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Foreign Direct Investment in Australia Following the Australia–US Free Trade Agreement

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Abstract

A model of inward foreign direct investment for Australia is estimated. Foreign direct investment is found to be positively related to economic and productivity growth and negatively related to foreign portfolio investment, trade openness, the exchange rate and the foreign real interest rate. Foreign direct investment is found to be a substitute for both portfolio investment and trade in goods and services. The exchange rate and the US bond rate affect foreign direct investment through the relative attractiveness of domestic assets. Actual foreign direct investment outperforms a model-derived forecast in recent years, consistent with the liberalisation of foreign investment screening rules following the Australia–US Free Trade Agreement.

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1. Introduction

There is little empirical literature on the determinants of inward foreign direct investment (FDI) in Australia. A notable exception is Yang, Groenewold and Tcha (2000), who estimate a model for inward FDI flows from the September quarter 1985 to the March quarter 1994, with out-of-sample forecast comparisons then made through to the June quarter 1996. However, they did not consider a number of important potential determinants of FDI. The extent of substitution between portfolio investment and FDI was not examined. Productivity growth was only addressed indirectly. The authors had difficulty finding an empirical role for real interest rates. The out-of-sample forecast performance of the model was poor. A longer run of methodologically consistent data on FDI transactions are now also available for the purposes of estimation. This article aims to improve on the results of Yang, Groenewold and Tcha and to examine the implications for the recent performance of inward FDI transactions following the liberalisation of FDI screening arrangements that began with the Australia–US Free Trade Agreement (AUSFTA) in 2005.

An important theme in the cross-country literature on FDI determinants is the importance of institutions and regulatory arrangements (Blonigen 2005). The role of institutions is more difficult to examine in a time series setting, given the short history and lack of within-country variation in the available measures of institutional arrangements. An obvious question of interest is the extent to which changes in the regulatory regime for foreign investment affects FDI. The Organisation for Economic Co-operation and Development (OECD)

compiles an index of FDI restrictiveness. Unfortunately, this index is currently based on only four irregular observations between 1997 and 2010 and is mainly suitable for cross-country comparisons. Australia has a relatively restrictive regulatory regime for FDI, based on this measure, although it has become significantly less restrictive in an absolute sense in recent years (Kalinova, Palerm and Thomsen 2010). Australia's inward FDI underperforms its potential, based on the United Nations Conference on Trade and Development's FDI performance and potential indices (Kirchner 2008). In addition to statutory restrictions on foreign investment, the *Foreign Acquisitions and Takeovers Act 1975* (Cwlth) affords the Australian Treasurer considerable discretion to reject inward FDI on open-ended 'national interest' grounds (Kirchner 2008; Mahony and Sadleir 2011). These powers have been exercised to reject specific transactions; most notably, Royal Dutch Shell's proposed acquisition of Woodside Petroleum in 2001 and Singapore Exchange's bid for the Australian Securities Exchange in 2011. This ministerial discretion may have a chilling effect or contribute to country-specific risk premia so that the implicit rejection rate for inward FDI may be higher than the explicit rejection rate, based on formal consideration of FDI applications by the Foreign Investment Review Board and the Treasurer.

The most significant liberalisation of Australia's regulatory regime for FDI in recent years was due to the AUSFTA, which came into operation on 1 January 2005. The United States is Australia's single largest source of foreign investment in general and FDI in particular (Sanyal 2011). While Australia has negotiated other bilateral free trade agreements, the AUSFTA 'has resulted in much more substantive changes to investment barriers than those of other agreements' (Productivity Commission 2010, p. 89). These changes saw an increase in the asset thresholds for scrutiny of US acquisitions in Australia from $50 million to $800 million (the $50 million threshold was initially retained for prescribed sensitive sectors). The agreement limits the discretion of the Treasurer to reject transactions on national interest grounds by extending national treatment to US FDI. Australia also undertook to review its foreign investment policy as part of the agreement. This review led to a further liberalisation of the general asset threshold for scrutiny of foreign acquisitions, from $50 million to $100 million on 2 December 2006, while the prescribed sensitive sectors threshold for US investors was also raised from $50 million to $100 million. In 2009, the general asset thresholds for scrutiny of foreign acquisitions were rationalised and further raised to $219 million and indexed for inflation (Foreign Investment Review Board, various years).

The net economic benefits of the AUSFTA for Australia were extensively studied and debated at the time of its negotiation. Modelling of the agreement focused mainly on the implications for trade in goods and services and often explicitly ignored the potential benefits flowing from the liberalisation of investment rules (see, for example, Siriwardana 2007). Most analyses also ignored political economy considerations; for example, the potential value of the agreement in securing Australia's bilateral trade and investment with the United States against a possible future resurgence of global and/or US protectionism (Harris and Robertson 2009).

Modelling of the AUSFTA by the Centre for International Economics (CIE) (2004), commissioned by the Department of Foreign Affairs and Trade, found that the liberalisation of foreign investment screening yielded the bulk of the net welfare gains for Australia. This was assumed to flow from a reduction in the risk premium for Australian assets. Modelling commissioned by an Australian Senate enquiry into the agreement called into question the relevance of the equity risk premium in the CIE's modelling, arguing that the relevant risks to foreign investors were encountered ex ante not ex post (Dee 2005). Yet, even without a change in country-specific risk premia, the liberalisation of screening arrangements could be expected to directly increase inward FDI transactions and the stock of FDI. The extent of further liberalisation in the FDI screening thresholds that occurred in 2006 and 2009 was not known at the time the agreement was negotiated, so the

potential benefits from the liberalisation of investment rules, to the extent they were considered at all, were probably underestimated at the time.

The implications of bilateral and regional free trade agreements for cross-border investment flows have been studied in other contexts, but the international evidence is mixed (Sauvant and Sachs 2009). In the Australian context, the liberalisation of screening thresholds has been considered more specifically in the context of services trade liberalisation (CIE 2010). The Productivity Commission (2010) has addressed the broader economic implications of bilateral and regional free trade agreements, but added little to the previous debate in 2004 and 2005 around the implications of the AUSFTA. Modelling of cross-border investment has been conducted mostly in a partial rather than a general equilibrium framework. As Blonigen (2005) notes, general equilibrium modelling of investment flows has lagged the modelling of trade flows and presents significant complications for empirical modelling. Consistent with related literature (see, for example, Waldkirch 2003), this article also adopts a partial equilibrium approach.

This article seeks to model the determinants of inward FDI transactions in Australia. The model is then used to estimate the effects of the liberalisation of foreign investment screening arrangements in the period following the introduction of the AUSFTA on 1 January 2005. For both theoretical and practical reasons, the article examines overall and not just US FDI in Australia. Increased US FDI could potentially displace or divert inflows from other sources. This trade diversion argument is one of the most significant objections raised to bilateral and regional free trade agreements relative to multilateral trade liberalisation processes. Since the AUSFTA also conditioned a broader liberalisation of FDI screening thresholds in 2006 and again in 2009, overall FDI inflows are the more appropriate focus.

Methodologically consistent data on US FDI in Australia are only available at an annual frequency over relatively short time horizons. Data from the US Bureau of Economic Analysis (<http://www.bea.gov/iTable/index_MNC.cfm>) shows that the Australian share of the stock of US FDI abroad has fallen slightly from an average 3.7 per cent between 1966 and 2003 to 3.1 per cent between 2005 and 2010. Australian Bureau of Statistics (ABS 2011) data show that the US share of the stock of overall FDI in Australia has fallen from an average 28.3 per cent between 2001 and 2004 to 26.5 per cent between 2005 and 2010. These data on the stock of US FDI in Australia include valuation effects from the exchange rate and other price changes, as well as distortions from a large transaction in 2004 that was reversed in 2005 and therefore straddles the implementation of the AUSFTA. Total US FDI in Australia in 2004 is suppressed by the US Bureau of Economic Analysis for reasons of commercial confidentiality. The ABS also suppresses information about the size of this transaction. It is thus difficult to estimate a model for inward US FDI with sufficient degrees of freedom that is free of valuation effects and other distortions. These data considerations also suggest that overall FDI inflows, rather than the stock of US FDI, are the more appropriate focus for empirical analysis.

The progressive liberalisation of the screening thresholds since the AUSFTA do not lend themselves to a single summary measure or dummy variable, given the complexities in their application and other regulatory arrangements for FDI, not to mention the Treasurer's discretionary powers. Any such measure would also not be independent of the other determinants of inward FDI. For example, FDI is widely assumed to impact domestic productivity growth and may be endogenous with trade in goods and services.

The approach taken in this article is to estimate a model for overall inward FDI transactions to the end of 2004. This is of interest in itself, given the paucity of recent empirical studies on the determinants of inward FDI in Australia. The model is then used to generate an out-of-sample forecast from the March quarter 2005 through to the June quarter 2011, the period since the implementation of the AUSFTA and subsequent further liberalisation of screening arrangements. The model-derived forecast is compared to actual FDI performance.

Section 2 considers the properties of the data on inward FDI transactions and their determinants. Section 3 estimates a model for the determination of inward FDI transactions in Australia and discusses its implications. Section 4 uses the model to generate an out-of-sample forecast for FDI transactions. The final section concludes by discussing the implications of these results.

2. Inward Foreign Direct Investment Transactions and Their Determinants

Methodologically consistent data for the stock of inward FDI in Australia are available from the ABS from the September quarter 1988. However, these data incorporate valuation effects from the exchange rate and other price changes that obscure the underlying volume of inward FDI transactions. Data for inward FDI transactions with price and exchange rate effects removed are also available for the period since the September quarter 1988. Yang, Groenewold and Tcha (2000) use these untransformed data over an earlier and smaller sample period as the dependent variable in their model. A log transformation of the data is preferable for the purposes of both estimation and interpretation; however, some quarters record negative FDI inflows. To address this problem, the stock of FDI liabilities at the end of the September quarter 1988 is taken as the first observation for the level of the dependent variable in the present model. Subsequent inward FDI transactions are added to this initial stock to derive a series for the stock of FDI liabilities that reflects only transactions. The log first difference of this series (Δfdi subsequently) is used as the dependent variable in the subsequent model (see Appendix 2 for data sources). The level of this series reflects the stock of FDI with exchange rate and other price effects removed and addresses the problem of negative values in the ABS series for inward FDI transactions.

A complication with the data on inward FDI transactions is a large transaction in the December quarter 2004 that was not completed and was reversed in the June quarter 2005. Information about the size of this transaction is suppressed by ABS and the US Bureau of Economic Analysis for commercial confidentiality reasons, making it difficult to adjust for the value of this transaction. However, it is addressed in subsequent modelling and forecast with a dummy variable that takes a value of 1 in the December quarter 2004, -1 in the June quarter 2005 and zero otherwise.

Growth in inward FDI transactions can be expected to be positively related to Australian real economic growth. Growth in real gross domestic income (GDI) is used instead of gross domestic product (GDP), since GDI better captures income effects from the terms of trade. A rising terms of trade subtracts from measured GDP growth due to the substitution of imports for domestic production as international purchasing power increases. Real GDI growth was found to have a quantitatively larger effect on inward FDI than GDP growth, with an elasticity of 0.64 (see Table 1), compared to 0.59 for GDP growth. While small, the difference in the magnitude of the elasticities can be attributed to the wedge driven between GDI and GDP by the terms of trade since the two series are otherwise conceptually similar. The terms of trade on its own was not found to be statistically significant in the model. However, growth in GDI may better capture the relevant income effects on FDI than the terms of trade, even if we cannot distinguish this effect from income growth more generally. Given their importance to the Australian economy, especially over the forecast period, GDI is used instead of GDP to ensure that there is some control for the terms of trade in both the model and the forecast.

Foreign direct investment can also be expected to respond positively to gains in host-country productivity, although FDI is also widely thought to enhance host-country productivity, suggesting scope for bilateral causality between the two variables (see Granger causality analysis below). The national accounts measure of market sector GDP per hour worked ($\Delta prod$) is used to measure productivity in the following model. Foreign portfolio investment inflows are potentially a substitute for FDI and are captured through growth in the stock of foreign portfolio investment ($\Delta port$).

Table 1 Equation (2): Growth in Inward Foreign Direct Investment Transactions[a]

Variable	*Coefficient*[b]
Constant (α_0)	1.497***[c]
	(0.375)[d]
Δfdi_{t-3} (α_1)	0.188*
	(0.099)
Δgdi_{t-1} (α_2)	0.642***
	(0.208)
$\Delta prod_t$ (α_3)	0.280
	(0.196)
Δr_{ft} (α_4)	−1.603***
	(0.390)
$\Delta port_t$ (α_5)	−0.235***
	(0.057)
$\Delta open_{t-1}$ (α_6)	−0.386**
	(0.160)
Δtwi_t (α_7)	−0.150***
	(0.052)
D_t (α_8)	0.126***
	(0.013)
Adjusted R^2	0.743
Standard error	1.177
Jarque-Bera test	{0.39}
Lagrange multiplier test	
1st order	{0.84}
4th order	{0.36}
Pagan-Godfrey test	{0.53}

Notes: (a) Estimated between June quarter 1989 and December quarter 2004.
(b) All the variables, except r^f and *open*, are multiplied by 100, so the coefficients are in percentages.
(c) *, ** and *** denote statistical significance at the 10 per cent, 5 per cent and 1 per cent level, respectively.
(d) Numbers in parentheses are standard errors; those in braces are p-values.

Trade openness has theoretically ambiguous implications for FDI. One the one hand, cross-border trade in goods and services is sometimes found to be positively correlated with cross-border trade in capital. On the other hand, FDI may be used as a mechanism for 'tariff-jumping' (Blonigen 2005), so that FDI becomes a substitute rather than a complement for trade in goods and services. This latter possibility is important in the Australian context, where FDI in manufacturing, particularly the car industry, continues to enjoy significant tariff protection and government subsidies. In the modelling that follows, trade openness is proxied by the usual measure, the sum of goods and services imports and exports as a share of GDP, differenced to render the series stationary ($\Delta open$). While it would be preferable to measure trade restrictions directly, as Waldkirch (2003, p. 161) notes, 'aggregating these rates [of protection] into one macroeconomic rate is problematic'. The potential endogeneity of the openness variable is addressed below.

The exchange rate also has theoretically ambiguous implications for inward FDI (Blonigen 2005), although focusing on transactions exclusive of valuation effects reduces the number of channels through which the exchange rate might operate on FDI inflows. The log first difference of the Australian dollar trade-weighted index (Δtwi) is used to capture these effects. The subsequent empirical estimates are little changed if the Reserve Bank of Australia's (RBA's) trade-weighted real effective exchange rate is used instead of the nominal TWI.

The change in the US 10 year bond yield minus the annual rate of change in the US core Consumer Price Index (CPI) (ex-food and energy) is used to proxy for the foreign real interest rate and is differenced to render it stationary (Δr^f). The choice of destination for FDI outflows is usually analysed as a global portfolio allocation decision and it is common to use the source country's real interest rate as the relevant interest rate variable in modelling FDI flows (see, for example, Waldkirch 2003), although the nominal US bond rate yielded similar results. All else being equal, a rise in the foreign interest rate could be expected to reduce the allocation of FDI to Australia. A decrease in the foreign interest rate could be expected to make Australia a relatively more attractive investment destination. A role could not be found for an Australian real interest rate or the differential with the US real interest rate in the model. The real interest rate differential with the United States could be viewed as measuring Australia-specific risk premia on debt instruments, although it may not capture relevant equity risk premia. Its lack of explanatory power for FDI suggests that risk premia may not be as important as previous modelling has assumed.

As noted previously, endogeneity between inward FDI and the various determinants

considered here cannot be ruled out. For example, one of the potential benefits of inward FDI is improved productivity growth through increased knowledge transfer. At the same time, to the extent that FDI is a substitute for trade in goods and services, FDI may reflect tariff and other non-tariff trade barriers that could be expected to lower productivity growth. One approach to addressing the endogeneity issue is to conduct individual and joint Granger non-causality tests between the variables. Ideally, the lagged explanatory variables in the empirical model should have predictive power for FDI, while lagged FDI should not Granger-cause the explanatory variables.

These tests can be conducted in first-differences or in levels of the variables using a vector autoregression (VAR). Lag-length criteria tests implied a zero lag for a VAR in first-differences, suggesting that the differenced lagged endogenous variables had little explanatory power. As the subsequent empirical model finds, most of the differenced explanatory variables have a contemporaneous relationship with FDI. Unreported cointegration tests failed to find a common stochastic trend among the variables that would support a vector error correction approach. In any event, conditioning on cointegrating relationships gives rise to pretest biases that render invalid the standard Wald and likelihood ratio tests used for causality testing. However, it is possible to estimate a VAR in levels of the variables using Toda and Yamamoto's (1995) approach to inference where the levels of the variables may be integrated or cointegrated of arbitrary order. The VAR's lag length k is chosen via the usual model selection criteria. A $p = (k + d_{max})$-order VAR is then estimated, based on equation (1):

$$y_t = \alpha_0 d_t + \sum_{i=1}^{p-1} \Gamma y_{t-i} + \varepsilon_t \qquad (1)$$

where y_t is a $n \times 1$ vector of endogenous variables in logarithms, d_t is a vector of deterministic elements (in this case, a constant term), Γ_i are the matrices of the dynamic coefficients and ε_t is a vector of random errors with an expected value of zero. The lag order p includes an additional exogenous lag (d_{max}) that is equal to the maximal order of integration that is suspected in the data.

Table 2 Wald Tests for Granger Non-Causality from Selected Explanatory Variables to *fdi*

Variables	*p-values for H_0 of Granger non-causality*
gdi → *fdi*	0.36
prod → *fdi*	0.25
r^f → *fdi*	0.00
port → *fdi*	0.08
open → *fdi*	0.06
twi → *fdi*	0.12
Joint test	0.00

Notes: Sample period 1989:Q3–2004:Q4. Based on VAR(k, d_{max}) (*fdi*, *gdi*, *prod*, r^f, *port*, *open*).

Table 3 Wald Tests for Granger Non-Causality from *fdi* to Selected Explanatory Variables

Variables	*p-values for H_0 of Granger non-causality*
fdi → *gdi*	0.28
fdi → *prod*	0.10
fdi → r^f	0.37
fdi → *port*	0.29
fdi → *open*	0.57
fdi → *twi*	0.94

Notes: Sample period: 1989:Q3–2004:Q4. Based on VAR(k, d_{max}) (*fdi*, *gdi*, *prod*, r^f, *port*, *open*).

The majority of model selection criteria suggested $k = 3$. A Lagrange multiplier test found no serial correlation for a maximum lag length of 4, which is an appropriate maximum lag length for quarterly data. Based on the order of integration tests in Appendix 1, d_{max} is set equal to 1. Zero restrictions on the first k dynamic coefficient matrices can then be tested with the last (d_{max}) lagged vector in the model ignored using otherwise standard Wald tests. Tables 2 and 3 show results from individual and joint Granger non-causality tests between the level of FDI and the explanatory variables used in the subsequent empirical model.

Table 2 shows that the lagged explanatory variables in levels are jointly significant in explaining FDI, with strong rejection of the null of Granger non-causality. Tests for the individual explanatory variables suggest that this result is mainly driven by the foreign real

interest rate, which is expected to be exogenous, but portfolio investment and trade openness are also Granger-causal below the 10 per cent level of significance. Non-causality from the TWI to FDI is only narrowly accepted above the 10 per cent level.

Table 3 shows the results from individual tests for Granger non-causality running from FDI to the selected explanatory variables. The test accepts non-causality from the lagged level of FDI to the other explanatory variables, although FDI is only narrowly accepted as Granger non-causal for productivity at the 10 per cent level of significance, consistent with the potential for endogeneity between the two variables. I do not report individual or joint tests of Granger non-causality between the other explanatory variables. While there was evidence that trade openness and the TWI were individually and jointly Granger-caused by some of the other variables in the VAR, the main concern is the potential for endogeneity with FDI. The results in Tables 2 and 3 give greater confidence that the explanatory variables in the subsequent model can be treated as exogenous with respect to FDI. However, as already noted, many of the relationships in first-differences are contemporaneous, so I cannot completely rule out endogeneity with FDI with tests based on lagged levels of the variables.

3. An Empirical Model of Inward Foreign Direct Investment Transactions in Australia

The preliminary investigation of the data in a VAR framework, together with the order of integration tests in Appendix 1, suggests the need for a more restricted model in first-differences of the variables that allows for the possibility of contemporaneous relationships. A general-to-specific modelling procedure is used with insignificant lags removed, yielding the specification in (2):

$$\begin{aligned}\Delta fdi_t = {} & \alpha_0 + \alpha_1 \Delta fdi_{t-3} + \alpha_2 \Delta gdi_{t-1} \\ & + \alpha_3 \Delta prod_t + \alpha_4 \Delta r_t^f + \alpha_5 \Delta port_t \\ & + \alpha_6 \Delta open_{t-1} + \alpha_7 \Delta twi_t \\ & + \alpha_8 D_t + \varepsilon_t \end{aligned} \quad (2)$$

where *fdi* is the log of inward FDI transactions as derived previously, *gdi* is the log of gross domestic income, *prod* is the log of market sector GDP per hour worked, r^f is the US 10 year bond yield minus the annual rate of change in the US core CPI (ex-food and energy), *port* is the log of the stock of foreign portfolio investment in Australia, *open* is the sum of import and export shares of GDP, *twi* is the log of the Australian dollar trade-weighted index, *D* is a dummy variable that takes a value of 1 in the December quarter 2004, −1 in the June quarter 2005 and zero otherwise and ε_t is a random error term. The results from estimating equation (2) are shown in Table 1.

The coefficient on lagged growth in FDI transactions points to some positive persistence in the growth rate of FDI inflows with a three-quarter lag. A 1 per cent increase in real GDI growth is associated with a 0.64 per cent increase in FDI inflows. This is in contrast to Yang, Groenewold and Tcha (2000), who find a counter-intuitive negative coefficient on the lagged growth rate of real GDP in two of their specifications. As already noted, substituting real GDP for GDI growth yields a very similar coefficient of 0.59 per cent. The difference in the two elasticities can be attributed to the terms-of-trade wedge between the two series discussed earlier. Productivity growth does not satisfy conventional levels of statistical significance, although the sign is correct and the magnitude of the estimated effect is plausible, even if subject to a large standard error.

Foreign direct investment inflows are highly elastic with respect to the foreign real interest rate, with a 1 percentage point increase in the US real bond yield associated with a 1.6 per cent decline in inward FDI transactions. Substituting the nominal US bond rate yielded a smaller elasticity of −1.4 per cent. This is consistent with FDI being allocated as part of a global portfolio allocation decision by source-country firms, with higher rates of return abroad leading to a reduction in FDI inflows to Australia. By the same token, inward FDI benefits when foreign real interest rates decline. In contrast to Yang, Groenewold

and Tcha (2000), I did not find a role for the nominal Australian bill yield. The interest rate differential with the United States was also insignificant. To the extent that the interest rate differential captures relevant risk premia, this argues against its importance as a determinant of FDI.

A 1 per cent increase in the growth rate of foreign portfolio investment reduces inward FDI transactions by around 0.2 per cent. This implies some substitution between portfolio investment and FDI. A 1 per cent increase in trade openness reduces growth in FDI transactions by approximately 0.4 per cent. Yang, Groenewold and Tcha (2000) obtain a coefficient of the same sign and magnitude on trade openness in one of their specifications. This is consistent with 'tariff-jumping' and suggests that FDI and trade in goods and services are substitutes rather than complements in Australia's case.

The trade-weighted index is negatively related to FDI transactions, with a 1 per cent increase in the growth rate of the TWI lowering growth in FDI transactions by around 0.15 per cent. A very similar elasticity of −0.14 per cent was found for the RBA's trade-weighted real effective exchange rate. This can be attributed to Australian assets becoming more expensive in foreign currency terms. A higher TWI could also be expected to raise Australian dollar export prices and lower Australian dollar import prices, leading to substitution out of domestic production and into imports. This in turn could also be expected to lower inward FDI transactions. This is in contrast to Yang, Groenewold and Tcha (2000), who find a positive coefficient on the change in the trade-weighted index.

Much of the model's measured fit of 0.74 comes from the dummy variable D, but even without the dummy, adjusted R^2 is 0.28. The equation standard error of 1.2 per cent compares favourably to the standard deviation of 2.3 per cent for the dependent variable. The p-values on the diagnostic tests shown in Table 1 indicate normal residuals, free of serial correlation and heteroscedasticity. The estimated model improves on Yang, Groenewold and Tcha (2000) in successfully motivating a role for a real interest rate variable, finding a role for real economic growth and the trade-weighted index with the expected sign and including a role for portfolio investment. The log transformation of the data yields more interpretable parameter estimates and is more conducive to a homoscedastic error variance than would be expected from the use of untransformed data (Yang, Groenewold and Tcha do not report tests for heteroscedasticity).

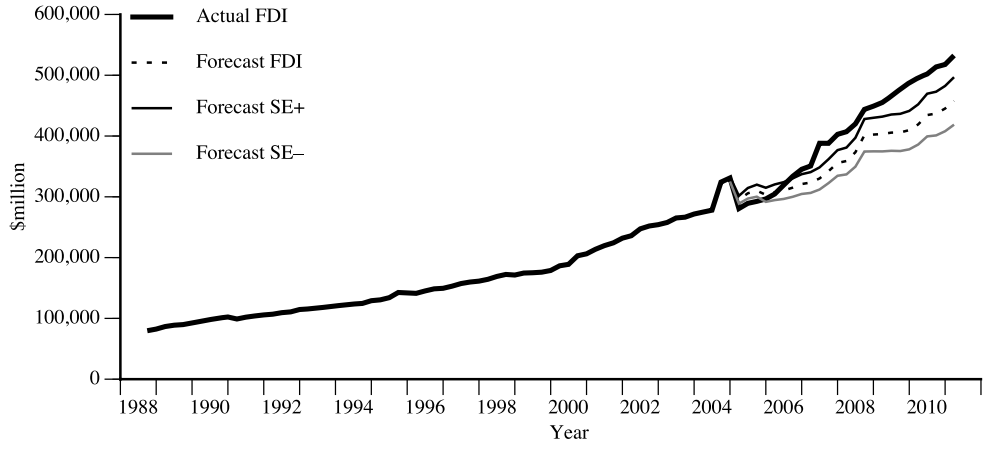
4. Out-of-Sample Forecast Performance and the Australia–US Free Trade Agreement

The estimated model based on (2) is used to generate out-of-sample forecasts for inward FDI transactions from the March quarter 2005 to the June quarter 2011, using actual values for the explanatory variables to generate the forecast. The expectation is that the out-of-sample forecast performance of the model should be poor, given the significant liberalisation of Australia's foreign investment rules following the implementation of the AUSFTA. In particular, actual inward FDI transactions are expected to be higher than forecast given these liberalisation measures.

Figure 1 shows the stock of inward FDI, based on transactions only from the December quarter 1989 to the December quarter 2004, plus forecast values from the March quarter 2005 to the June quarter 2011 and their standard error bands based on the model estimated by equation (2).

Actual inward FDI is initially below the model's forecast, but exceeds the forecast values from the September quarter 2006 and the upper standard error band for the forecast from the March quarter 2007. The difference in actual inward FDI transactions relative to forecast peaks in the March quarter 2010, with the stock of inward FDI being $77.814 billion higher than forecast. The stock of FDI is $74.704 billion higher than forecast at the end of the forecast period in the June quarter 2011. To put this in perspective, the addition to the stock of FDI relative to the model-derived forecast is approximately equal to the current account deficit of $73 billion for the year-ended in the June quarter 2008.

Figure 1 Actual versus Forecast Inward Foreign Direct Investment (FDI)



Note: SE denotes standard error.

The poor out-of-sample forecast performance of the model can be attributed to unmodelled exogenous factors and their potential interaction with the model's estimated parameters. The outperformance of inward FDI transactions relative to the model's forecast can be plausibly attributed to the significant liberalisation of FDI screening thresholds that began with the AUSFTA in the March quarter 2005, with further liberalisation taking place in 2006 and 2009. While there have been other changes in the regulatory arrangements for FDI over the same period, these are likely to have been relatively small in their implications and the outperformance relative to the model's forecast suggests that the net effect of these changes has been positive for overall inward FDI.

This approach to quantifying the implications of the liberalisation of investment screening arrangements is only approximate and could both underestimate or overestimate the expected positive effect. The estimated model has limited explanatory power and the forecast cannot distinguish between effects from the liberalisation of screening arrangements and other factors that have not been controlled for in the model. I cannot rule out some substitution between FDI sourced from the United States and other sources, although complete substitution would seem unlikely, given the net gains to FDI inflows and the broader liberalisation of screening thresholds in 2006 and 2009. The results are consistent with the expectation that the liberalisation of investment screening arrangements should yield an increase in FDI inflows and the stock of FDI relative to expectations derived from a model estimated to the end of 2004.

5. Conclusion

The estimated model is a significant improvement on that estimated by Yang, Groenewold and Tcha (2000), the only previous attempt at estimating an empirical model of inward FDI transactions for Australia. In particular, the model finds roles for real GDI growth, foreign real interest rates, portfolio investment, trade openness and the trade-weighted exchange rate that are consistent with theory, although theory is ambiguous in its expectations for trade openness and the exchange rate. Only the trade-openness variable is found to have effects consistent with the previous study. The model estimated here suggests that inward FDI transactions are substitutes for portfolio investment. This substitution effect is desirable in so far as FDI has larger economic benefits than portfolio investment and is less subject to the risk of capital flight in the context of credit market shocks. Foreign direct investment was also found to be a substitute rather than a complement to trade openness. This is a less welcome

finding, suggesting that inward FDI transactions are motivated in part by tariff-jumping in Australia's case.

Inward FDI transactions are negatively related to the foreign real interest rate, consistent with FDI being determined as part of a global portfolio allocation decision on the part of source-country firms. Australia must compete with rates of return in the rest of the world for its share of global FDI flows. The differential between Australian and US real interest rates could be expected to capture country-specific risk premia, but was found to be insignificant in unreported modelling. However, debt instruments may not adequately reflect the relevant equity risk premium.

Growth in the Australian dollar trade-weighted index lowers inward FDI transactions by making Australian dollar-denominated assets more expensive in foreign currency terms. This finding is at odds with Yang, Groenewold and Tcha (2000). While the exchange rate has theoretically ambiguous implications for FDI, the focus on transactions data with valuation effects from the exchange rate removed reduces the number of channels through which the exchange rate might operate on FDI.

As with Yang, Groenewold and Tcha (2000), the out-of-sample forecast performance of the estimated model is poor. However, for the period since 2004, there is a plausible explanation for the outperformance of FDI relative to the model's forecast: the significant liberalisation of foreign investment rules that followed the introduction of the AUSFTA on 1 January 2005 and the further liberalisation of overall FDI screening thresholds in 2006 and 2009. Inward FDI was found to be quantitatively and statistically higher than implied by the model's forecast by an amount sufficient to fully finance the current account deficit for 12 months. This is, at best, an approximation of the effects due to the liberalisation of screening thresholds. Since overall, rather than US, FDI flows are being modelled, I can rule out the possibility of US FDI having completely displaced FDI from other sources (the trade diversion argument against bilateral and regional FTAs), especially given the broader liberalisation seen in 2006 and 2009. While increased FDI inflows probably came at the expense of portfolio investment, the coefficient of substitution is small and FDI is widely assumed to have benefits that do not attach to portfolio investment.

The increase in inward FDI suggests that the AUSFTA and the subsequent broader liberalisation of FDI screening arrangements had direct economic benefits that were mostly ignored in earlier modelling of the implications of the agreement for bilateral trade in goods and services. These benefits do not necessarily depend on a reduction in the risk premium on Australian assets, as suggested by the CIE's modelling for the Department of Foreign Affairs and Trade, but are the consequence of an increased stock of FDI from all sources due to the wider liberalisation in Australia's foreign investment rules following the agreement. Despite being liberalised in an absolute sense, Australia's regulatory regime for FDI remains relatively restrictive by international standards. The OECD estimated that Australia could increase its stock of inward FDI by around 45 per cent by lowering FDI restrictions to the level of the United Kingdom, the OECD's least restrictive FDI regime (Nicoletti et al. 2003). The outperformance of Australian FDI in recent years relative to expectations derived from the model estimated here suggests that significant further additions to the capital stock could be realised through further reductions in screening thresholds or by extending full national treatment to FDI from all sources.

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Appendix 1: Order of Integration (Augmented Dickey-Fuller) Tests

Table A1 presents Augmented Dickey-Fuller tests for the order of integration of the dependent and explanatory variables.

Appendix 2: Data Sources

Table A2 presents data sources for the dependent and explanatory variables. See the text for data descriptions.

Table A1 Order of Integration (Augmented Dickey-Fuller) Tests

Variable[a]	*Lags*[b]	*Constant*	*Constant and trend*
Level			
fdi	0/0	0.2032	−2.645
gdi	0/1	1.3550	−2.492
prod	0/0	−1.0250	−0.981
r^f	1/1	−2.5430	−4.473***[c]
port	1/1	−1.0660	−2.866
open	1/1	−2.5640	−3.562**
twi	1/1	−1.5080	−2.472
First-difference			
Δ*fdi*	1/1	−9.1950***	−9.238***
Δ*gdi*	0/0	−6.8870***	−7.062***
Δ*prod*	0/0	−9.1960***	−9.243***
Δr^f	3/3	−6.2600***	−6.193***
Δ*port*	0/0	−7.2520***	−7.288***
Δ*open*	0/0	−7.5700***	−7.562***
Δ*twi*	0/1	−7.9440***	−7.710***

Notes: (a) *t*-tests for $\rho = 1$ in regressions of $y_t = \alpha + \rho y_{t-1} + \varepsilon_t$ and $y_t = \alpha + \beta_t + \rho y_{t-1} + \varepsilon_t$ for sample period 1989:3–2011:2

(b) Lag length for test with constant/constant and trend chosen by Schwarz information criterion.

(c) *, ** and *** denote statistical significance at the 10 per cent, 5 per cent and 1 per cent level, respectively.

Table A2 Data Sources

Series	*Source*
fdi	Australian Bureau of Statistics 2011, *Balance of Payments and International Investment Position*, Cat. no. 5302.0, June, ABS, Canberra
gdi	Australian Bureau of Statistics 2011, *Australian National Accounts: National Income, Expenditure and Product*, Cat. no. 5206.0, June, ABS, Canberra
prod	Australian Bureau of Statistics 2011, *Australian National Accounts: National Income, Expenditure and Product*, Cat. no. 5206.0, June, ABS, Canberra
r^f	Federal Reserve Bank of St Louis, 'FRED database', viewed December 2011, <http://research.stlouisfed.org/fred2/>
port	Australian Bureau of Statistics 2011, *Balance of Payments and International Investment Position*, Cat. no. 5302.0, June, ABS, Canberra
open	Australian Bureau of Statistics 2011, *Balance of Payments and International Investment Position*, Cat. no. 5302.0, June, ABS, Canberra
twi	Reserve Bank of Australia, 'Exchange rate data – Statistics', viewed December 2011, <http://www.rba.gov.au/statistics/hist-exchange-rates/index.html>

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