is held abroad, as per equation (9). The home-owned share of domestic capital is important because if affects the level of factor income outflow associated with profit repatriation.

Table 7: Aggregate Effects of Labour Market Reforms[a]

Per cent change	Oligopoly[b] Short run[c]	Oligopoly[b] Long run[c]	Free entry/exit[b] Long run[c]
Production and skilled labour up 5%			
Output and factor volumes			
Real GDP	2.9	5.6	4.2
Capital stock	0.0	4.3	5.4
Production employment	2.4	5.0[d]	5.0[d]
Government and external			
Government expenditure[e] /GDP	2.6	4.7	3.1
Current account /GDP	-44.4	38.6	21.0
Finance			
Rate of return gross of tax[f]	4.3	2.8	-3.0
Home interest rate[g]	-5.2	-3.2	-1.3
Investment expenditure /GDP	4.7	-2.9	-3.2
Inward foreign investment /GDP	97.9	-3.3	-8.6
Outward foreign investment /GDP	33.0	15.6	4.8
Pricing and costs			
Real exchange rate	0.19	-0.98	-0.73
Number of firms	0.00	0.00	14.7
Average mark-up[h], tradables	0.15	-0.14	-0.13
Average mark-up[h], services	0.14	0.08	-0.23
Fixed costs /GDP	-0.03	-0.16	1.2
Pre-tax pure profits /GDP	2.1	2.9	-3.3
Average industry scale[j], tradables	1.7	8.0	-4.3
Average industry scale[j], services	3.2	5.2	-6.3
Welfare			
Real GNP, P^C deflated	2.7	5.1	4.0
Real production wage, P^C deflated	0.00	-0.39	0.53
Real production wage, P^Y price deflated	-0.01	-0.27	0.59
Real skilled wage, P^C deflated	-3.1	-0.51	0.59

a This experiment simply raises the stock of production labour and the stock of skilled (professional) labour by 5%. In the short run all the additional production labour is not necessarily employed since the real production wage is held constant.
b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax).
c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.
d These entries represent the exogenous shocks to production labour use.
e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.
f This is inclusive of pure profits and pre-tax. It is different from the "market rate of return".
g This is the yield on home-issued long term bonds, or the financing rate.
h This is the gross-revenue weighted mark-up ratio.
j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.
Source: Simulations of the model described in the text.

Table 8: Aggregate Effects of Company Tax Reforms [a]

Per cent change	Oligopoly[b] Short run[c]	Oligopoly[b] Long run[c]	Free entry/exit[b] Long run[c]
Power of capital taxes reduced by 5%			
Output and factor volumes			
Real GDP	3.8	4.9	3.8
Capital stock	0.0	3.9	5.2
Production employment	-0.7	0.0	0.0
Government and external			
Power of the consumption tax	8.2	7.2	8.7
Government expenditure[e] /GDP	-3.3	-3.4	-2.8
Current account /GDP	-0.2	83.0	53.7
Finance			
Rate of return gross of tax[f]	-0.9	-3.0	-10.8
Home interest rate[g]	-10.9	-8.7	-6.2
Investment expenditure /GDP	4.3	-2.9	-4.1
Inward foreign investment /GDP	74.0	-29.6	-36.1
Outward foreign investment /GDP	40.4	21.9	5.0
Pricing and costs			
Real exchange rate	-0.36	-1.25	-0.85
Number of firms	0.00	0.00	26.0
Average mark-up[h], tradables	0.06	-0.26	-0.24
Average mark-up[h], services	0.40	0.30	-0.17
Fixed costs /GDP	-0.10	-0.20	1.59
Pre-tax pure profits /GDP	-3.6	-2.8	-12.3
Average industry scale[j], tradables	0.9	6.6	-11.2
Average industry scale[j], services	-1.1	-0.3	-15.5
Welfare			
Real GNP, P^C deflated	-4.5	-2.8	-4.8
Real production wage, P^C deflated	-7.54	-6.01	-6.02
Real production wage, P^Y price deflated	0.00	0.88	2.20
Real skilled wage, P^C deflated	-8.38	-6.08	-5.88

a This experiment reduces the power of company taxes by 5% but maintains government spending by replacing the lost revenue via the consumption tax, the increase in the power of which is here endogenous.
b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax). Because after tax pure profits are held constant, pure profits before tax decline, which is pro-competitive.
c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.
d These entries represent the exogenous shocks to production labour use.
e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.
f This is inclusive of pure profits and pre-tax. It is different from the "market (after tax) rate of return", which is fixed externally in this long run analysis.
g This is the yield on home-issued long term bonds, or the financing rate.
h This is the gross-revenue weighted mark-up ratio.
j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.
Source: Simulations of the model described in the text.

Table 9: Aggregate Effects of Company Tax Reforms Combined with Reduced Corporate Saving[a]

	Oligopoly[b]		Free entry/exit[b]
Per cent change	Short run[c]	Long run[c]	Long run[c]
Power of capital taxes reduced by 5%, combined a corporate saving rate lower by 50%			
Output and factor volumes			
Real GDP	3.1	5.6	4.4
Capital stock	0.0	10.4	11.7
Production employment	0.5	0.0	0.0
Government and external			
Power of the consumption tax	2.2	1.8	3.4
Government expenditure[e] /GDP	-7.0	-5.4	-4.4
Current account /GDP	-318.8	-99.0	-105.7
Finance			
Rate of return gross of tax[f]	1.5	-6.7	-14.8
Home interest rate[g]	-2.2	14.6	18.9
Investment expenditure /GDP	0.2	-20.2	-21.7
Inward foreign investment /GDP	227.6	-45.3	-50.9
Outward foreign investment /GDP	-21.9	-70.2	-76.3
Pricing and costs			
Real exchange rate	4.29	0.07	0.17
Number of firms	0.00	0.00	59.4
Average mark-up[h], tradables	0.72	-0.08	-0.09
Average mark-up[h], services	-0.53	-0.82	-1.38
Fixed costs /GDP	0.56	0.29	2.24
Pre-tax pure profits /GDP	-2.4	-3.0	-13.7
Average industry scale[j], tradables	-10.0	-0.9	-9.4
Average industry scale[j], services	3.7	5.5	-16.6
Welfare			
Real GNP, P^C deflated	0.3	3.1	0.8
Real production wage, P^C deflated	-1.88	2.03	2.10
Real production wage, P^Y price deflated	0.00	3.80	5.32
Real skilled wage, P^C deflated	-1.03	2.23	2.54

a This experiment reduces the power of company taxes by 5% but maintains government spending by replacing the lost revenue via the consumption tax, the increase in the power of which is here endogenous. This change, combined with corporate governance reforms, is assumed to induce a reduction by half in the rate of corporate saving from after tax capital income.

b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax). Because after tax pure profits are held constant, pure profits before tax decline, which is pro-competitive.

c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.

d These entries represent the exogenous shocks to production labour use.

e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.

f This is inclusive of pure profits and pre-tax. It is different from the "market (after tax) rate of return", which is fixed externally in this long run analysis.

g This is the yield on home-issued long term bonds, or the financing rate.

h This is the gross-revenue weighted mark-up ratio.

j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.

Source: Simulations of the model described in the text.

Table 10: Aggregate Effects of Tighter Pricing Surveillance[a]

Per cent change	Oligopoly[b] Short run[c]	Oligopoly[b] Long run[c]	Free entry/exit[b] Long run[c]
Reduced collusion: conjectural variations parameters reduced by 20%.			
Output and factor volumes			
Real GDP	2.6	2.1	2.1
Capital stock	0.0	3.5	2.4
Production employment	3.1	0.0	0.0
Government and external			
Government expenditure[e] /GDP	-2.2	-0.9	-1.1
Current account /GDP	-33.9	33.1	36.7
Finance			
Rate of return gross of tax[f]	1.2	-3.7	-1.1
Home interest rate[g]	-5.7	-0.5	-1.3
Investment expenditure /GDP	5.8	-2.3	-1.5
Inward foreign investment /GDP	97.9	-23.7	-17.8
Outward foreign investment /GDP	37.8	2.1	7.0
Pricing and costs			
Real exchange rate	-0.37	-1.16	-0.98
Number of firms	0.00	0.0	-4.16
Average mark-up[h], tradables	0.00	-0.25	-0.25
Average mark-up[h], services	-1.07	-1.24	-0.87
Fixed costs /GDP	0.22	0.23	-0.23
Pre-tax pure profits /GDP	-2.6	-3.9	-1.1
Average industry scale[j], tradables	2.7	4.0	2.3
Average industry scale[j], services	3.8	3.0	13.9
Welfare			
Real GNP, P^C deflated	2.6	2.2	2.1
Real production wage, P^C deflated	0.11	3.54	2.53
Real production wage, P^Y price deflated	0.00	3.49	2.50
Real skilled wage, P^C deflated	4.16	3.74	2.62

a This experiment simply reduces the conjectural variations parameter (the index of collusion between oligopoly firms) by 20% to reflect tighter surveillance as part of competition policy. In the short run the real production wage is held constant relative to the GDP price level.

b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax).

c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.

d These entries represent the exogenous shocks to production labour use.

e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.

f This is inclusive of pure profits and pre-tax. It is different from the "market rate of return".

g This is the yield on home-issued long term bonds, or the financing rate.

h This is the gross-revenue weighted mark-up ratio.

j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.

Source: Simulations of the model described in the text.

Table 11: Aggregate Effects of Tighter Price Cap Regulation[a]

Per cent change	Oligopoly[b] Short run[c]	Oligopoly[b] Long run[c]	Free entry/exit[b] Long run[c]
Closure of price-to-average cost gap 20%			
Output and factor volumes			
Real GDP	7.7	5.6	7.6
Capital stock	0.0	10.0	9.1
Production employment	10.2	0.0	0.0
Government and external			
Government expenditure[e] /GDP	-8.6	-3.8	-5.1
Current account /GDP	-210.1	83.0	132.0
Finance			
Rate of return gross of tax[f]	2.9	-11.5	-4.6
Home interest rate[g]	-23.4	-1.8	-5.3
Investment expenditure /GDP	27.6	-6.3	-5.5
Inward foreign investment /GDP	742.7	-56.1	-53.9
Outward foreign investment /GDP	308.4	7.0	30.4
Pricing and costs			
Real exchange rate	1.60	-1.59	-2.11
Number of firms	0.00	0.0	-29.9
Average mark-up[h], tradables	-0.94	-1.87	-1.95
Average mark-up[h], services	-2.74	-3.25	-2.96
Fixed costs /GDP	1.05	0.91	-0.88
Pre-tax pure profits /GDP	-8.9	-13.1	-5.1
Average industry scale[j], tradables	7.9	15.2	51.2
Average industry scale[j], services	11.8	7.6	37.1
Welfare			
Real GNP, P^C deflated	7.6	5.7	7.2
Real production wage, P^C deflated	0.29	10.78	9.71
Real production wage, P^Y price deflated	0.00	10.71	9.81
Real skilled wage, P^C deflated	13.07	11.00	9.71

a This experiment imposes mark-ups that reduce the initial price-to-average cost gap by 20%.. In the short run the real production wage is held constant.

b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax).

c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.

d These entries represent the exogenous shocks to production labour use.

e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.

f This is inclusive of pure profits and pre-tax. It is different from the "market rate of return".

g This is the yield on home-issued long term bonds, or the financing rate.

h This is the gross-revenue weighted mark-up ratio.

j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.

Source: Simulations of the model described in the text.

Table 12: Aggregate Effects of Tighter Price Cap Regulation Combined with Services Productivity Improvement[a]

Per cent change	Oligopoly[b] Short run[c]	Oligopoly[b] Long run[c]	Free entry/exit[b] Long run[c]
Closure of the price-to-average cost gap by 20% combined with a services productivity boost of 2% (short run) and 5% (long run)			
Output and factor volumes			
Real GDP	13.9	17.7	18.5
Capital stock	0.0	19.6	19.7
Production employment	14.9	0.0	0.0
Government and external			
Government expenditure[e] /GDP	-14.5	-9.3	-9.5
Current account /GDP	-400.9	230.1	246.8
Finance			
Rate of return gross of tax[f]	10.5	-9.5	-7.7
Home interest rate[g]	-39.7	-10.5	-11.2
Investment expenditure /GDP	54.1	-8.9	-9.0
Inward foreign investment /GDP	2453.1	-57.7	-58.0
Outward foreign investment /GDP	1153.6	73.1	80.5
Pricing and costs			
Real exchange rate	2.67	-6.35	-6.73
Number of firms	0.00	0.0	-19.2
Average mark-up[h], tradables	-0.20	-2.30	-2.25
Average mark-up[h], services	-2.26	-3.10	-3.14
Fixed costs /GDP	1.58	1.49	0.91
Pre-tax pure profits /GDP	-5.5	-11.6	-9.5
Average industry scale[j], tradables	7.9	37.0	40.4
Average industry scale[j], services	21.3	20.0	33.0
Welfare			
Real GNP, P^C deflated	13.4	17.1	17.7
Real production wage, P^C deflated	0.49	23.29	23.10
Real production wage, P^Y price deflated	0.00	23.51	23.40
Real skilled wage, P^C deflated	19.23	23.57	23.34

a This experiment imposes mark-ups that reduce the initial price-to-average cost gap by 20% while at the same time boosting output productivity by 2% in the short run and 5% in the long run. In the short run the real production wage is held constant.

b "Oligopoly" refers to fixed numbers of firms with unfettered oligopoly pricing. "Free entry/exit" allows firm numbers to adjust while retaining pure (economic) profits at their initial levels (defined relative to foreign prices, after tax).

c The long run allows free international mobility of capital at an external after tax rate of return along with full real wage adjustment to clear labour markets. The short run fixes the capital stock in each industry and the real wage of production workers.

d These entries represent the exogenous shocks to production labour use.

e This is government expenditure on goods and services only. Pensions (transfers) are held constant relative to the CPI.

f This is inclusive of pure profits and pre-tax. It is different from the "market rate of return".

g This is the yield on home-issued long term bonds, or the financing rate.

h This is the gross-revenue weighted mark-up ratio.

j Scale is defined as the ratio (in %) of the gross quantity produced to minimum efficient scale, which in turn, is the level of output where unit fixed cost is 5% of unit variable cost. Here it is an average, weighted by gross revenue.

Source: Simulations of the model described in the text.