



Financial Sector Growth, Capital Formation and Productivity

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Summary

- The financial and insurance services sector is the largest of the 12 industries that make up the market sector of the Australian economy, with a 9.9% share of output compared to the next largest sector, mining, with a 9.8% share.
- Productivity growth in the financial and insurance sector has outperformed productivity growth in the market sector as a whole on average over the 24 years to 2013-14.
- There is a large body of cross-country empirical evidence establishing a positive relationship between financial sector size and economic development.
- The share of financial services in national income in Australia has risen over time in line with international trends.
- For developed economies like Australia's, economic growth is driven by the quality rather than the quantity of investment.
- Measures of the efficiency of the financial system usually fail to account for the social value of information production in financial markets.
- Economic growth and productivity typically slow as living standards measured by per capita income rise. This leads to the effects of convergence in living standards across countries being falsely attributed to increases in the financial sector and financial depth.
- Internationally, there is no evidence to suggest the unit cost of financial services has risen along with the income share of financial services.
- Statistical tests do not support the view that growth in the financial sector and secondary market activity in Australia has come at the expense of capital formation.
- There is a statistically significant long-run relationship between financial sector value-added and gross fixed capital formation in the Australian economy for the period since 1990.
- There is little statistical support for the view that growth in financial sector value-added subtracts from overall growth in labour productivity.
- Dwelling investment is an important component of overall capital formation and the financial sector plays a key role in financing that investment.
- Bank credit and market securitisation support both new housing supply and turnover in the stock of established housing.
- Total turnover in the housing market is more likely to be inefficiently low than inefficiently high given the significant transaction costs incurred in buying and selling residential real estate.
- The prominence of established housing in housing finance is not a sign of inefficiency in financial markets, although may be symptomatic of inefficiencies in the housing market.
- Policies that aim to suppress secondary financial markets based on a view that there is 'too much finance' are likely to harm capital formation, productivity and living standards.

1. Introduction

The financial and insurance services sector is the largest of the 12 industries that make up the market sector of the Australian economy, with a 9.9% share of output compared to the next largest sector mining with a 9.8% share. Productivity growth in the financial and insurance sector has outperformed productivity growth in the market sector as a whole on average over the 24 years to 2013-14.¹

The financial sector contributes directly to productivity growth through its share of the economy, but also indirectly through its role in determining the quantity and quality of investment. The financial sector mobilises saving, while financial markets allocate that saving to its most productive uses in the form of investment. The efficiency of this capital formation process is an important driver of productivity growth, which is the main long-run driver of national income per capita.

There is an extensive literature demonstrating a positive relationship between financial system development and economic development as proxied by national income per capita. However, questions have also been raised as to whether there can be ‘too much finance.’ It has been suggested that the financial sector may grow to exceed its optimal or efficient size, subtracting from productivity and national income, or increasing the risk of financial crises. In the context of the 2014 Financial System Inquiry, some submissions claimed that the Australian financial system has become less efficient in fostering capital formation, reducing productivity growth.²

This paper briefly reviews some of the literature on the relationship between the financial sector and economic development. Productivity growth typically slows as economies mature and approach the frontier of global productivity and living standards represented by the United States. At the same time, the financial services sector’s share of national income and measures of financial depth tend to increase with living standards. Failure to adequately control for the long-run relationship between domestic and global productivity and living standards can lead to a slowing in productivity growth being falsely attributed to variables positively correlated with living standards, such as the size of the financial services sector and measures of financial depth.

The paper then examines empirically some of the claims made about the Australian financial system in the context of the recent Financial System Inquiry. It estimates the relationship between gross fixed capital formation and measures of financial sector activity, finding that there is a positive long-run relationship between investment and financial sector gross value-added and that this relationship has become stronger since 1990. It is suggested that this long-run relationship has only emerged as the financial system has matured post-deregulation.

This paper also finds evidence for a small positive effect of growth in financial sector value-added on growth in overall labour productivity for the period since 1990. However, the long-run relationship between Australian labour productivity, US labour productivity and financial sector value-added is unstable, reflecting a persistent failure of the Australian economy to converge on US productivity levels. While this lack of convergence has a wide range of possible explanations, there is a little

¹ Productivity Commission, “PC Productivity Update” (Melbourne: Productivity Commission, July 2015).

² Industry Super Australia, “Finance and Capital Formation in Australia,” November 2013, 3.

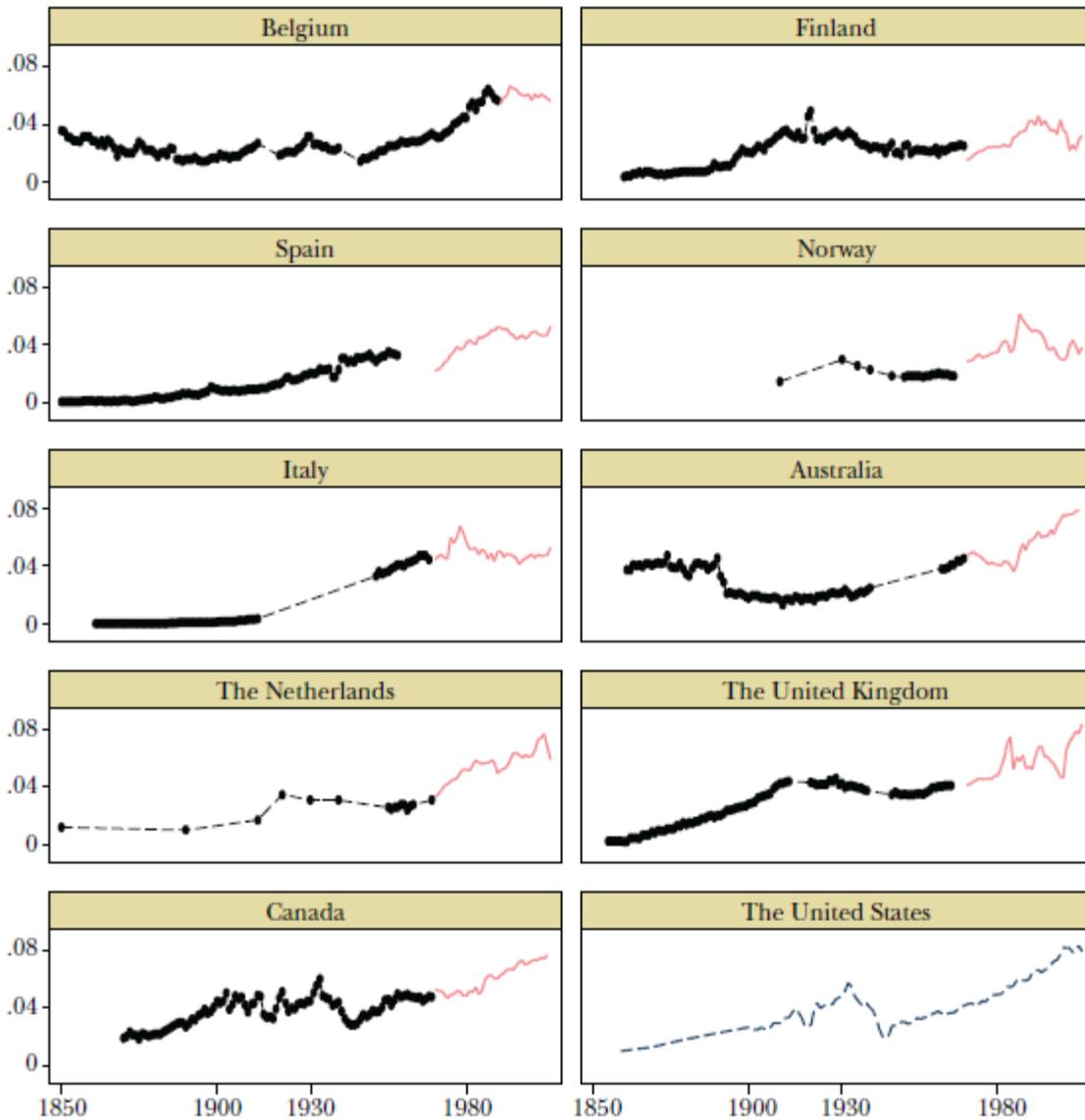
statistical support for the view that financial sector value-added subtracts from labour productivity in Australia. These results are consistent with financial system development playing an important role in both capital formation and productivity growth. Public policy needs to be mindful of these relationships if it is to maximise long-run growth in living standards.

2. The Financial System and Economic Development

The financial services share of the economy tends to grow over time as living standards rise and consumers and business demand more sophisticated financial services. This is a global phenomenon in which Australia has been a participant. Figure 1 shows the financial sector's share of national income in Australia and other developed economies since 1850.

Figure 1

Historical Income Share of the Financial Sector, 1850–2007



Source: Philippon and Reshef (2013). Black dots represent historical sources, solid lines represent modern sources, dashed lined are combined or interpolated sources.

There is a large body of cross-country empirical evidence establishing a positive relationship between measures of financial depth, financial market activity and the level of economic development and living standards as proxied by the national income per capita.³ However, recent

³ Ross Levine, "Finance and Growth: Theory and Evidence," in *Handbook of Economic Growth Vol 1A*, ed. Philippe Aghion and Steven Durlauf (Elsevier, 2005).

papers by the International Monetary Fund,⁴ the Bank of International Settlements⁵ and the OECD⁶ have questioned whether the size of the financial sector measured by the credit to GDP ratio and other measures of financial depth may exceed an optimal size and subtract from economic growth and living standards. As William Cline shows, the same non-linear empirical relationship between financial sector depth and economic development can be also be found for the number of doctors, fixed line telephones and R&D technicians. This suggests the unlikely result that these variables may also reach a level where they damage economic growth. These results are due to a failure to adequately control for the fact that economic growth and productivity typically slow as living standards measured by per capita income rise. This leads to the effects of convergence in living standards across countries being falsely attributed to increases in financial depth.⁷

The financial system plays an important role in mobilising saving and determining the *quantity* of investment. The financial system is also an important determinant of the efficiency of the capital allocation process, which determines the *quality* of investment. It is the quality of investment that determines productivity growth and growth in living standards. The financial sector and financial markets improve the quality of investment through a number of mechanisms:

1. Improving the quality and quantity of information used to evaluate investments and investment risks. This includes the essential role of price discovery in financial markets in allocating capital. Equity market prices and investment are correlated over time. Price discovery is a positive externality generated by market participants who do not individually capture the full benefit of more efficient prices, but bear the cost acquiring information.⁸ While the efficiency of financial market prices is often called into question, this is an argument for lowering transaction costs and more complete and active markets that improve the informational content of asset prices. The resources devoted to price discovery in markets could be inefficiently low rather than inefficiently high.
2. Providing competitive markets for the ownership and control of equity and other capital, ensuring that assets are owned by those best able to maximise rates of return.
3. Providing risk management and risk-reduction services, including hedging of risks through financial instruments and markets.

⁴ Jean-Louis Arcand and Ugo Panizza, "Too Much Finance?," IMF Working Paper (Washington, DC: International Monetary Fund, June 2012).

⁵ Stephen Cecchetti and Enisse Kharroubi, "Reassessing the Impact of Finance on Growth," Working Paper No 381 (Basle: Bank for International Settlements, July 2012).

⁶ Boris Cournede and Oliver Denk, "Finance and Economic Growth in OECD and G20 Countries," Economics Department Working Paper No. 1223 (Paris: OECD, June 2015).

⁷ William Cline, "Too Much Finance, or Statistical Illusion?," Policy Brief (Washington, DC: Peterson Institute for International Economics, June 2015); William Cline, "Further Statistical Debate on 'Too Much Finance,'" Working Paper 15-16 (Washington, DC: Peterson Institute for International Economics, October 2015).

⁸ Kenneth R. French, "Presidential Address: The Cost of Active Investing," *Journal of Finance* 63, no. 4 (2008).

As Cochrane argues, the socially optimal or efficient size of the financial sector is not the right question to ask. It is function that matters, not size per se.⁹ The more relevant question is whether the financial system is performing the above tasks effectively.

3. Has the Australian Financial System Become Less Efficient at Capital Formation Over Recent Decades?

In the context of the Murray inquiry into the financial system, some submissions argued that the Australian financial system has become less efficient at capital formation. For example, Industry Super Australia (ISA) made four major claims about the efficiency of the financial system:

1. 'The Australian financial system has become relatively less efficient at capital formation over recent decades.'¹⁰
2. This decline in efficiency is partly attributed to 'growth in trading or exchanging assets compared to creating new ones.'¹¹ This leads to a recommendation for 'reforms' to address 'excessive secondary market trading.' Industry Super does not state what form policy changes might take, although suggests that 'some of these reforms undoubtedly will require changes to public policy.'¹²
3. 'The business of banking has increasingly focused on financing the resale of existing housing stock, rather than the creation of new capital.'¹³
4. 'There are positive and negative aspects of secondary market trading. In the case of the Australian capital markets, the expansion of trading activity has not clearly resulted in a capital market that is friendlier to capital raising, and indeed, the opposite appears to have happened.'¹⁴

Industry Super define the efficiency of the financial system in terms of gross fixed capital formation (adjusted for retained earnings and foreign finance) divided by value-added in financial services. This yields a measure of capital formation per dollar of financial services output.

This 'efficiency ratio' assumes that the main function of the financial sector is to determine the quantity of investment. While this is an important function, an equally important function is to improve the efficiency with which saving and investment are allocated in the economy. This in turn determines quality of the capital stock and its contribution to productivity and long-run economic growth and living standards.

⁹ John Cochrane, "Finance: Function Matters, Not Size," *Journal of Economic Perspectives* 27, no. 3 (Spring 2013).

¹⁰ Industry Super Australia, "Finance and Capital Formation in Australia," 3.

¹¹ *Ibid.*, 6.

¹² *Ibid.*

¹³ Industry Super Australia, "Financial System Efficiency," March 2014, 2.

¹⁴ *Ibid.*, 9.

As Industry Super note, 'our analysis does not seek to address allocative efficiency or the quality of the capital formation attributable to finance.'¹⁵ This is an important omission. Much of the output of the financial sector is geared to improving the quality rather than increasing the quantity of investment. Indeed, an important function of financial markets is to ensure that the economy is not over-capitalised, investing more in physical and other capital than would be economically efficient.

It is worth noting that the investment share of Australian GDP rose to a record high of 29% of GDP in the first quarter of 2012 compared to just under 17% of GDP in the depths of the early 1990s recession. While the mining investment boom accounts for much of the increase, a record investment share of output that is also high by the standards of Australia's developed country peers does not suggest Australia has a problem with capital formation. This is not to claim that the investment share of GDP has been optimal, only to highlight that Australia's recent investment performance has been strong by historical and international standards. At roughly the same time, the finance and insurance sector's share of gross value-added has also seen record highs, with a 9.9% share of market sector output. The relationship between investment and financial sector gross value-added is tested more formally later in this paper.

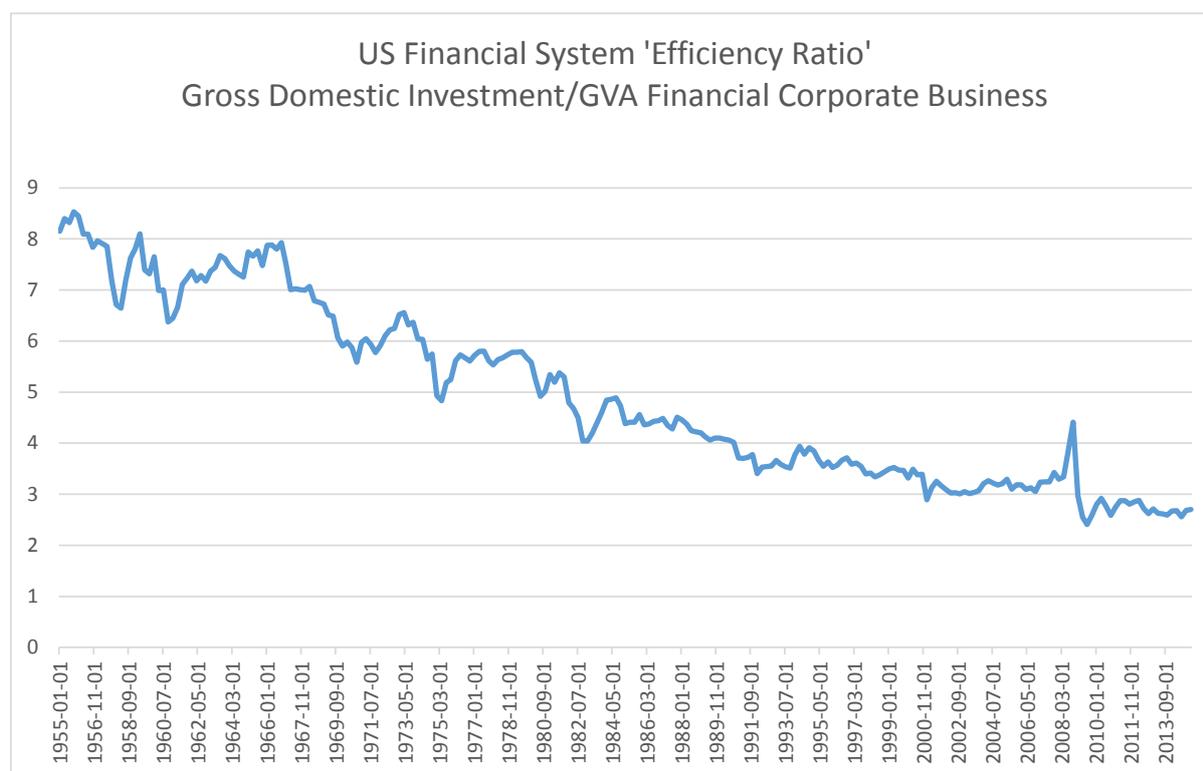
The decline in the 'efficiency ratio' highlighted by Industry Super can be taken to imply that more of the output of the financial sector is devoted to improving the quality rather than the quantity of investment. This is to be expected in an advanced economy such as Australia's, where the stock of capital per person is already high and gains in productivity are driven primarily through the adoption of new technology, innovation and additions to human rather than physical capital. The financial sector's share of output rises because improving the quality of investment becomes harder when the economy is already close to the frontier of productive efficiency. Similarly, when markets are already very efficient in incorporating information into asset prices, further efficiency gains require greater market turnover and expenditure on price discovery. Economic growth that is driven primarily by the quantity rather than the quality of investment is a characteristic of developing rather than developed economies like Australia's.

Industry Super's efficiency ratio can also be calculated for the United States, dividing gross fixed investment by value-added on the part of financial corporate business (Figure 2).¹⁶ These data show a similar 'efficiency ratio' and trend over time to that reported by Industry Super for Australia. Note the perverse implication that the US financial sector became more 'efficient' during the financial crisis in the final quarter of 2008 as gross value-added in the financial sector collapsed relative to investment.

¹⁵ Industry Super Australia, "Finance and Capital Formation in Australia," 7.

¹⁶ Note Figure 1 is derived from series that are not strictly comparable to those used by Industry Super for Australia, but are a close approximation.

Figure 2



Source: US Bureau of Economic Analysis

Based on this metric, the US financial system has also become increasingly less efficient since the mid-1950s.

A more meaningful measure of financial system efficiency is the ratio of the income of financial intermediaries to the quantity of intermediated assets. On this measure, the US financial system has exhibited constant returns to scale for the last 130 years.¹⁷ However, even this measure fails to take account of 'the social value of information production in financial markets. This effect is elusive because it can show up as an improvement in total factor productivity with little impact on the aggregate quantity of assets.'¹⁸ Similarly, we would not necessarily expect the information produced by financial markets to impact the aggregate quantity as opposed to the quality of investment. Internationally, there is no evidence to suggest the unit cost of financial services has risen along with the income share of financial services.¹⁹ While the failure of unit costs to decline in the long-run, whether due to scale economies or the adoption of new technology, is something of a puzzle, such productivity puzzles are not unique to the financial sector. Some measures of transaction costs in financial markets, such as bid-ask spreads on Dow Jones stocks and commissions on NYSE equity

¹⁷ Thomas Philippon, "Has the US Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation," *American Economic Review* 105, no. 4 (2015).

¹⁸ *Ibid.*, 1435.

¹⁹ Thomas Philippon and Ariell Reshef, "An International Look at the Growth of Modern Finance," *Journal of Economic Perspectives* 27, no. 2 (Spring 2013).

trades do show evidence of long-term decline.²⁰ The growth in electronic trading has been associated with an improvement in the quality of US equity markets on a broad-range of measures.²¹

Australia and the US also exhibit a similar long-run trend in relation to the financial services share of the economy.²² For a small open economy like Australia, the financial sector plays an important role in integrating the Australian economy with the world economy. The financial services share of the Australian economy is a reflection of its openness to the rest of the world given its role in the intermediation of the foreign capital inflows that underpin domestic capital formation.

The fact that Australia and the US have seen a similar ratio and trend in the ratio of investment to financial services value-added implies that the causes are common to both economies and not specific to Australia. As already noted, the observed trend on this measure is consistent with an advanced economy in which productivity growth is driven primarily by innovation and the adoption of new technology and financial sector output is largely focused on maximising the efficiency and not the quantity of investment.

A Model of Australian Gross Fixed Capital Formation

The relationship between the financial sector and investment can be tested in the context of a model that explains the growth in gross fixed capital formation in terms of financial sector gross-value added and other explanatory variables. An error correction model can be used to capture both the short-run effect of financial sector growth on investment growth, as well as long-run effects from the size of the financial sector.²³

The following error correction model (equation 1) is estimated by least squares:

$$\Delta gfcf_t = \alpha_0 + \alpha_1 t + \alpha_2 \Delta gfcf_{t-1} + \alpha_3 \Delta gfcf_{t-2} + \alpha_4 \Delta fgva_{t-1} + \alpha_5 \Delta gdp_{t-1} + \alpha_6 \Delta gdp_{t-4} + \alpha_7 GST + \alpha_8 gfcf_{t-1} + \alpha_9 fgva_{t-1} + \varepsilon_t \quad (1)$$

where $gfcf$ is the log of gross fixed capital formation,²⁴ gdp is the log of real GDP, $fgva$ is the log of gross value-added on the part of the financial and insurance sector, GST is a dummy variable that

²⁰ Charles M. Jones, "A Century of Stock Market Liquidity and Trading Costs," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, May 23, 2002), <http://papers.ssrn.com/abstract=313681>.

²¹ James Angel, Lawrence Harris, and Chester S. Spatt, "Equity Trading in the 21st Century," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, February 23, 2010), <http://papers.ssrn.com/abstract=1584026>.

²² Philippon and Reshef, "An International Look at the Growth of Modern Finance," 74.

²³ A conditional unrestricted error correction model of the type estimated in equation (1) is well-suited to estimating both short and long-run dynamics. The model implicitly assumes that financial sector gross value-added is exogenous with respect to investment. This assumption could be violated in a number of ways. However, the close relationship between Australian and international trends in the financial services share of the economy suggests that the financial services share of the economy is determined in large part by Australia's openness to global influences. The lag structure of the model means that financial sector value-added is pre-determined for investment. The model tests whether financial sector value-added has predictive power for investment.

²⁴ All data sourced from ABS. No adjustment is made to investment for retained earnings or foreign sector financial intermediation. The absence of this adjustment is expected to weaken the relationship between

takes a value of 1 in Q3 and Q4 2000 and zero otherwise, t is an unrestricted linear time trend, Δ is a first difference operator and ε_t is a random error term.

The model assumes that growth in investment is a function of its own lags, lagged growth in GDP, lagged growth in financial sector-value added and a deterministic linear trend. The lagged levels of investment and financial sector value-added seek to capture the long-run relationship, if any, between these variables. The GST dummy controls for the sharp decline in the contribution of dwelling investment to gross fixed capital formation in the two quarters following the introduction of the GST.

The model is estimated over three sample periods. The first is the full sample period from 1975:Q1 to 2015:Q1, which is determined by the availability of consistent ABS data on value-added by industry and the lag structure of the model. The second sample is 1984:Q1 to 2015:Q1. This is the period since financial deregulation, dated from the float of the Australian dollar at the end of 1983, which could be expected to change the relationship between the financial sector and capital formation. The third sample is from 1990:Q1 to 2015:Q1. This period was chosen as Industry Super identifies the early 1990s as a turning point in the 'efficiency' of the financial sector's role in capital formation, claiming the financial sector has become less efficient in 'recent decades' due to excessive growth over the last 20 years.²⁵ By comparing the three sample periods, it is possible to determine whether there is a change in the relationship between investment and financial sector value-added.

The estimated model is shown in Table 1 for the full sample and the two sub-samples.

financial sector value-added and total gross fixed capital formation, raising the hurdle to finding an economically and statistically significant relationship between these variables.

²⁵ In fact, Figure A on page 3 of Industry Super's report *Finance and Capital Formation in Australia* implies the main 'efficiency' loss occurred between 1975 and the early 1990s, not in the period since. However, Industry Super is correct in identifying the period since the early 1990s as the period in which growth in the financial sector outperformed other sectors of the economy.

Table 1. Equation 1: Growth in Gross Fixed Capital Formation

Variable	From 1975:Q1	From 1984:Q1	From 1990:Q1
Constant	41.16 (29.20)	36.45 (32.09)	5.81 (39.00)
t	0.04 (0.048)	0.04 (0.05)	-0.02 (0.07)
$\Delta gfcf_{t-1}$	-0.05 (0.08)	-0.08 (0.09)	0.03 (0.10)
$\Delta gfcf_{t-2}$	0.18*** (0.07)	0.20** (0.08)	0.19** (0.08)
$\Delta fgva_{t-1}$	-0.07 (0.10)	-0.07 (0.13)	0.04 (0.18)
Δgdp_{t-1}	0.92*** (0.25)	0.98** (0.44)	0.54 (0.45)
Δgdp_{t-4}	-0.45** (0.21)	-0.51 (0.32)	-0.79** (0.34)
GST	-0.10*** (0.02)	-0.10*** (0.02)	-0.09*** (0.02)
$gfcf_{t-1}$	-0.06** (0.02)	-0.06** (0.03)	-0.18*** (0.04)
$fgva_{t-1}$	0.02 (0.03)	0.03 (0.03)	0.21*** (0.06)
$\theta = -(\alpha_9/\alpha_8)$	0.27	0.39	1.2
F -test of $\alpha_8 = \alpha_9 = 0$	3.84	3.01	10.19***
Adj. R^2	0.27	0.26	0.42
S.E	2.37	2.41	2.10
JB-test	{0.60}	{0.64}	{0.39}
LM test			
- 1 st order	{0.65}	{0.80}	{0.72}
- 4 th order	{0.26}	{0.42}	{0.18}
BPG-test	{0.50}	{0.08}	{0.73}

Notes: Numbers in parentheses () are standard errors, those in braces {} are p -values. ***, **, * denote the 1, 5 and 10 per cent significance levels respectively. Significance level for F -test based on Pesaran *et al* (2001).

The main coefficients of interest are those on $\Delta fgva_{t-1}$, $gfcf_{t-1}$ and $fgva_{t-1}$. The coefficient on $\Delta fgva_{t-1}$ shows the short-run effect of lagged growth in financial sector value-added on investment. This

coefficient is not statistically different from zero across the three sample periods. This implies that lagged growth in the financial sector does not explain the growth rate of investment. However, it is also inconsistent with the idea that growth in the financial sector is subtracting from capital formation. For this to be true, we would expect to see a statistically significant negative coefficient on this variable.

The long-run relationship between financial sector gross value-added and investment is given by $\theta = -(\alpha_9/\alpha_8)$. This coefficient implies that a 1% increase in financial sector gross-value added raises investment by 0.27% based on the full sample, 0.39% based on the sample from 1984:Q1 and 1.2% for the sample from 1990:Q1. However, only the coefficient for the latter sample is statistically significant.

The F -test statistic for $\alpha_7 = \alpha_8 = 0$ tests whether there is a statistically significant long-run equilibrium relationship between financial sector gross value-added and investment based on the bounds testing methodology proposed by Pesaran *et al* (2001). This test is robust to the order of integration of the two variables and the possibility of cointegration between them. The test statistic of 10.19 exceeds the upper bound of the one percent critical values given by Pesaran *et al* ($F_{Upper} = 9.63$) for the period from 1990:Q1. A positive and statistically significant long-run equilibrium relationship exists between these two variables over this period, but not the earlier samples.

The estimated coefficient of -0.18% on the lagged level of investment for the period since 1990:Q1 measures how much of the disequilibrium in the long-run relationship between investment and financial sector value-added is corrected each quarter. The t -statistic on the lagged level of investment of -4.51 exceeds the upper bound of -3.69 given by Pesaran *et al*'s bounds t -test at the one percent significance level for the period since 1990:Q1. The estimated relationship is consistent with causality running from financial sector value-added to investment.

The estimated model is inconsistent with the suggestion that growth in financial sector value-added has impeded capital formation in recent decades. In fact, the long-run relationship has strengthened both quantitatively and in terms of statistical significance for the period from 1990 through to the first quarter of 2015 relative to earlier sample periods. A straightforward explanation for this result is that the financial sector went through a period of significant growth and structural change in the mid-1980s as a result of financial deregulation. It is only since the financial system matured post-deregulation that a stable long-run relationship with capital formation has emerged. There is no evidence for the proposition that capital formation has been impeded by growth in the financial sector based on this model.

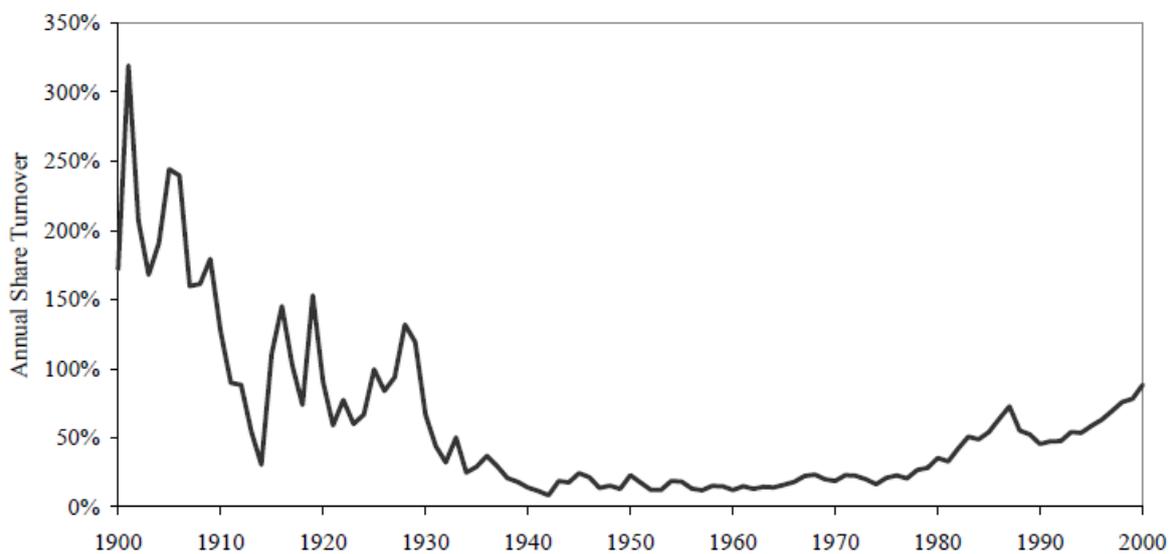
4. Does Secondary Market Activity Impede Capital Formation?

Secondary markets are those in which securities issued in primary markets trade after they have been issued. For example, an initial public offering (IPO) of equity is a capital raising in the primary market. Subsequent trading in the newly issued equity takes place in the secondary market, usually on a stock exchange. Primary and secondary markets both play an important and mutually reinforcing role in the financial system. Secondary markets support primary markets by ensuring that investors can more easily transact in the assets they acquire through primary markets.

Liquidity in stock markets is positively related to economic growth, investment and productivity.²⁶ Stock market liquidity is an important determinant of the cost of firms raising external capital.²⁷ Liquidity is also an important determinant of equity returns.²⁸ Recent volatility in equity, fixed income and other markets has been attributed in part to a reduction in secondary market liquidity flowing from regulatory changes to prudential, liquidity, collateral and capital requirements.²⁹

Much has been made of rising equity market turnover ratios in Australia and abroad. Yet historically, equity turnover ratios were much higher in the early part of the 20th century than in the latter part, at least in the United States (Figure 3).

Figure 3: Annual Turnover in NYSE Stocks, 1900-2000



Source: Jones (2002)

Equity market turnover on the NYSE has declined since 2000, with annualised year to date turnover in December 2014 at 57%.³⁰

Growth in secondary market activity is a sign of financial system maturity. Secondary market turnover can be expected to increase over time, notwithstanding the variable long-run trend in the US equity market noted above. This is partly due to the way in which technology has lowered the

²⁶ G. Caporale, P Howelles, and A Soliman, "Stock Market Development and Economic Growth: The Causal Linkage," *Journal of Economic Development*, 2004; T Beck and R Levine, "Stock Markets, Banks and Growth: Panel Evidence," *Journal of Banking and Finance* 28 (2003).

²⁷ Alexander Butler, Gustavo Grullon, and James Weston, "Stock Market Liquidity and the Cost of Issuing Equity," *Journal of Financial and Quantitative Analysis* 40, no. 2 (June 2005).

²⁸ Viral Archarya and Lasse Pedersen, "Asset Pricing with Liquidity Risk," *Journal of Financial Economics* 77 (2005); Jones, "A Century of Stock Market Liquidity and Trading Costs."

²⁹ PwC, "Global Financial Markets Liquidity Study," August 2015.

³⁰ http://www.nyxdata.com/nysedata/asp/factbook/viewer_edition.asp?mode=table&key=3149&category=3

cost of trading and facilitated more frequent re-estimation of optimal portfolio strategies.³¹ Secondary market turnover in the Australian equity market has been on a rising trend since at least the late 1970s.

The secondary market in equity and other securities facilitates the price discovery that determines the quality of investment. Secondary market liquidity also lowers the cost of raising capital in the primary market by ensuring that investors can buy and sell assets more easily. The growth in secondary market liquidity may help explain the decline in the 'efficiency' ratio referenced above, since more financial sector output is devoted to this activity, but this does not mean that growth in the secondary market comes at the expense of capital formation. Indeed, growth in the secondary market should facilitate capital formation.

It has been suggested that the efficiency of capital formation has been impaired by 'growth in trading or exchanging assets compared to creating new ones.'³² This proposition can be tested by substituting the ASX turnover ratio³³ (ASX trade value divided by domestic market capitalisation) (*asxtr*) for financial sector gross-value added in the error correction model estimated in equation (1) above, yielding estimated equation (2) shown in Table 2. Turnover ratio data is available for the ASX from December 1979. The entry of the Chi-X exchange into secondary market trading in competition with ASX from November 2011 reduced turnover on the ASX, so the model is estimated using data from 1980:Q2 to 2011:Q3, with the starting point reflecting the lag structure of the model. A shorter sub-sample from 1990:Q1 is also estimated to test the claim that capital formation has been impeded by the growth in secondary market activity in recent decades.

³¹ Andrei Kirilenko, and Andrew Lo, "Moore's Law versus Muphy's Law: Algorithmic Trading and Its Discontents," *Journal of Economic Perspectives* 27, no. 2 (Spring 2013): 55.

³² Industry Super Australia, "Finance and Capital Formation in Australia," 6.

³³ The turnover ratio effectively normalises traded value and obviates the need for inflation adjustment. The author would like to thank the ASX for providing these data. Market turnover has been shown to be correlated with economic growth in other studies, for example, Ross Levine and Yona Rubinstein, "Stock Markets, Banks and Economic Growth," *American Economic Review*, 88 (1998).

Table 2. Equation 2: Growth in Gross Fixed Capital Formation

Variable	From 1980:Q2	From 1990:Q1
Constant	53.14** (23.3)	156.28*** (37.22)
t	0.05 (0.04)	0.20*** (0.07)
$\Delta gfcf_{t-1}$	-0.07 (0.10)	-0.04 (0.11)
$\Delta gfcf_{t-2}$	0.15* (0.08)	0.08 (0.09)
$\Delta asxtr_{t-1}$	-0.03* (0.02)	-0.01 (0.03)
Δgdp_{t-1}	0.97*** (0.37)	0.66 (0.45)
Δgdp_{t-4}	-0.53* (0.29)	-0.58 (0.37)
GST	-0.10*** (0.02)	-0.09*** (0.02)
$gfcf_{t-1}$	-0.06** (0.03)	-0.18*** (0.03)
$asxtr_{t-1}$	0.02 (0.02)	0.04 (0.03)
$\theta = -(\alpha_9/\alpha_8)$	0.28	0.25
F -test of $\alpha_8 = \alpha_9 = 0$	2.82	9.20**
Adj. R^2	0.27	0.44
S.E	2.51	2.1
JB-test	{0.81}	{0.28}
LM test		
- 1 st order	{0.49}	{0.41}
- 4 th order	{0.41}	{0.75}
BPG-test	{0.78}	{0.74}

Notes: Numbers in parentheses () are standard errors, those in braces {} are p -values. ***, **, * denote the 1, 5 and 10 per cent significance levels respectively. Significance level for F -test based on Pesaran *et al* (2001).

The short-run effect of the ASX turnover ratio on investment is given by the coefficient on $\Delta asxtr_{t-1}$. The coefficient is not economically or statistically significant at conventional significance levels.

The estimated long-run elasticity is given by $\theta = -(\alpha_9/\alpha_8)$ and ranges between 0.25% to 0.28% over the two samples, implying that a 1% increase in the ASX turnover ratio yields a close to 0.3% increase in investment. The F -test statistic of 9.20 is greater than the upper bound of the five percent critical values given by Pesaran *et al* ($F_{Upper} = 7.30$) for the period from 1990:Q1, although the test is inconclusive at the 1% level. This is consistent with a long-run equilibrium relationship between these two variables over this period. The t -statistic on the lagged level of investment of -4.24 exceeds the 5% critical value of -3.69 given by Pesaran *et al* for the more recent sample, although again is inconclusive at the 1% level. While the long-run relationship between the ASX equity market turnover ratio and the level of investment is not statistically significant for the early sample, the long-run elasticities are quantitatively similar. This does not suggest that there has been a change in the long-run relationship between secondary market activity and investment. The estimated relationship is inconsistent with the view that secondary market activity comes at the expense of capital formation.

5. Does Bank Credit for Established Housing Impede Capital Formation?

One criticism of the Australian financial system is that ‘the business of banking has increasingly focused on financing the resale of existing housing stock, rather than the creation of new capital.’³⁴ By definition, the sale of established homes does not contribute to gross fixed capital formation and only contributes to GDP indirectly through ownership transfer costs. Bank credit is an important source of finance for both new investment and transactions involving existing assets, including housing. Whether there is substitution between credit for established housing and credit for other purposes including investment spending (in the national accounts sense) is not straightforward to test. To the extent that there is a substitution, this could be demand (ie, consumer) driven rather than supply (financial sector) driven.

It is worth noting that the construction and new dwelling share of housing finance was on a declining trend from the mid-1970s through to the early 2000s, but has stabilised more recently. The supply of new dwellings is small relative to the total housing stock. New dwelling commencements in 2014 were equal to just over 2% of the existing residential housing stock. Over the same period, housing finance for the construction or purchase of new dwellings averaged around 17% of total housing finance commitments by number (26% excluding refinancing). The share of newly built housing in housing finance is greater than the share of new housing relative to the total housing stock. Housing finance is thus more heavily weighted to newly-built homes than the supply of new dwellings would imply.

The financial sector plays an essential role in financing new dwelling supply (which is a component of gross fixed capital formation in the national accounts) as well as financing turnover in the existing housing stock. Turnover in established dwellings is essential in ensuring that the stock of established

³⁴ Industry Super Australia, “Financial System Efficiency,” 2.

housing is allocated efficiently.³⁵ Transaction taxes such as stamp duty and capital gains tax (on investment properties) reduce housing market turnover and liquidity, implying that turnover in the housing stock is more likely to be inefficiently low rather than inefficiently high.³⁶ Sydney house prices have risen rapidly in recent years in part because the housing stock listed for sale (both new and established) has been low relative to other capital cities (Table 3). Total listings have been on a declining trend nationally in recent years. This is not consistent with 'excessive' turnover in the housing stock.

Table 3. Listed Housing Stock by Capital City as at October 2015: Trending Lower



Properties listed for sale, capital city

Capital city	No of new listings	12 mth change (%)	No of total listings	12 mth change (%)
Sydney	9,552	0.3%	22,564	4.4%
Melbourne	9,171	-4.6%	29,948	-8.1%
Brisbane	4,550	-5.7%	18,151	-5.9%
Adelaide	2,268	-12.0%	7,646	-8.3%
Perth	3,691	-22.4%	19,284	10.7%
Hobart	472	-0.8%	2,494	-14.2%
Darwin	203	-13.6%	1,581	13.8%
Canberra	720	3.7%	2,184	-7.8%
Combined capitals	30,627	-6.4%	103,852	-1.9%

Properties listed for sale, national

State	No of new listings	12 mth change (%)	No of total listings	12 mth change (%)
NSW	14,774	0.9%	56,627	-3.7%
Vic	12,925	-4.3%	55,755	-6.4%
Qld	10,173	-6.7%	63,356	-3.2%
SA	3,155	-11.0%	16,955	-0.8%
WA	5,068	-20.0%	33,576	7.1%
Tas	1,150	0.8%	9,778	-4.9%
NT	276	-10.4%	2,110	14.0%
ACT	726	3.3%	2,227	-8.0%
National	48,247	-5.5%	240,384	-2.6%

Source: CoreLogic RP Data

Given that much of the established housing stock is owned outright, it should not be surprising that housing finance is more heavily skewed to new homes than the supply of new homes relative to the total housing stock might otherwise suggest. However, the supply of residential land and new housing is largely determined by regulation. The financial sector cannot finance new homes that are not built because of these regulations. Similarly, investors in rental housing are necessarily limited in their capacity to invest in new homes because the overall demand to invest in property exceeds new supply. The role of the financial sector in funding new dwelling investment is necessarily constrained by the impediments to new housing supply.

³⁵ Cameron Kusher notes that Australia has a shortage of housing, but a glut of bedrooms, because public policy does not support an efficient allocation of the housing stock, see 'Australia has a glut of bedrooms but a dearth of policies in place to make these rooms and homes available to those who need them most,' CoreLogic RP Data Research Blog, 21 April 2015. <http://blog.corelogic.com.au/2015/04/australia-has-a-glut-of-bedrooms-but-a-dearth-of-policies-in-place-to-make-these-rooms-and-homes-available-to-those-who-need-them-most/>

³⁶ Subsidies to new home buyers could be expected to offset the under-allocation of resources to housing turnover to some extent.

Dwelling investment is an important component of overall capital formation and the financial sector plays a key role in financing that investment. Bank credit and market securitisation support both new housing supply and turnover in the stock of established housing. Total turnover in the housing market is more likely to be inefficiently low than inefficiently high given the significant transaction costs incurred in buying and selling residential real estate. The prominence of established housing in housing finance is not in itself a sign of inefficiency in financial markets, although may be symptomatic of inefficiencies in the housing market.

6. Does Secondary Market Activity Impede the Primary Market?

As noted above, there is a well-established relationship between equity market development and economic development, the cost of raising capital and asset returns. This relationship is a function of the role of equity markets in promoting both capital accumulation and the efficiency of the capital stock. A recent study by Andriansyah and Messinis extends this literature by distinguishing between the roles of the primary and secondary equity market. They find a positive and causal relationship between the secondary market and economic development for a sample of 54 countries, but not for the primary market. The primary market benefits economic growth only indirectly through its role as a supplier of new shares to the secondary market. They conclude that ‘capital raised through the primary equity market is not an important determinant of economic growth’³⁷ based on their results.

Industry Super claim that ‘the expansion of trading activity has not clearly resulted in a capital market that is friendlier to capital raising, and indeed, the opposite appears to have happened.’ The performance of the primary equity market in Australia may be cause for concern, particularly the failure to attract more foreign listings, but there is no reason to believe that secondary market development comes at the expense of the primary market. Policies designed to address ‘excessive’ secondary market trading are likely to damage both markets and harm living standards through reduced capital formation and productivity.

7. The Relationship between the Financial System and Productivity

The financial system can affect productivity through a number of channels. The financial sector’s own productivity makes a direct contribution to economy-wide productivity through its share of output. As noted above, multifactor productivity in the financial sector has outperformed economy-wide multifactor productivity in recent decades. Capital formation and the capital-labour ratio is another channel. As shown in previous sections, there is an economically and statistically significant relationship between financial sector value-added and capital formation in Australia since 1990.

The financial system can also influence productivity through the efficiency of the capital stock or the quality rather than the quantity of investment. This channel is harder to measure, since it is difficult to measure the social value of the information generated by the financial sector, most notably, the

³⁷ Andriansyah Andriansyah and George Messinis, “Equity Markets and Economic Development: Does the Primary Market Matter?,” *Economic Record* 90, no. Special Issue (June 2014): 139.

determination of asset prices. However, the financial sector's contribution to productivity can nonetheless be proxied by its contribution to value-added in the national accounts. Financial sector value-added may capture rents and other market inefficiencies that ideally would be excluded from this measure. These inefficiencies will tend to weaken the relationship between financial sector value-added and productivity.

ABS time-series data on productivity is limited. Multifactor productivity data are only available from the mid-1990s. GDP per hour worked is only available from the late 1970s, with market sector data only available from the mid-1990s. The Conference Board publishes data on labour productivity that dates from 1950. This is available on a purchasing power parity-adjusted basis, which enables estimation of the relationship between Australian and US productivity. Labour productivity is generally thought to be more closely related to changes in living standards, whereas multifactor productivity is more closely related to technological change and production efficiency.³⁸ If the transmission mechanism from the financial system to productivity is mainly through a qualitative rather than a quantitative channel, then labour productivity may not be the best measure to use to capture this relationship.

Productivity for a small open economy such as Australia's is influenced by changes in global productivity, proxied by growth in US productivity, as well as long-run convergence with the level of US productivity and the level of US income per capita. These convergence dynamics can be captured by estimating the relationship between Australian labour productivity, US productivity and Australian per capita income. While productivity is an important driver of living standards as measured by per capita income, productivity growth can also be expected to slow as the level of per capita income approaches the global frontier (normally associated with US per capita income). This is the basic explanation for why productivity growth tends to slow over time in mature economies such as Australia's.

As Bill Cline suggests, because the financial services share of output and financial depth increase as per capita incomes grow, failure to control for the level of per capita income would lead to the slowing in productivity growth driven by convergence with global productivity and living standards being falsely attributed to the financial services sector.³⁹

While the theoretical and empirical basis for these long-run relationships is generally well established, the available time series data may not capture the true long-run relationship given that adjustment to any disequilibrium in that relationship may take decades and fall outside the range of the sample. The failure of Australian productivity to converge on that of the United States in recent decades has been widely noted and has several possible explanations.⁴⁰ It should not be entirely surprising if the limited time series data available for Australia reject these long-run relationships. However, this still provides a framework in which to test the contribution financial sector value-added makes to economy-wide labour productivity.

³⁸ Ben Dolman, Dean Parham, and Simon Zheng, "Can Australia Match US Productivity Performance?," Staff Working Paper (Melbourne: Productivity Commission, March 2007), 3.

³⁹ Cline, "Too Much Finance, or Statistical Illusion?"

⁴⁰ Dolman, Parham, and Zheng, "Can Australia Match US Productivity Performance?"

A Model of Australian Labour Productivity Growth

The following error correction model (equation 3) is estimated by least squares:

$$\Delta lp_t = \alpha_0 + \alpha_1 t + \alpha_2 \Delta uslp_t + \alpha_3 \Delta lu_{t-1} + \alpha_4 \Delta lp_{t-1} + \alpha_5 \Delta fgva_{t-1} + \alpha_6 \Delta gdppc_{t-1} + \alpha_7 lp_{t-1} + \alpha_8 uslp_{t-1} + \alpha_9 fgva_{t-1} + \alpha_{10} gdppc_{t-1} + \varepsilon_t \quad (3)$$

where lp is Australian labour productivity, $uslp$ is US labour productivity, lu is labour utilisation (measured as total hours worked divided population), $fgva$ is financial sector gross value-added adjusted for purchasing power parity,⁴¹ $gdppc$ is Australian real GDP per capita on a purchasing power parity-adjusted basis, t is an unrestricted linear time trend, Δ is a first difference operator and ε_t is a random error term.⁴²

The model is estimated based on annual data from 1975 to 2015, reflecting the availability of data on financial sector value-added and the lag structure of the model. Sub-samples are also estimated from 1984 and 1990, for reasons discussed earlier in this paper. This results in some small sample sizes that are unlikely to capture the adjustment to long-run relationships that may span many years or decades. However, they are included here as a check on the robustness of the estimated relationships. The results are shown in the Table 4.

⁴¹ It is assumed that the financial sector has the same share of purchasing power parity-adjusted GDP as the financial sector's share of gross-value added in real GDP expressed in Australian dollars.

⁴² Australian labour productivity, US labour productivity, Australian labour utilisation and Australian real GDP per capita on a purchasing power parity basis are all taken from the Conference Board's Total Economy Database. Australian financial sector gross value-added is taken from the ABS and adjusted for purchasing power parity as noted above.

Table 4. Equation 3: Growth in Labour Productivity

Variable	From 1975	From 1984	From 1990
Constant	204.53*** (66.63)	311.41*** (95.21)	295.76** (105.03)
t	0.45*** (0.11)	0.65*** (0.16)	0.80*** (0.18)
$\Delta uslp_t$	0.55** (0.23)	0.67 (0.44)	0.43** (0.24)
Δlu_{t-1}	-0.50* (0.28)	-0.60 (0.36)	-0.42** (0.20)
Δlp_{t-1}	-0.26 (0.24)	-0.36 (0.38)	-0.14 (0.19)
$\Delta fgva_{t-1}$	0.02 (0.05)	0.04 (0.06)	0.19*** (0.05)
$\Delta gdppc_{t-1}$	0.44 (0.33)	0.57 (0.51)	0.20 (0.31)
lp_{t-1}	-0.24*** (0.07)	-0.16 (0.17)	-0.04 (0.10)
$uslp_{t-1}$	0.42*** (0.10)	0.24 (0.22)	0.02 (0.16)
$fgva_{t-1}$	-0.01 (0.03)	0.02 (0.03)	-0.04 (0.06)
$gdppc_{t-1}$	-0.43*** (0.13)	0.46** (0.20)	-0.28* (0.14)
$\theta_{uslp} = -(\alpha_8/\alpha_7)$	1.72	1.51	0.66
$\theta_{fgva} = -(\alpha_9/\alpha_7)$	0.03	0.10	-1.17
$\theta_{gdppc} = -(\alpha_{10}/\alpha_7)$	-1.79	-2.9	-7.75
F -test of $\alpha_7 = \alpha_8 = \alpha_9 = \alpha_{10} = 0$	9.59***	1.46	0.92
Adj. R ²	0.50	0.53	0.65
S.E	0.96	0.90	0.69
JB-test	{0.52}	{0.07}	{0.97}
LM test			
- 1 st order	{0.03}	{0.70}	{0.62}
BPG-test	{0.46}	{0.70}	{0.66}

Notes: Numbers in parentheses () are HAC robust standard errors, those in braces { } are p -values. ***, **, * denote the 1, 5 and 10 per cent significance levels respectively. Significance level for F -test based on Pesaran *et al* (2001).

Australian productivity growth has an elasticity with respect to contemporaneous US productivity growth⁴³ of around 0.6% for the full sample, with little change across the two sub-samples.

The growth in labour utilisation has the expected negative effect on labour productivity, with an elasticity of -0.5% for the full sample and quantitatively similar results for the two sub-samples

Lagged labour productivity and real GDP per capita growth are not statistically significant, although the signs and magnitudes of the estimated coefficients are plausible.

Lagged growth in financial sector value-added has a positive effect on labour productivity, but this is only quantitatively and statistically significant for the sub-sample from 1990. This is consistent with the earlier results in relation to gross fixed capital formation in suggesting that it is only since the financial system has matured post-deregulation that growth in financial sector value-added has become a statistically significant determinant of measured productivity growth. While these results need to be treated with caution, they are not consistent with the view that growth in financial sector value-added has subtracted from productivity growth in recent decades. The short-run relationship between financial sector value-added and measured labour productivity has if anything strengthened since 1990.

The estimated long-run relationship with US productivity, financial sector value-added and GDP per capita shows considerable instability across the full sample and two sub-samples. For the full sample, the *F*-test is consistent with a long-run relationship between these variables and Australian labour productivity, although financial sector gross value-added is not quantitatively or statistically significant in this relationship. The *t*-statistic on the lagged level of labour productivity for the full sample rejects a long-run relationship at the 5% level. The two sub-samples also reject a long-run equilibrium relationship between labour productivity and the other three variables.

These results imply that the level financial sector value-added is not a significant long-run determinant of overall labour productivity alongside the level of US productivity growth and real GDP per capita. However, it is noteworthy that there is also considerable instability in the estimated long-run relationship with US productivity and Australian real GDP per capita.

These results need to be interpreted with considerable caution for reasons already discussed above. Productivity growth is subject to measurement error and structural change. However, there is little support in these data for the 'too much finance' view that financial sector value-added is subtracting from productivity growth or that the financial sector is making less of a contribution to productivity than in the past.

⁴³ US productivity growth is assumed to be exogenous with respect to Australian productivity growth, so potential endogeneity in estimating a contemporaneous relationship is not a concern.

8. Conclusion

The financial sector makes an essential contribution to the quantity and quality of capital formation. It contributes directly to productivity growth through its own share of output and indirectly through its contribution to the efficiency of the capital stock and the social value of the information produced by financial markets. Financial markets promote competition in the ownership of the capital stock and allow consumers and business to better manage risk.

The financial sector plays an important role in mobilising saving and investment and ensuring that capital is allocated efficiently. For an advanced economy such as Australia, the quality of investment is more important than the quantity. Growth in productivity and living standards that is driven primarily by capital accumulation is more characteristic of a developing rather than a developed economy such as Australia's. Indeed, an important function of financial markets is to ensure that there is not over-investment. The price signals generated by financial markets are an essential part of this process. However, the social value of this information is difficult to measure directly. Policies that discourage 'excessive' secondary market trading, such as a financial transactions taxes, may harm primary markets by reducing secondary market liquidity. They may also hinder the price discovery that is essential to ensuring the quality of investment spending.

Even if we accept the quantity of investment as the benchmark for financial system efficiency, there is little evidence to support claims about growing financial system inefficiency. This paper has tested the relationship between gross fixed capital formation, financial sector value-added and the ASX equity market turnover ratio for the period over which consistent data are available. It finds little support for the view that financial sector value-added impedes capital formation. On the contrary, the data are consistent with a positive long-run relationship between financial sector-value added, secondary market activity and capital formation for the period from 1990. This suggests that a stable long-run relationship with capital formation has only emerged as the financial system has matured post-deregulation.

This paper has also tested the relationship between financial sector gross value-added and economy-wide labour productivity. Labour productivity growth tends to slow as productivity and living standards converge on the global frontier represented by the United States. Analyses that fail to control for these convergence dynamics are likely to falsely attribute a slow-down in productivity growth to variables that are positively correlated with living standards, such as the size of the financial services sector. However, the Australian economy has been notable for its failure to converge on US levels of labour productivity. There are several possible explanations for this lack of convergence, including distance from markets and lack of scale, although there is little agreement on the relative importance of these and other factors. Institutional quality is unlikely to be a factor given that Australia now typically outranks the US on measures of economic freedom.⁴⁴ We find little evidence to support the view that growth in financial sector value-added impedes productivity growth. Public policy needs to be mindful of the relationship between financial system development, capital formation and productivity. Policies that aim to suppress secondary markets based on a view that there is 'too much finance' are likely to harm market liquidity, capital formation, productivity and living standards.

⁴⁴ See, for example, the Heritage Foundation's index of economic freedom <http://www.heritage.org/index/>

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