CONSUMPTION, INVESTMENT AND INTERNATIONAL LINKAGES

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ABSTRACT

This paper seeks to explain the strong contemporaneous relationship between Australian and foreign output growth. It does so by adopting a more disaggregated approach than previous work, focussing in particular on consumption and investment. The theoretical frameworks of the permanent income hypothesis for consumption and the cash flow version of the neo-classical model of investment are used to identify potential foreign linkages. Some evidence of a foreign linkage through consumption is established. Little evidence is found of foreign influences on domestic investment, although an indirect channel operating through business confidence is identified. The paper also provides evidence of a decline in liquidity constraints since financial deregulation, and confirms previous evidence of the importance of cash flow in determining investment.

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1. INTRODUCTION

The Australian economy is generally assumed to be strongly influenced by developments in the industrialised world economy and, in particular, the US economy. Gruen and Shuetrim (1994) document a strong contemporaneous correlation of 0.8 between quarterly Australian and OECD growth, but are unable to explain this finding. Hall and McTaggart (1993) estimate a coefficient on US growth of 0.5 in a model of Australian growth.[1] Obstfeld (1994) identifies similar strong correlations between the output growth of the G-7 countries (although on an annual basis).

One possible explanation for the correlation is that the oil shocks of the 1970s caused a synchronisation of the business cycles of the industrial countries, which has persisted over the last twenty years. However, this is unlikely, given the different policy responses to the second oil price shock, and the large number of idiosyncratic shocks that have occurred since, such as the different experiences under the ERM and German unification. Another possible linkage is through explicit or implicit policy coordination. For instance, there was a general shift in anti-inflationary preferences over the 1980s in most industrial countries, which may have resulted in similar monetary policy settings across countries. However, the common shift in policy preferences is unlikely to imply such a strong contemporaneous correlation. Furthermore, the timing of this shift in policy preferences varied considerably across countries. For example, Australia shifted to a tighter fiscal policy stance much in advance of the US, but brought inflation down to low single figures considerably later.

The purpose of this paper is to better understand the linkages behind the strong contemporaneous correlation by focusing on two components of Australian output – consumption and investment – to isolate the channels through which foreign developments affect the Australian economy.

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[1] In a similar regression Gruen and Shuetrim (1994) estimate a coefficient on US growth of 0.4.

In focusing on consumption and investment, we also update previous Bank work on the estimation of aggregate consumption and investment models. Our consumption equation updates the test of the permanent income hypothesis of McKibbin and Richards (1988) while our investment equation updates the cash-flow model of investment tested by McKibbin and Siegloff (1987). The two approaches are theoretically similar, relying on capital market imperfections: in the case of consumption, a fraction of consumers are assumed to be 'rule-of-thumb' consumers or liquidity constrained and thus fund their consumption from current rather than permanent income; in the case of investment, a fraction of firms are also liquidity constrained (or pay a premium on external funds) and hence fund their investment from current cash flow (profit) rather than borrowing or issuing equity against future streams of profit. Consequently, consumption and investment are 'excessively sensitive' to current income and cash flow respectively.

By using this framework we are able to determine if foreign variables provide a useful signal of permanent income (in the case of consumption) or future profitability (in the case of investment). That is, this approach tests whether foreign variables have a direct impact on consumption or investment controlling for their indirect effect through domestic output. We find some evidence of such a channel for consumption. The only channel of significance for investment that we identify is through business confidence.

As a byproduct of this approach, we also test the hypothesis that consumers have become less liquidity constrained as a result of the financial deregulation of the 1980s. The results suggest that this is indeed the case. The investment equations also confirm the findings of other studies that internal finance is an important determinant of business investment.[2]

The next section provides some summary information on the relationship between the Australian business cycle and foreign business cycles. Movements in levels as well as growth rates are considered. Section 3 presents the theoretical models that motivate our consumption and investment equations, while Section 4 presents the results of the estimation. Section 5 concludes.

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[2] See Mills, Morling and Tease (1994) for micro evidence of this.

2. AUSTRALIAN AND FOREIGN BUSINESS CYCLES

Gruen and Shuetrim (1994) – henceforth GS – identify a strong contemporaneous relationship between the OECD/US and Australian economies. A natural extension of the GS framework is to apply their specification to components of gross domestic product. The motivation for doing so is to shed some light on which domestic component of GDP may be underpinning the strong aggregate relationship.

To perform this preliminary investigation, the following error correction model, allowing for a cointegrating relationship between the particular component of domestic GDP, w, and foreign output y^f, is estimated:

$$\Delta w_t = a + b\Delta y_t^f - gw_{t-1} + ly_{t-1}^f + e_t \qquad (1)$$

The significance of $\hat{g}$ allows the identification of a cointegrating relationship[3] while the size and significance of $\hat{b}$ capture the relative importance of contemporaneous foreign output growth in explaining the growth of the component of domestic GDP. However, given the strength of the relationship between domestic and foreign GDP identified in the GS equation, this equation may be mis-specified because the foreign growth variable may only be proxying for the excluded variable – domestic output growth. Consequently, we include the contemporaneous growth in domestic output in equation (1) and estimate the following specification:

$$\Delta w_t = a + b\Delta y_t^f + d\Delta y_t - gw_{t-1} + ly_{t-1}^f + e_t \qquad (2)$$

This equation identifies whether foreign growth influences these components of output, controlling for its influence through domestic output. Table 1 contains the results of estimating equation (2) for the period 1971:Q2-1994:Q4 and the two sub-periods 1971:Q2-1982:Q4 and 1983:Q1-1994:Q4. The foreign growth measure is

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[3] All series were tested for non-stationarity. Exports and non-dwelling construction were found to be non-stationary. For the remaining components of investment and consumption, ADF tests proved unclear – the rejection or acceptance of the null hypothesis of a unit root and no trend being marginal. However, the discussion of this section is premised on all series being I(1). For investment and its related components this is reasonable – the non-stationarity of non-dwelling construction implies the non-stationarity of related aggregate investment series.

OECD growth. For each model, $\hat{b}$, its associated standard error and the cointegration t-statistic for the lagged level domestic component (γ) are reported.

Table 1: Simple Error Correction Models for GDP Components

w	1971:Q2-1982:Q4 $\hat{b}$	Test statistic $\hat{g}$	1983:Q1-1994:Q4 $\hat{b}$	Test statistic $\hat{g}$	1971:Q2-1994:Q4 $\hat{b}$	Test statistic $\hat{g}$
GDP	0.40	3.0#	1.60**	1.91	0.70**	3.08#
	(0.25)		(0.37)		(0.18)	
Consumption	-0.02	1.41	0.57	1.87	0.06	2.40
	(0.18)		(0.40)		(0.15)	
Investment	1.15	1.77	4.35**	1.92	1.27**	2.28
	(0.72)		(1.85)		(0.65)	
Business fixed	0.58	1.92	5.26*	1.66	0.85	2.57#
	(0.91)		(2.81)		(0.91)	
Equipment	1.06	2.26	7.53**	2.75#	1.44	3.28#
	(1.09)		(3.31)		(1.09)	
Non-dwelling construction	-0.58	1.88	-0.44	0.03	-0.51	2.06
	(1.21)		(3.15)		(1.08)	
Exports	0.93	2.86#	-0.38	2.45	0.38	1.99
	(1.07)		(1.59)		(0.78)	

Notes: (a) Numbers in parentheses () are standard errors. Coefficients marked with ** (*) imply that the coefficient is significantly different from zero at the 5% (10%) level.

(b) The test statistic is the absolute value of the t-statistic on the coefficient $\hat{g}$.

(c) The test statistic is used for a test of cointegration. The appropriate distribution is somewhere between the N(0,1) and Dickey-Fuller distributions (see Kremers, Ericsson and Dolado (1992)). The 10% critical value based on the Dickey-Fuller distribution for 50 and 100 observations is -2.6 and -2.58 respectively. Values marked with # indicate the presence of a cointegrating relationship at the 10% level .

The results for GDP lend support to the GS output equation.[4] A cointegrating relationship is found as is a strong contemporaneous relationship between foreign and domestic output growth. However, for the full sample period it is evident that the only prominent foreign influence at the disaggregated level is for investment. For

[4] Note that interest rates and the weather are not included in our specification but are in GS. The inclusion of these variables serves to strengthen the cointegrating relationships though leaves overall conclusions unaltered.

the more recent period (1983-94), a strong contemporaneous relationship is also found for equipment investment.[5]

For consumption, evidence of a cointegrating relationship and a significant foreign contemporaneous influence is found when equation (1) is estimated (results not shown). However, the strength of these consumption relationships clearly results from the high correlation between foreign and domestic output growth, as the inclusion of contemporaneous growth in domestic GDP in the above specification renders the above findings insignificant. Lastly, we do not find a channel of influence through exports for the full sample period. There is neither a cointegrating relationship nor a significant contemporaneous relationship.

The results also show that the relationship with foreign growth is generally stronger in the latter period. This is consistent with the observed synchronisation between the domestic and the OECD/US economies being a recent phenomenon. Further evidence of synchronisation is provided by US and Australian inventory movements. The stock cycle is a lagging indicator of activity and closely tied to the business cycle. Figure 1 below gives centred three-quarter moving averages of both inventory series.[6] It is clear that since the early 1980s the series have exhibited highly correlated co-movements. In fact, for the period from 1983 the smoothed series have a correlation coefficient of 0.66 and the original series a correlation of 0.60. These correlations reflect the observed output correlation and indicate the presence of similar supply and demand dynamics.

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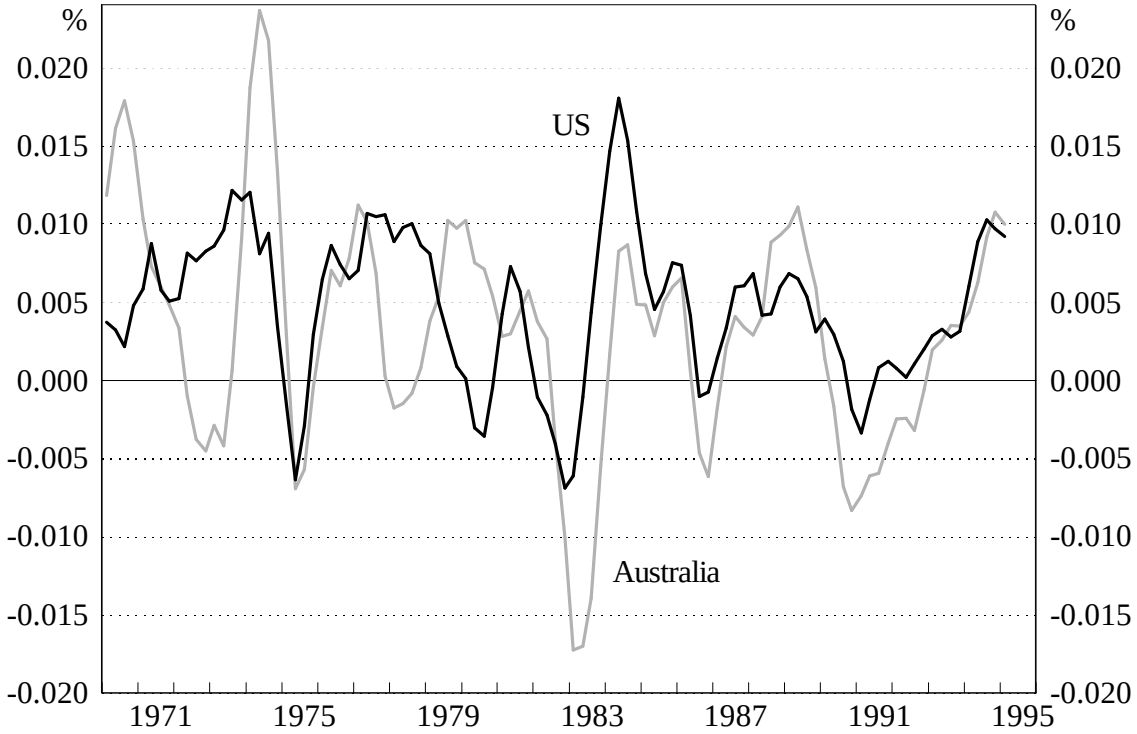
5 The results are sensitive to the inclusion of other variables to capture short-run dynamics. This emphasises the problems of estimating co-integrating relationships with small samples.

6 The foreign and domestic inventory changes are normalised by the respective GDP measures.

Figure 1: US and Australian Inventory Changes

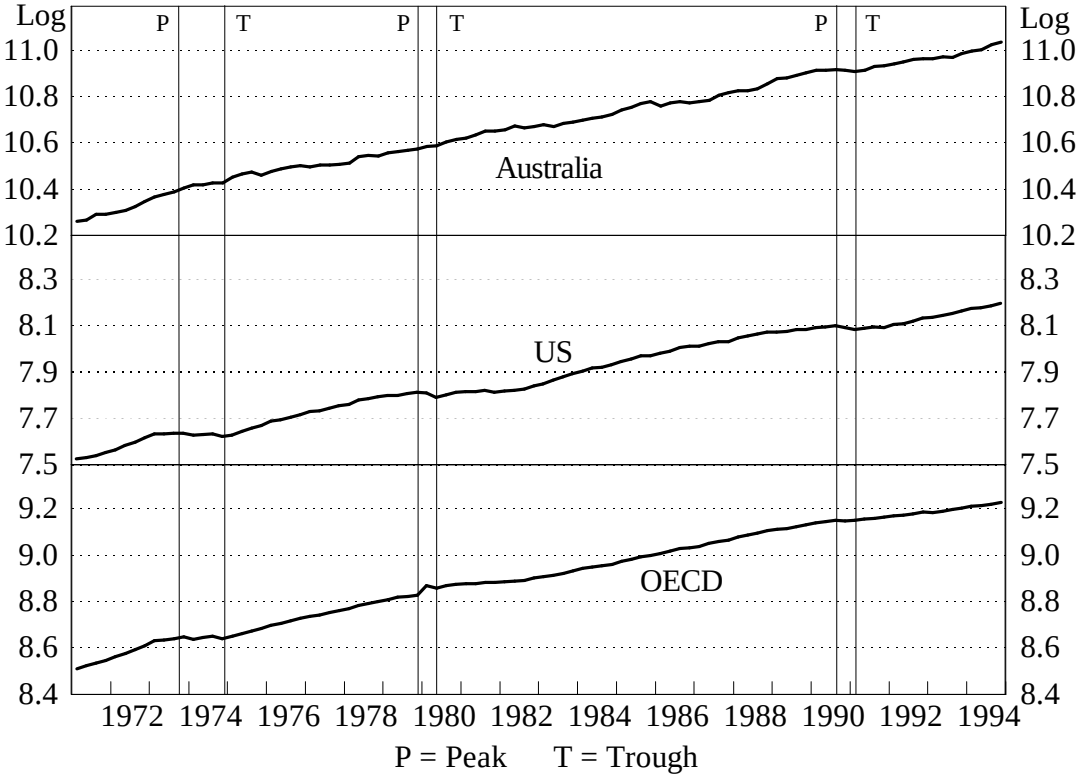


Note: Growth in the ratio of inventory investment to GDP, three-quarter moving average.

Another perspective on the potential international linkages can be gained by looking at relative movements in levels rather than in growth rates. Figures 2, 3 and 4 compare the cyclical movements in real consumption, investment and activity in Australia, the US and the OECD. They plot the log levels of each of the series. The vertical lines on each figure also shows the peaks and troughs of the relevant US series. A peak in a series represents a quarter in which the level is higher than the adjacent two quarters either side in both the original series and a three-quarter centred moving average.[7] A trough is defined similarly. The levels series show that the business cycles are not as tightly coordinated as one might expect given the strength of the contemporaneous relation in the GS equation.

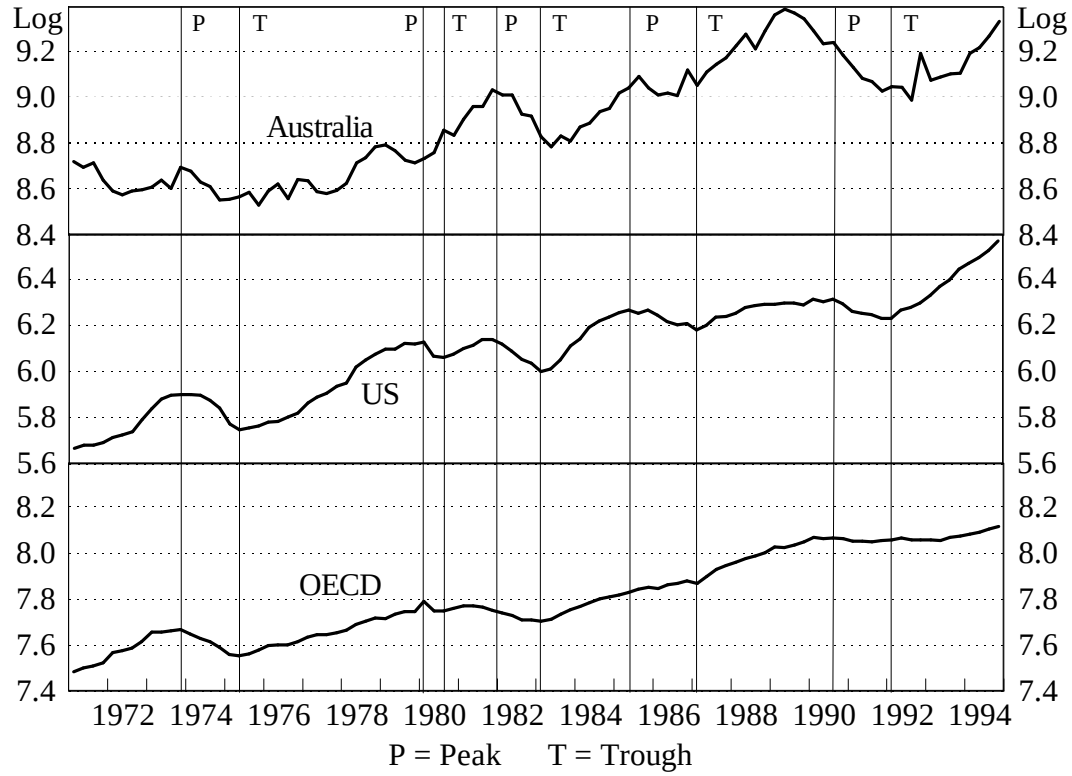
[7] This procedure for identifying cycles is based on that developed by Bry and Boschan (1971). For more information see Artis, Kontolemis and Osborn (1995).

Figure 2: Consumption



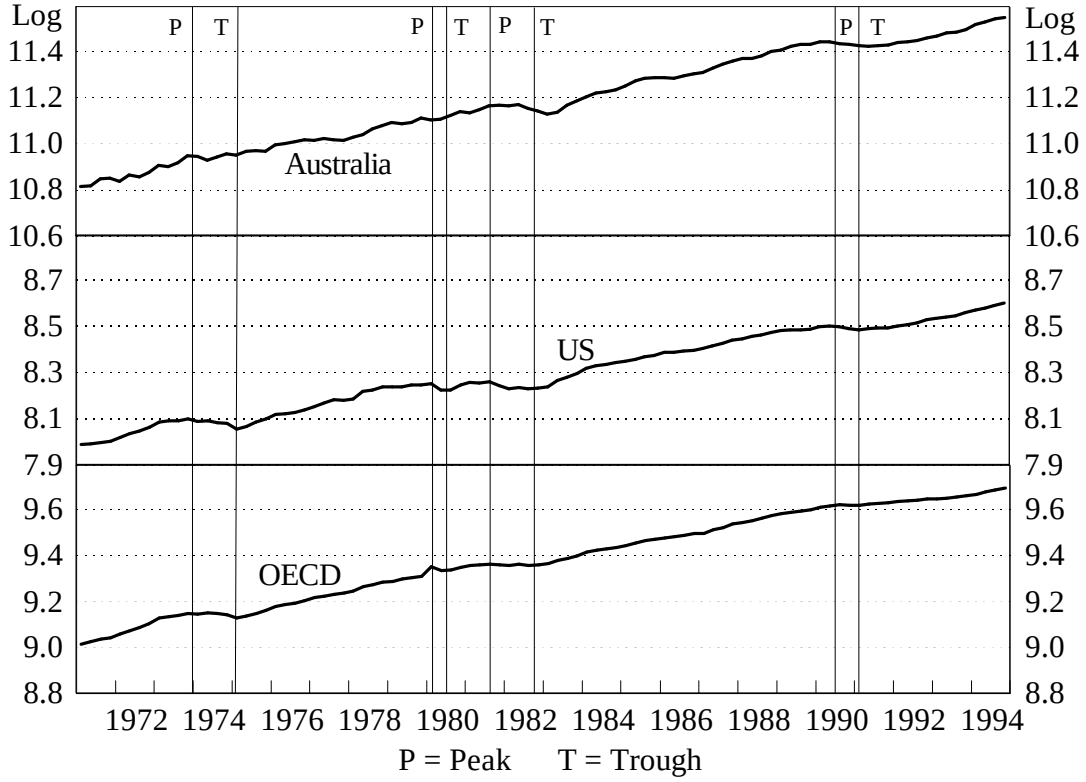
Notes: The appropriate scale for Australian data is the log of A$ millions. For the US and OECD the scale is given by the log of US$ billions.

Figure 3: Business Fixed Investment



Notes: The appropriate scale for Australian data is the log of A$ millions. For the US and OECD the scale is given by the log of US$ billions.

Figure 4: Gross Domestic Product



Notes: The appropriate scale for Australian data is the log of A$ millions. For the US and OECD the scale is given by the log of US$ billions.

The relationship between the turning points in OECD and Australian output is not close, although there is a tighter relationship between the turning points in Australian and US output. Nevertheless, Australia exhibits one more cycle than the US in the mid 70s. For investment, the relationships between the cycles in the different countries are not at all strong. The peak in Australian investment in 1989 preceded that in the US by over a year, while the trough in 1992 was two quarters later. Consumption in each country does not exhibit much cyclical behaviour but generally maintains an upward trend.

In conclusion, despite the simplicity of the above exercises, the results suggest a narrower focus of investigation for possible foreign linkages may be beneficial. While the levels analysis of specific components fails to identify a strong underlying link, the results in Table 1 indicate that business fixed investment may underpin the strong aggregate relationship.

The remainder of the paper investigates possible (business fixed) investment and consumption channels. However, a different approach to GS is adopted. Whereas the GS analysis is to some extent measurement led, the frameworks presented here

are derived from first principles – the permanent income and neo-classical investment models are used for consumption and investment respectively. The analysis of potential foreign influences can then be couched in the theoretical frameworks described in the next section which identify specific channels of influence.

3. THE MODELS

3.1 Consumption

Our consumption model is based on that in Campbell and Mankiw (1989), which in turn is derived from Hall (1978). The consumer chooses the path of consumption to maximise expected lifetime utility:

$$\max_{\{c_t\}} \; E\left[\sum_{t=0}^{T-1}(1+q)^{-t}U(C_t)|0\right] \qquad (3)$$

where θ is the rate of time preference and $E[.|t]$ denotes expectation conditional on information at time *t*.

The consumer is subject to the budget constraint $A_{t+1} = (A_t + L_t - C_t)(1+r)$ where *A* is financial wealth and *L* is labour income.

The solution to this maximisation problem yields the following first order condition:

$$U'(C_t) = (1+\theta)^{-1}(1+r)E[U'(C_{t+1})|t] \qquad (4)$$

Intuitively this first order condition means that the consumer is indifferent between a small increase in consumption today rather than saving the increase and consuming it tomorrow.

If we assume that the utility function is quadratic, then the first order condition implies:

$$C_{t+1} = K + \left(\frac{1+q}{1+r}\right)C_t + e_{t+1} \qquad (5)$$

where K is a constant that reflects parameters in the utility function and the ratio of the discount rate to the interest rate. The expectation of ε_{t+1} at time t is zero. No other variable known to the consumer at time t should help predict consumption at time t+1, given C_t.

Campbell and Mankiw assume that the permanent income hypothesis does not apply to all consumers, because of the presence of liquidity constraints or myopia. Rather, there are two groups of consumers. The first group (a fraction λ of the population) are current income consumers, perhaps because of liquidity constraints: $C_{1t} = Y_{1t}^d = lY_t^d$ where Y^d is disposable income. Thus $\Delta C_{1t} = l\Delta Y_t^d$.

The second group are permanent income consumers: $\Delta C_{2t} = (1-l)e_t$ where e_t represents innovations to permanent income.[8] Consequently aggregate consumption can be written:

$$\Delta C_t = \Delta C_{1t} + \Delta C_{2t} = l\Delta Y_t^d + (1-l)e_t \qquad (6)$$

ε_t represents any innovation to permanent income in time t. To introduce foreign influences into the consumption framework we assume that e_t comprises two components. The first, q, represents innovations in permanent income as in the traditional framework while the second, f_t, captures that part of innovations to permanent income attributable to information provided by foreign variables. We assume that the foreign variables are orthogonal to the error term q. Thus we will estimate the model (in per capita terms), allowing for a constant μ in the estimation procedure:

$$\Delta c_t = m + l\Delta y_t^d + f_t + q \qquad (7)$$

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8 Note that we have assumed that the discount rate is equal to the interest rate in deriving this expression from equation (5). We relax this assumption in the empirical work.

This equation allows us to test two different hypotheses. Firstly, if λ is significantly different from zero, then the permanent income hypothesis cannot be accepted.[9] More particularly, one can interpret λ as the proportion of liquidity constrained consumers, and one can examine whether this has declined over time as one might expect given financial deregulation.

Secondly, the hypothesis that movements in foreign variables at time *t* represent news about permanent income can be tested. If the coefficient estimate, γ, on the foreign variable *f*, proves significant, then the model provides evidence of the existence of an international linkage through a consumption channel. Thus the model allows us to test whether foreign variables have a direct effect on consumption controlling for the indirect effect operating through income *Y*. The mechanism providing the connection may be an expectational channel – the knowledge that the US economy is performing strongly, coupled with the apparently tight links between both economies in the previous decade, may induce an increase in consumption because of the perceived increment in permanent income.

Obstfeld (1994) estimates an equation similar to (7) although he excludes domestic income growth, in order to examine the degree of world capital market integration. He uses growth in world consumption as the foreign variable under the assumption that with integrated capital markets, idiosyncratic national risks can be diversified so that the correlation of international consumption should be high. Obstfeld finds that in general the correlation between domestic and foreign consumption is low, but has increased in the period 1972-88 from 1951-72. Bayoumi and MacDonald (1994) combine Obstfeld's specification with that of Campbell and Mankiw but their results suffer from a high degree of multicollinearity. Importantly, the interpretation of variations of the foreign income growth coefficient becomes difficult with the inclusion of foreign consumption growth as part of the dependent variable. In this paper we are attempting to isolate the influence of foreign variables on domestic permanent income. The Bayoumi and MacDonald (1994) specification not only captures this channel but also the offsetting channel of changing foreign liquidity constraints.

Finally, it is necessary to estimate the equation using instrumental variables. This is because innovations to current income are likely to be correlated with innovations to

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9 Campbell and Mankiw (1989) interpret the size of λ as the extent to which the permanent income hypothesis is approximately true.

permanent income. Thus Δy_t is not orthogonal to d_t, violating the assumptions of ordinary least squares. Therefore we use as instruments for Δy_t, variables which are correlated with Δy_t but not with δ_t.

3.2 Investment

The investment model combines a standard neoclassical model of investment with adjustment costs (based on Hayashi (1982)) with the recent literature emphasising the importance of cash flow in financing investment (see Fazzari, Hubbard and Petersen (1988)). This latter literature relies on theories of asymmetric information to argue that it may be more costly for a firm to raise funds for investment from external sources compared to internal finance.[10] Consequently, similarly to liquidity-constrained consumers, for some firms, current investment spending is 'excessively sensitive' to current cash flow.

The sensitivity of investment to cash flow is counter to the proposition of Modigliani and Miller (1958) which implies a separation between the real and financial decisions of the firm. However, Modigliani and Miller noted in their seminal article that their results assumed that firms had complete access to capital markets (see p. 296).

To derive the investment equation, assume that the cost of increasing the capital stock *k* by an amount *z* is given by:

$$i = z\left(1 + T(z/k)\right) \tag{8}$$

i is the level of gross investment (all variables are in per capita terms) and it takes *T*() units to transform goods into capital. For simplicity we assume that *T* is constant so that the cost of adjustment is quadratic.

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[10] An earlier tradition explains the reliance on internal funds by the presence of transactions costs.

The firm maximises the present discounted value of future cash flow which is the value of output less wage and investment costs:

$$\max_{\{z_t\}} V_0 = \int_0^{\infty} \left[f(k_t) - z_t \left(1 + T(Z_t / k_t) \right) - w_t \right] e^{-qt} dt \qquad (9)$$

subject to the capital accumulation equation:

$$\dot{k} = z - \delta k \qquad (10)$$

where w is the wage, δ is the depreciation rate, θ is the discount rate and $f(k)$ is the production function (in per capita terms).

The solution to this problem yields the following two equations:[11]

$$q = \int_{s=t}^{\infty} (f'(k) - T(z/k)^2) e^{-(q+\delta)(s-t)} ds \qquad (11)$$

where q is the shadow price of investment and equals the present discounted value of the marginal product of capital less the cost of installing the capital; and:

$$z/k = \frac{q-1}{2T} \qquad (12)$$

That is, capital formation is positive when $q>1$. Writing this in terms of gross investment i (which is what we actually observe) gives:

$$i/k = \frac{q-1}{2T}\left(1 + \frac{q-1}{2}\right) = \frac{Q}{2T} \qquad (13)$$

As in the permanent income model of consumption we assume that a fraction μ of firms follow this neoclassical model of investment while a fraction $(1-\mu)$ either are unable to borrow externally or need to pay a premium on external borrowing

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[11] The solution is presented in more detail in Appendix A.

and must fund their investment from current cash flow *CF*. The equations we estimate are then based on the following specification:

$$i_t / k_{t-1} = a_0 + m\frac{Q_{t-1}}{2T} + (1-m)\,CF_t / k_{t-1} + w_t \qquad (14)$$

In estimating this equation, *Q* performs two separate roles. Firstly, it is the determinant of investment for firms which have complete access to capital markets. Secondly, for those firms which are constrained in the capital market, it controls for the fact that the cash flow variable may partly reflect information about future investment opportunities, in the same way that current income may be correlated with permanent income in the consumption equation.

The *Q* variable that we use is average *Q* rather than marginal *Q* which may reduce its ability to capture future investment prospects. Another problem with the *Q* variable is the fact that the very assumption of capital market imperfections implies that the firm's internal assessment of *Q* differs from the measurable market assessment. Hubbard and Kashyap (1992) also argue that *Q* may be an imprecise measure because of imperfect competition and non-constant returns to scale. Consequently, we try sales as a proxy for the future investment component of cash flow.

We use the lagged value of *Q* to reflect the investment opportunities at the beginning of the period. As with current income in the consumption equation, cash flow may be correlated with the error term. Consequently, we use lagged values of cash flow as instruments. An alternative approach is to use the end of period value of *Q* which should incorporate all news and productivity shocks that occurred during the period.

To capture the 'time-to-build' aspect of investment, we adopt two approaches. Firstly, we include the lagged dependent variable on the right-hand side. Secondly, we include lagged values of the cash flow variable.

As in the consumption equation, we introduce foreign variables to the right-hand side of this equation to determine if there is a contemporaneous linkage between the world and the Australian economy through investment. There are a number of potential channels for foreign variables to influence domestic investment. As in the consumption model it is reasonable to posit an expectational channel. This could

operate through both real and financial factors. Alternatively, changes in foreign business fixed investment may actually reflect fluctuations in foreign direct investment in the domestic economy. This may directly be captured as higher domestic investment and also serve to boost domestic business sentiment. Lastly, with increasing financial integration developments in foreign assets may have important implications for domestic costs of finance.

Thus versions of the following equation are estimated with the significance of ϕ determining the influence of the foreign variables:

$$i_t / k_{t-1} = a_0 + a_1 \frac{Q_{t-1}}{2T} + a_2 CF_t / k_{t-1} + a_3 i_{t-1} / k_{t-2} + \phi_t + w_t \qquad (15)$$

4. RESULTS

4.1 Consumption

The consumption equation (7) is estimated using quarterly data. Domestic consumption and output are expressed in per capita terms, although foreign output is not – intuitively it is clear that any information contained in an innovation to foreign output is adequately gleaned from the aggregate quantity. As discussed in detail in Appendix B of McKibbin and Richards (1988), a true measure of consumption[12] – one that includes the flow of services provided by the accumulated stock of durables – is required. The technique used to generate this flow measure follows McKibbin and Richards (1988) and is outlined in Appendix B.

The instruments used for domestic disposable income growth in the estimation procedure include lagged domestic real cash rates, consumption growth and the level and growth of domestic income. Foreign output, in levels and differences, is also considered. A cointegrating relationship between domestic and foreign activity levels is allowed for in one of the specifications. The inclusion of an error correction term, involving domestic consumption and income, was also considered. However, the presence of a cointegrating relationship was not established using the Engle and Granger two step method and further, its inclusion generally proved insignificant.

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[12] The national accounts measure of consumption was also used in the estimation procedure. Appendix C details results.

The model is estimated for the sample period 1973:Q2-1994:Q4 and also for the sub-periods 1973:Q2-1982:Q4 and 1983:Q1-1994:Q4, in order to identify any changes in the degree of liquidity constraints. OECD, US and Japanese output measures are considered.

The results from estimating equation (7) are given in Tables 2 and 3. Table 2 comprises three distinct parts: each part uses different foreign activity measures in the consumption model. Columns 1, 3, and 5 of Table 2 contain the R^2 highlighting the ability of the specified instrument set to explain real household disposable income.[13] The results show that the instrument set including a foreign activity measure provides the superior explanation of household income.[14] Consequently, the standard errors for the point estimates also tend to be smaller for these models. Of these, the preferred model is a variant of the GS equation, excluding the Southern Oscillation Index and incorporating differing lag structures for interest rates, domestic output and foreign output. For OECD and US activity measures, the GS equation explains about 55 per cent of the variation in real household disposable income per capita over the period 1983:Q1-1994:Q4, supporting the results presented in GS for real GDP. The use of Japanese output as the foreign output measure in the preferred instrument set reduced the R^2 to 0.47. Additionally, the preferred GS equation provides a substantially better set of instruments than those proposed by McKibbin and Richards (1988).

It is worth noting an empirical curiosity that arises when using the GS equation to estimate real household disposable income. The striking result of GS is the strength of the contemporaneous relationship between Australian and foreign output growth. However, for the OECD and US models, there is a negative

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[13] The size of the R^2 of the regression of the endogenous variable on the instruments is not necessarily the ideal measure of the usefulness of the instrument set. Good explanatory power of the instruments may be associated with higher endogeneity, thus reducing their value. See Hall, Rudebusch and Wilcox (1994).

[14] Several variants of the GS type instrument set were used in the estimation procedure that are not reported. All provided superior explanatory power to models not including foreign activity.

Table2: Consumption Model

Instruments	1973:Q2-1982:Q4 R^2 (1)	1973:Q2-1982:Q4 $\hat{l}$ (2)	1983:Q1-1994:Q4 R^2 (3)	1983:Q1-1994:Q4 $\hat{l}$ (4)	1973:Q2-1994:Q4 R^2 (5)	1973:Q2-1994:Q4 $\hat{l}$ (6)
			OECD			
ΔY_d	0.25	0.45**	0.18	0.11	0.14	0.22
		(0.21)		(0.14)		(0.14)
$\Delta Y_d, \Delta C$	0.32	0.67**	0.19	0.03	0.16	0.22*
		(0.20)		(0.14)		(0.13)
$\Delta Y_d, r$	0.31	0.44**	0.34	0.21**	0.17	0.23*
		(0.18)		(0.10)		(0.12)
$\Delta Y_d, \Delta Y_f,$ Y_d, Y_f, r	0.56	0.37**	0.51	0.20**	0.37	0.23**
		(0.12)		(0.08)		(0.08)
			US			
ΔY_d	0.25	0.47**	0.15	0.05	0.14	0.21
		(0.21)		(0.16)		(0.14)
$\Delta Y_d, \Delta C$	0.33	0.67**	0.17	-0.03	0.16	0.21
		(0.19)		(0.16)		(0.13)
$\Delta Y_d, r$	0.31	0.49**	0.33	0.21**	0.17	0.23*
		(0.18)		(0.10)		(0.12)
$\Delta Y_d, \Delta Y_f,$ Y_d, Y_f, r	0.53	0.43**	0.54	0.20**	0.36	0.25**
		(0.12)		(0.08)		(0.08)
			Japan			
ΔY_d	0.23	0.39**	0.14	0.09	0.14	0.21
		(0.19)		(0.15)		(0.13)
$\Delta Y_d, \Delta C$	0.31	0.58**	0.18	0.02	0.15	0.22*
		(0.18)		(0.14)		(0.12)
$\Delta Y_d, r$	0.28	0.45**	0.35	0.25**	0.16	0.22*
		(0.17)		(0.10)		(0.12)
$\Delta Y_d, \Delta Y_f,$ Y_d, Y_f, r	0.54	0.34**	0.47	0.23**	0.36	0.23**
		(0.11)		(0.08)		(0.08)

Notes: (a) Subscripts d and f denote domestic real disposable income and foreign GDP respectively.
(b) Differenced instruments are lagged one to three periods.
(c) Real cash rates (r) are lagged for the second through fifth quarters with other level variables lagged one quarter.
(d) Superscript ** (*) denotes significance at the 5% (10%) level.

Table 3: Significance Levels for the Contemporaneous Change in Foreign GDP in the Consumption Equation

Instruments	1973:Q2-1982:Q4	1983:Q1-1994:Q4	1973:Q2-1994:Q4
		OECD	
ΔY_d	0.31	0.25	0.45
$\Delta Y_d, \Delta C$	0.12	0.23	0.44
$\Delta Y_d, r$	0.30	0.31	0.42
$\Delta Y_d, \Delta Y_f$, Y_d, Y_f, r	0.34	0.30	0.40
		US	
ΔY_d	0.15	0.85	0.59
$\Delta Y_d, \Delta C$	0.05	0.89	0.58
$\Delta Y_d, r$	0.11	0.77	0.54
$\Delta Y_d, \Delta Y_f$, Y_d, Y_f, r	0.11	0.77	0.48
		Japan	
ΔY_d	0.84	0.04	0.42
$\Delta Y_d, \Delta C$	0.80	0.05	0.41
$\Delta Y_d, r$	0.95	0.06	0.40
$\Delta Y_d, \Delta Y_f$, Y_d, Y_f, r	0.73	0.06	0.39

coefficient on the contemporaneous foreign growth term when disposable income growth is regressed on the GS explanators. This is somewhat surprising given that disposable income and gross domestic product are highly correlated. Irrespective, our principal concern is the identification of suitable instruments – the GS equation is clearly adequate for this purpose.

The remaining columns detail the point estimates of λ with standard errors in brackets. All twelve regressions reported in Table 2 show a decline in the point estimate over the two sub-samples. Formal tests of a decline in λ show weak evidence of declining sensitivity of consumption to current income (see Appendix D).

The decline in the point estimates potentially captures the effect of financial deregulation in reducing liquidity constraints encountered by some portion of the

economy. The estimates can be interpreted as suggesting that the proportion of current income (liquidity constrained) consumers has decreased from 40-45 per cent in the 1970s to 20-25 per cent in the 1980-90s. Blundell-Wignall, Browne and Tarditi (1995) present results for the pre and post financial deregulation periods (the 1960-70s and the 1980-90s) for a number of OECD countries. They find a similar decline in the sensitivity of consumption to current income for the majority of countries studied. However, they did not find such a result for Australia. We established that the difference in findings is due to the extended sample period in the deregulated environment available for the analysis presented here.

Table 3 provides results for the role of foreign activity as an indicator of permanent income. In particular, the significance levels (p-value) of γ, the foreign variable coefficient in the estimated model indicate whether there is a direct influence of foreign activity levels on consumption decisions.

The results show that innovations in OECD output are not statistically significant determinants of current consumption. When US output is used, one instrument set yields a significant coefficient value on US output growth at the 5 per cent level over the 1973:Q1-1982:Q4 sub-period with two other instrument sets providing significant results at the 11 per cent level. The latter period yields no significant results. For the earlier period a coefficient value of 0.2 was estimated for the growth of US output when the preferred instrument set was used.

A rationalisation for the changing US influence is that the 1970s was to some degree a period of greater economic uncertainty, placing increased importance on new information in forming consumption decisions. Hence, knowledge of the contemporaneous change in foreign output is an influential determinant of consumption due to its perceived implications for domestic income levels. In the 1980s though, it could perhaps be argued that a more stable economic environment implied recent developments in foreign output provided little information about changes in domestic permanent income.

However, given the documented strength of the relationship between the contemporaneous growth rates of Australia and the US or OECD, particularly in the latter period, the specification may suffer from multicollinearity. This tends to bias results against establishing significant point estimates for the coefficient on foreign

output growth, and hence, may explain the failure of the model to identify a significant foreign influence.

Lastly, the results for Japan show that innovations in Japanese activity provide substantial information about Australian permanent income. For the sub-period 1983:Q1-1994:Q4 all models give a significant coefficient on the contemporaneous growth coefficient at the 6 per cent level, while in the former period all coefficients are insignificant. Over the latter period the coefficient on Japanese activity growth is 0.3. A possible rationale for the differing sub-period results is that over the sample period, the average consumer has become increasingly aware of the importance of Japan as an Australian export market. Thus improved Japanese economic performance, leading to increased domestic export revenues, may be perceived as an increment to permanent income.

The preceding results are based on the assumption that the market rate of interest is constant (and equal to the rate of time preference). If this assumption is relaxed, then the appropriate specification also includes the real interest rate. However, the inclusion of contemporaneous real cash rates proved insignificant. The real five and ten year treasury bond yields were also considered but again proved to be insignificant.

4.2 Investment

The investment equations are estimated over the period 1980:Q1-1994:Q3 using quarterly data. Two measures of the capital stock were used. Firstly, the ABS measures of the annual capital stock were interpolated to give a quarterly series. Secondly, the theory behind the investment equation described in Section 3 implies that not all of gross investment results in increases in the capital stock as some is used up in transforming goods into capital. Consequently, a measure of the capital stock was calculated using equations (8) and (10). This requires an estimate of the parameter T. Whereas McKibbin and Siegloff (1987) use three different values of T (10, 20 and 30), the value of T used here is 15. Separate cost-adjusted series were calculated for non-dwelling construction and equipment investment due to the availability of depreciation estimates for each component. Note that varying T also changes the value of Q.

The model is estimated in log levels. The cash flow to capital stock ratio and the investment to capital stock ratio were tested for non-stationarity. The cash flow to capital stock series clearly rejects the presence of a unit root though the ADF tests were not as decisive for the investment to capital stock series. However, observing the data indicates the series has appeared to fluctuate around two means over the period 1960:Q3 to 1994:Q3 – a shift to a lower investment stock ratio occurring around the time of the first oil shock. This observation, coupled with the knowledge that the ratio is necessarily bounded, suggests that estimation in levels is appropriate.

To obtain a suitable investment equation several variations of equation (14) are considered. Results for all models are presented in Table 4.

Table 4: Investment Models

	Model								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cash flow	0.19 (0.13)	0.18 (0.13)	0.21** (0.05)	0.22** (0.05)	0.19** (0.07)	0.04 (0.07)	0.18** (0.07)	0.08 {0.00}	0.13 {0.00}
Q	-0.05 (0.07)								
Q(-1)		-0.01 (0.07)	0.02 (0.03)				0.05 (0.05)	0.02 (0.03)	0.01 (0.06)
I/K(-1)			0.90** (0.05)	0.91** (0.06)	0.88** (0.06)	0.64** (0.10)	0.89** (0.06)	0.87** (0.07)	
Sales				-0.03 (0.10)					
Confidence					0.00005* {0.09}				
Capacity utilisation						0.0018** (0.0006)			
Credit							-0.01 (0.02)		
$\overline{R}^2$	0.01	0.00	0.84	0.84	0.85	0.86	0.84	0.84	0.31

Notes: (a) Numbers in parentheses () are standard errors. Numbers in brackets {} are F-statistics derived from joint significance tests.
(b) For models (7) and (8) the contemporaneous cash flow and two lags are included. The value reported is the average value.
(c) For model (5) the first and second lags of the business confidence measure are included. Again the average coefficient value is reported.
(d) ** (*) indicates coefficient is significant at the 5% (10%) level.

Estimated models for the basic framework, allowing for differences in the time at which information captured by *Q* is available, are given in columns (1) and (2). As

discussed above the specification with the lagged value of *Q* is preferable given that investment flows in a given quarter will generally be based on information available at the commencement of that period. However, results indicate that both models possess negligible explanatory power and that the time at which information becomes available is not important. A large number of studies have noted difficulty in establishing the empirical significance of *Q*. Various rationalisations for its low explanatory power have been cited with most related to the disparity between the market assessment of firms and the firms own internal assessments.

Column (3) allows for the 'time to build' aspect of investment. Contemporaneous cash flows and the lagged dependent variable enter significantly with *Q* remaining an insignificant explanator.

Given the empirical inadequacy of *Q*, three other variables are considered that may provide suitable proxies for the information *Q* theoretically embodies: retail trade (sales), business confidence and a capacity utilisation measure. Of these, business confidence most closely resembles *Q*, and probably provides a better measure of the firm's own internal assessment of its investment prospects. However, sales and capacity utilisation provide an indication of the state of the cycle, firm performance and the productivity of future investment and hence seem sensible candidates.

Columns (4), (5) and (6) present results for the specification when *Q* is replaced by these alternative measures. Retail trade, lagged one period, enters negatively and insignificantly. The business confidence measure was allowed to enter with two lags. The second lag of the confidence measures was included because a comparison of its time series relative to that for business fixed investment suggests that business confidence leads investment expenditure by more than a quarter. The results show that the average contribution of business sentiment is positive and significant (at the 10 per cent level).[15] Contemporaneous cash flows and the lagged dependent variable also remain significant.

The last variable to be introduced in lieu of *Q* is capacity utilisation. While it enters as a significant explanator it seems that capacity utilisation and cash flows are highly collinear. The coefficient on cash flows becomes insignificant when capacity

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[15] A model including only the second lag of business confidence was also estimated giving a coefficient estimate of 0.00035. However, the coefficient is only significant at the 15 per cent level.

utilisation measure is introduced. The existence of a strong relationship is reasonable as both provide similar information. Both are adequate indicators of the economic cycle and both have informational content with regard to future returns to investment, although the cash flow variable should better capture the financial aspect.

While the *Q*-related variables do not appear to be good explanators of investment, the significance of the cash flow term lends support to the cash flow theories of investment. The results suggest that cash flow constraints do matter for firms. Instrumental variables estimation of the effect of cash flow yield similar results. Another variable that captures the health of a firm's balance sheets is the level of indebtedness, measured here by business credit. Model (7) shows that the point estimate is of the expected negative sign but is insignificant.

The remaining two models include lags of the cash flow variable with model (9) excluding the lagged dependent variable. Contrasting the results for model (8) against model (3) indicates that adding two lags of cash flow adds little predictive power and fails to alter the contribution of cash flows to investment expenditure. Model (9) shows that in the absence of the lagged dependent variable the addition of cash flow lags improves the model substantially over the basic model given by (2). However, in the light of the results in (8), it is clear that the lagged dependent variable captures all information provided by lagged cash flows.

As mentioned in the introduction to this section an alternative investment series implied by the neo-classical model was also used in the estimation procedure. Appendix E shows that the use of the cost-of-investment-adjusted series makes no substantial difference to the general results.

In view of the preceding discussion, models (3) and (5) provide suitable specifications of the investment equation with which to analyse the influence of foreign variables. The foreign influences considered are OECD and US contemporaneous output growth, US business fixed investment growth, the Dow Jones share price index, and US ten year bond rates.

Table 5 contains the estimates (using model 3) of γ, the coefficient on the foreign variable in equation (15) and the associated standard errors. None of the variables enter significantly and only one variable carries the expected sign. The analysis

suggests that there does not appear to be a direct link between foreign economic outcomes and the level of domestic business fixed capital investment.

Table 5: Significance of Foreign Variables in the Investment Equation

Foreign variable	US GDP growth	OECD GDP growth	US investment growth (lagged)	US share price (lagged)	Lagged real US bond rates	Japan share price (lagged)
Coeff	-0.65	0.12	-0.37	-0.0013	-0.0003	0.0006
(s.e)	(0.84)	(1.41)	(0.33)	(0.0010)	(0.0026)	(0.0009)

Finally, of all the variables considered in the investment equation, business confidence is the most likely to be influenced directly by foreign economic conditions. Consequently we estimate a business confidence equation and as previously, test for the inclusion of foreign variables. The domestic real cash rate and the contemporaneous and lagged domestic output growth rate are included as explanators. This is to control for the effects of domestic monetary policy on financial conditions and the relative profitability of investment and the stage of the economic cycle. Using this specification as a base regression, foreign variables are then included.

Table 6 contains the results of this estimation over the period 1980:Q1-1994:Q3, and highlights some interesting results. While the contemporaneous growth in US and OECD activity enter insignificantly, growth in US business fixed investment and the levels of various financial indicators are significant explanators. The real Fed Funds rate and the growth in US business fixed expenditure are significant at the 5 per cent level and real quarterly growth in the Dow Jones Index significant at the 10 per cent level. The real quarterly growth in the Nikkei index is also significant though enters with a negative sign. This result is surprising given that the business confidence and the Nikkei real quarterly growth series have a simple correlation coefficient of 0.04 and that theoretical priors suggest the relationship should be positive.

Hence, we have identified one channel of influence of foreign developments. However, column 5 in Table 6 shows that the effect of changes in business

confidence on investment is small in magnitude.[16] Further, business confidence enters the specification with several lags rather than contemporaneously.

Table 6: Foreign Influences on Business Confidence

Foreign variable	US GDP growth	OECD GDP growth	US investment growth	US share price	Real US bond rate	Real US Fed funds rate	Japan share price
Coeff	190.15	-45.28	339.04**	0.69*	-1.17	-2.68**	-0.57*
(s.e)	(368.53)	(647.59)	(145.50)	(0.39)	(1.12)	(1.07)	(0.32)

Notes: Values marked ** (*) are significant at the 5% (10%) respectively.

5. CONCLUSION

In conclusion, the results suggest some evidence of a direct link flowing from foreign indicators to domestic consumption or domestic investment. That there is a relationship is again highlighted by the ability of the Gruen and Shuetrim type explanators to explain real household disposable income in the consumption framework. Movements in US activity through the 1970s and Japanese activity innovations in the 1980s seem to provide information about movements in domestic permanent income and hence influence consumption decisions in a direct sense.

However, it appears that overseas developments provide little information about future profitability and hence investment. An indirect channel was identified operating through business confidence but this channel operates with a lag and has a small impact on aggregate investment. However, in estimating the investment equation it is likely that cash flows, for instance, capture part of the information provided by business confidence – mitigating the estimated direct effect of confidence on investment, and thus potentially understating this channel of foreign influence.

The analysis also bore some additional fruit concerning domestic consumption and investment behaviour. Estimation of the consumption equation provided evidence that the degree of liquidity constraints has declined in the deregulated period in

[16] The immediate effect of a ten percentage point change in business confidence is a 0.1 percentage point change in the ratio of investment flows to stock. Allowing for the strong auto-regressive nature of the specification a 0.83 percentage point change in the ratio of investment flows to stock results in the long run.

Australia. Further, the estimated investment equations confirmed the findings of other studies that cash flow is a significant determinant of the level of investment.

The principal objective of this paper was to understand the strong contemporaneous linkage identified by Gruen and Shuetrim. While evidence of a consumption channel through Japan was identified in the 1980s, results for an investment channel through business confidence were neither strong nor immediate. The lack of strong evidence for the US and OECD may be due to the strong collinearity between the growth rates of those variables and domestic output growth.

Furthermore, the model presented by GS is an aggregate specification. The numerous interconnections of economic activity are often better captured by aggregate quantities.[17] Aggregate quantities by their nature are, in part, the product of nonlinearities and economic subtleties. Hence, the combined effects operating through consumption and investment may underpin the aggregate result, given a specification that adequately models feedback and multiplier effects. For example, the increase in business confidence leads to a rise in investment which in turn generates increased cash flow leading to further increases in investment, while also increasing household disposable income which increases consumption.

[17] Duguay (1994) finds that an aggregate equation captures the transmission mechanism in Canada better than a more disaggregated approach.

APPENDIX A: SOLUTION TO THE NEO-CLASSICAL INVESTMENT FRAMEWORK

To solve the firm's investment problem, we set up the present value Hamiltonian:

$$H = \left[f(k) - z_t\left(1 + T\left(z_t / k_t\right)\right) - w_t + \lambda(z - \delta k) \right] e^{-\rho t}$$

The first order conditions for optimisation give:

$$H_z = 0 \Leftrightarrow T\, z/k + 1 + T\, z/k = \lambda$$

which can be rewritten as $$z/k = \frac{\lambda - 1}{2T}$$

$$H_k = -\partial(\lambda e^{-\rho t})/\partial t \Leftrightarrow -\dot{\lambda} e^{-\rho t} + \rho\lambda e^{-\rho t} = (f'(k) - T(z/k)^2 - \delta\lambda)e^{-\rho t}$$

Rearranging the latter equation:

$$\dot{\lambda} = (\rho + \delta)\lambda - f'(k) - T(z/k)^2$$

Integrating this forward from time t gives:

$$\lambda = \int_{s=t}^{\infty} (f'(k) - T(z/k)^2) e^{-(\rho+\delta)(s-t)} ds$$

That is λ is the present discounted value of the future marginal product which is the marginal product of capital less the cost of installing that capital. This is essentially Tobin's q and is replaced by q in the text.

APPENDIX B: THE FLOW MEASURE OF DURABLE SERVICES

True consumption consists of non-durables consumption plus the flow of services from consumption of durables. The latter series is calculated by assuming that the flow is proportional to the stock of durables. The stock of durables series was taken from the series on the NIF-10 database. The flow was calculated by assuming (as in McKibbin and Richards (1988)) that the net return on durables must be equal to the net return on other assets. We assume an average real return of 1.125 per cent a quarter, and a quarterly depreciation rate of 6.5 per cent for motor vehicles and 5.75 per cent for other durables. Consequently, the flow of durable services per quarter was calculated as 7.625 per cent of the stock for motor vehicles and 6.825 per cent of the stock for other durables.

APPENDIX C: ESTIMATION WITH NATIONAL ACCOUNT CONSUMPTION MEASURE

The table below gives results for the estimation of the consumption model when the constructed true consumption measure is replaced by the national accounts measure of consumption. Only the preferred model is considered, using all foreign output measures.

Table 7: Results Using the National Accounts Consumption Measure

	1973:Q2-1983:Q1	1983:Q1-1994:Q4	1973:Q2-1994:Q4
		US	
Point Estimate of $\hat{g}$	0.38** (0.13)	0.28** (0.09)	0.27** (0.09)
Significance of $\hat{f}$	0.12	0.73	0.22
		OECD	
Point Estimate of $\hat{g}$	0.35** (0.12)	0.31** (0.09)	0.28** (0.08)
Significance of $\hat{f}$	0.22	0.07	0.07
		Japan	
Point Estimate of $\hat{g}$	0.29** (0.12)	0.36** (0.10)	0.26** (0.09)
Significance of $\hat{f}$	0.76	0.11	0.32

Note: Values marked ** (*) are significant at the 5% (10%) respectively.

Point estimates for domestic disposable income growth are similar in magnitude to those detailed in Table 2 though a little larger for the 1983:Q1-1994:Q4 period. Again, significance levels for the foreign growth term in the US and Japanese cases display a similar pattern to results for the true consumption measure. Interestingly, for the OECD case, the use of the national accounts consumption measure provides a significant result for the latter and full sample periods. This suggests that the actual consumption expenditure on durables rather than the flow of services generated from such expenditures is more highly correlated with OECD economic developments.

APPENDIX D: TESTS FOR DECLINING LIQUIDITY CONSTRAINTS

Table 8: Unit Normal Tests of the Hypothesis of Declining Liquidity Constraints

	Foreign activity measure		
Instruments	OECD	Japan	US
ΔY_d	1.35*	1.24	1.59*
$\Delta Y_d, \Delta C$	2.62**	2.46**	2.82**
$\Delta Y_d, r$	1.12	1.01	1.36*
$\Delta Y_d, \Delta Y_f, Y_d, Y_f, r$	1.18	0.81	1.59*

Notes: The table tests whether $\hat{l}_1 > \hat{l}_2$. Values reported are test statistics calculated using: $Z = \frac{\hat{l}_1 - \hat{l}_2}{\sqrt{\hat{s}_1 + \hat{s}_2}}$ where $\hat{l}_1$ and $\hat{l}_2$ are point estimates for the sub-periods 1973:Q2-1982:Q4 and 1983:Q1-1994:Q4 respectively. Similarly $\hat{s}_1$ and $\hat{s}_2$ are estimates of the associated variances. *Z* has approximately an N(0,1) distribution for sufficiently large samples. N(0,1) has critical values 1.65 and 1.29 at the 5% and 10% per cent levels, respectively. Values marked ** (*) are significant at the 5% (10%) level.

APPENDIX E: COST OF INVESTMENT-STOCK-ADJUSTED MODEL

Allowing for cost of investment stock adjusted series gives the following estimation results for selected models.

Table 9: Results for Cost of Investment Stock Adjusted Model

	Model	
Variable	(1)	(2)
Cash flow	0.21**	0.20**
	(0.05)	(0.07)
Q(-1)	0.02	
	(0.03)	
I/K(-1)	0.90**	0.88**
	(0.05)	(0.06)
Confidence		0.00005*
		{0.09}

Note: Values marked ** (*) are significant at the 5% (10%) respectively.

Comparison of results with those presented in Table 7 reveals that the allowance of investment costs alters neither the point estimates nor standard errors substantially.

APPENDIX F: DATA

Australian Data

Data	Source
GDP(A)	ABS Cat. No. 5206, Table 48.
Consumption	ABS Cat. No. 5206, Table 52.
Residential investment	Calculated as the sum of the Dwellings and Real Estate Transfer series ABS Cat. No 5206, Table 52.
Non-dwelling construction	ABS Cat. No. 5206, Table 52.
Equipment investment	ABS Cat. No. 5206, Table 52.
Business fixed investment	Calculated as the sum of Non Dwelling Construction and Equipment Investment series.
Increase in stocks private non-farm	ABS Cat. No. 5206, Table 52.
Exports of goods and services	ABS Cat. No. 5206, Table 52.
GDP(E) implicit deflator	ABS Cat. No. 5206, Table 19.
Non-durable consumption	NIF-10 Database.
Durable consumption	NIF-10 Database.
Household disposable income	ABS Cat. No. 5206, Table 28. Deflating this series using the private consumption deflator gives Real Household Disposable Income.
Non-dwelling capital stock	ABS Cat. No. 5221, Table 6.
Equipment capital stock	ABS Cat. No. 5221, Table 6.
Business fixed capital stock	Calculated as the sum of Equipment and Non-Dwelling Construction Capital Stocks.

Data	Source
Capacity utilisation	ACCI Westpac survey data from 'Survey of Industrial Trends'.
Business confidence	ACCI Westpac survey data from 'Survey of Industrial Trends'.
Credit	RBA unpublished AFI Credit by Sector series.
Retail trade	ABS Cat. No. 8501, Table 14.
Gross operating surplus	ABS Cat. No. 5206, Table 22.
Gross operating surplus net of interest payments	Calculated as Gross Operating Surplus less ABS unpublished series for net interest payments. Series is deflated using GDP(E) implicit deflator.
Australian cash rate	RBA, *Bulletin*, Table F1. (Unofficial market 11am call generate observations before 1982:Q2).
Nominal 10 year bond yield	RBA *Bulletin*, Table F2.
Nominal 5 year bond yield	RBA *Bulletin*, Table F2.
All ordinaries share price index	RBA *Bulletin*, Table F6.
Business fixed investment deflator	Calculated as the ratio of nominal to real Business Fixed Investment ABS Cat. No 5206.
Real share price	Calculated by deflating the All Ordinaries Share Price Index with the Business Fixed Investment deflator.

Foreign Data

Data	Source
US	
GDP	Datastream, USGDP...D.
Business fixed investment	Datastream, USNRSINVD.
Non-farm inventory changes	Datastream, USBINNFMD.
CPI	Datastream, USCPANNL.
US Bond Yield	Datastream, USTRBYLD.
Fed Fund Rate	Datastream, USFEDFUN.
Dow Jones Index	Datastream, USDJINDS.
Japan	
GDP	Datastream, JGDP...D.
Tokyo Share Price	Datastream, JPTOKYO.
OECD	
GDP	Datastream, OCGDP.D.

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