



SUPERANNUATION AND MACROECONOMIC GROWTH AND STABILITY

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ABSTRACT

The economic consequences of an expanded Australian superannuation sector were recently quantified by Giesecke et al.^[1] using a financial computable general equilibrium (FCGE) model of Australia. Using the FCGE model by Giesecke et al.^[2], Nassios et al.^[3] studied the short - and long - run structural implications of expansion in the size of Australia's superannuation sector. Several structural shifts were identified: (1) A rise in the use of debt relative to equity to finance the residential housing stock; (2) A rise in the ratio of gross private debt to household income; (3) A fall in Australia's net foreign financing requirement, measured via a reduction in the current account deficit relative to GDP; (4) An expansion in non - bank financial intermediaries and life insurer's; and (5) A change in the capital structure of commercial banks, particularly a greater reliance on bond financing. In this paper, we consider the implications of these structural shifts for macroeconomic stability and growth. To this end, we survey literature addressing how economic structure and policy can influence macroeconomic stability and growth. We also summarise how several counter - cyclical macroeconomic policies we identify are modelled in the VU - Nat FCGE model applied herein. As we shall discuss, the literature on financial and macroeconomic stability suggests that a rise in the level of private - debt - to - income does not generally aid macroeconomic stability. Nevertheless, stability and future growth prospects are in all likelihood improved by the noted reduction in Australia's net foreign financing requirement, via a reduction in Australia's exposure to foreign credit supply shocks such as those the Australian commercial banks experienced during the GFC. A key structural shift driving this result is the increase in demand for corporate debt liabilities by domestic financial asset agents, such as the superannuation funds, which drives a deepening of Australia's corporate bond market.

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Abstract

The economic consequences of an expanded Australian superannuation sector were recently quantified by Giesecke *et al.*^[1] using a financial computable general equilibrium (FCGE) model of Australia. Using the FCGE model by Giesecke *et al.*^[2], Nassios *et al.*^[3] studied the short- and long-run structural implications of expansion in the size of Australia's superannuation sector. Several structural shifts were identified: (1) A rise in the use of debt relative to equity to finance the residential housing stock; (2) A rise in the ratio of gross private debt to household income; (3) A fall in Australia's net foreign financing requirement, measured via a reduction in the current account deficit relative to GDP; (4) An expansion in non-bank financial intermediaries and life insurer's; and (5) A change in the capital structure of commercial banks, particularly a greater reliance on bond financing. In this paper, we consider the implications of these structural shifts for macroeconomic stability and growth. To this end, we survey literature addressing how economic structure and policy can influence macroeconomic stability and growth. We also summarise how several counter-cyclical macroeconomic policies we identify are modelled in the VU-Nat FCGE model applied herein. As we shall discuss, the literature on financial and macroeconomic stability suggests that a rise in the level of private-debt-to-income does not generally aid macroeconomic stability. Nevertheless, stability and future growth prospects are in all likelihood improved by the noted reduction in Australia's net foreign financing requirement, via a reduction in Australia's exposure to foreign credit supply shocks such as those the Australian commercial banks experienced during the GFC. A key structural shift driving this result is the increase in demand for corporate debt liabilities by domestic financial asset agents, such as the superannuation funds, which drives a deepening of Australia's corporate bond market.

Keywords: Financial CGE model; Superannuation; Macroeconomic stability.

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1 Introduction

The role of superannuation in the Australian financial system was recently investigated by Giesecke *et al.*^[1] and Nassios *et al.*^[3]. Giesecke *et al.*^[1] outline the development of the VU-Nat financial computable general equilibrium (financial CGE) model, which integrates detail of the economy's financial sector with a traditional real-side CGE model. This model is used by Giesecke *et al.*^[1] to explore the macroeconomic effects of the superannuation sector in Australia, by simulating a one percentage point increase in the ratio of Australian superannuation contributions relative to the national wage bill. The macroeconomic implications of the policy are outlined, and the various mechanisms via which the financial and traditional real-side elements of the model interact to drive these outcomes are explored.

This analysis was extended by Nassios *et al.*^[3] in two ways. Firstly, the authors use a version of the VU-Nat model developed by Giesecke *et al.*^[2], which includes two refinements based on the original model by Giesecke *et al.*^[1]: (1) The asset allocation and capital structure of commercial banks is constrained based on regulator-imposed capital adequacy and liquidity constraints; and (2) The central banking agent actively sets monetary policy, with the domestic cash rate adjusted based on a policy rule as per Taylor^[4]. With these refinements in place, the authors investigate the implications of an expanded superannuation system for the Australian commercial banking sector. Five long-run structural implications are identified: (1) The ratio of debt-to-equity used in financing of residential housing rises; (2) The private-debt-to-income ratio is elevated; (3) Australia's net foreign financing requirement falls; (4) The non-bank financial intermediaries and life insurance agents expand; and (5) The capital structure of the commercial banks changes, with an increased reliance on corporate bond and equity financing relative to bank deposits. The commercial banks are also shown to expand in the long-run, however unlike the five shifts identified above, this expansion is contingent upon a rise in the national savings rate calibrated using the results by Connolly^[5].

Our aim herein is to explore the implications of these structural shifts for macroeconomic growth and stability. The definition of macroeconomic stability has evolved over the course of the 20th century. The post-war era was dominated by the notion of Keynesian stability, which viewed targeting low inflation and full employment as stability-enhancing policies^[6]. These policies had at their core a focus on real economic activity. Throughout the 1980's, the notion of macroeconomic stability was contextualised by Williamson^[7] via a core set of policy objectives that financing institutions such as the IMF and World Bank promoted as stability-enhancing. The so-called "Washington consensus" policy proposals emphasised fiscal conservatism, reduced controls on foreign direct investment flows and interest rate liberalisation (which was later broadened to include credit control reform^[8] under the umbrella of financial liberalisation^[9]), as policy reforms that enhance macroeconomic stability and growth prospects.

More recently, attempts to define policies that aid macroeconomic stability by the World Bank^[10] have focused on mitigating phenomena that drive macroeconomic volatility. These phenomena increase unpredictability, which hampers resource allocation via behavioural means, e.g., by driving increases in required rates of return on capital investment. This has led to the use of the term macroeconomic stability to refer to: (i) a general set of macroeconomic policies that are *counter-cyclical*; and (ii) a range of values for certain structural variables that

are widely regarded as stability-promoting during market stress periods. Macroeconomic policies that are regarded as counter-cyclical tend to damp macroeconomic volatility^[6] *throughout* the business cycle. The emphasis on through-cycle counter-cyclicality serves to obviate policies that are counter-cyclical during normal market environments, e.g., a conservative public sector deficit target, but become pro-cyclical when mandated independently of the business cycle. Herein, we study the pro- and counter-cyclical properties of various economic structures and policies. This allows us to gauge the implications of the various structural shifts identified by Nassios *et al.*^[3] as arising from a rise in Australia's superannuation guarantee rate.

We begin with a summary of the approach and findings in Nassios *et al.*^[3], which is presented in section 2. This is followed in section 3 by a detailed exposition of the pro- and counter-cyclicality of various macroeconomic policies. Our literature review facilitates a description of how various economic policy measures and responses are modelled in VU-Nat, including automated and discretionary fiscal policy, the exchange rate regime, monetary policy and capital in- and outflows. We also provide a summary of research regarding how the capital structure and financial asset holdings of various financial agents impact macroeconomic stability^[11]. In section 4, the structural implications of an expanded superannuation sector from Nassios *et al.*^[3] are considered in light of the assessment presented in section 3, particularly the discussion of balance sheet effects that we provide in section 3.3. This allows us to contextualise the impact of the superannuation sector on Australian macroeconomic growth and stability. We conclude with a summary of our key findings in section 5, and an agenda for future work in section 6. References and Figures are provided in sections 7 and 8.

2 Structural Impacts of a Rise in the Australian Superannuation Guarantee Rate on the Australian Economy

This section serves to summarise the approach and findings in Nassios *et al.*^[3].

The study by Nassios *et al.*^[3] simulates a rise in the superannuation guarantee rate in Australia by delivering two counterfactual simulation shocks in the VU-Nat model developed by Giesecke *et al.*^[2]:

- (1) We increase the amount of household savings intermediated by the superannuation sector (rather than allocated to financial assets directly held by the household sector) by one percentage point of the national wage bill. We refer to this as the *intermediation effect*;
- (2) Consistent with the findings of Connolly^[5], we raise the national savings rate to reflect the idea that a higher superannuation rate will tend to raise the savings of households who would save less if not for compulsory superannuation. We refer to this as the *savings effect*.

A series of decomposition diagrams are presented to elucidate the structural impacts of the increased superannuation guarantee rate. These diagrams distinguish the aggregate impact of both effects, from the intermediation effect and the savings effect in isolation. The decomposition diagrams are generated by undertaking four counterfactual simulations:

- (i) One in which only the savings rate rises (the “Savings effect” simulation);
- (ii) One in which only the share of household savings flowing to superannuation rises, and the central bank (CB) does not undertake open market operations to stabilise the domestic cash rate (the “Intermediation effect (no CB)”¹);
- (iii) One in which only the share of household savings flowing to superannuation rises, and the central bank sets the domestic cash rate according to a policy rule (the “Impact of the CB on the Int. effect”);
- (iv) One in which both the savings rate and the share of household savings flowing to superannuation rises (the “Aggregate effect”).

An expansion of the Australian superannuation sector causes five short-run structural shifts that also persist in the long-run:

- (1) Both the intermediation and savings effects reduce Australia’s long-run net foreign financing requirement, as measured by the current account deficit (CAD). The intermediation effect drives real investment below baseline in the long-run, while the savings effect causes real private consumption to fall. Both the intermediation and savings effects therefore depress long-run real GNE relative to real GDP, driving the CAD towards surplus.
- (2) The supply of equity finance by households to the reproducible² (or RH) and non-reproducible³ (or NRH) housing agents expands, because their savings rate (and therefore their asset budget) has increased. The savings effect therefore depresses the debt-to-equity ratio of the RH and NRH agents. In contrast, the intermediation effect reduces the supply of equity to the housing sector, because households are compelled to allocate a greater proportion of their savings to superannuation. The intermediation effect therefore drives up the debt-to-equity ratio of the housing sector, and this effect dominates the impact of the savings effect in the long-run.
- (3) The savings and intermediation effects each drive an expansion in gross private debt levels relative to household income. This is because private debt grows strongly as households increase borrowing to fund dwelling investment and offset the reduction in their capacity to supply equity finance. Consequently, we observe a rise in the long-run private-debt-to-income ratio in response to the rise in the superannuation guarantee rate.
- (4) Because the proportion of commercial bank loans to reproducible housing rises relative to non-reproducible housing in the long-run, and reproducible housing loans carry a higher risk-weight (0.5 versus 0.35), the commercial banks risk-weighted assets expand by a larger percentage relative to baseline than the asset-side of their balance sheet. Their use of equity finance therefore must expand, relative to deposits and bonds. Additionally, with both foreigners and superannuation funds holding a greater

¹ In simulation (ii), the domestic cash rate is therefore determined by equilibrium in the market for exchange settlement deposits. These deposits are assets of the commercial banks, and liabilities of the central bank. This simulation is included solely for the purpose of isolating the pure intermediation effect, from the impact of the central bank.

² The reproducible housing agent undertakes investment in outer urban developments or new inner city apartments and units.

³ The term non-reproducible housing is used to denote dwellings in established inner-city regions.

proportion of commercial bank bonds than households do, the intermediation effect drives an expansion in the use of bond finance relative to equity and deposits. The capital structure of the commercial banks therefore shifts, with a greater reliance on bond and equity finance than deposits.

- (5) With the supply of financial capital elevated due to the increased savings rate, the WACC of the non-bank financial intermediaries (NBFIs) and the life insurers falls relative to baseline in the long-run. This reinforces an expansion in financial intermediation caused by the intermediation effect, which arises from the relative preference for NBFI and life insurance liabilities by superannuation funds compared to Australian households. The NBFIs and life insurers therefore expand in the long-run, in response to a rise in the superannuation guarantee rate.

The five structural shifts summarised above are caused by the intermediation effect, and are either reinforced or only partially offset by the savings effect. A sixth structural shift was identified in Nassios *et al.*^[3]: an expansion of the commercial banks. This shift was however driven by the savings effect in the long-run, and partially offset by the intermediation effect. For the full details, we refer the reader to Nassios *et al.*^[3].

In section 4, we revisit some of these structural shifts and consider their impact on macroeconomic stability and growth.

3 Macroeconomic Stability and Growth

In this section we consider the impact of several economic policies on macroeconomic stability and growth, and how some of these policies are modelled in VU-Nat. In section 3.1, we provide a brief summary of how various fiscal, exchange rate and monetary policies can benefit or hinder stability, while we also briefly summarise the treatment of these policies in VU-Nat. Section 3.2 focuses on capital controls and market development, while balance sheet factors are discussed in section 3.3.

3.1 The impact of fiscal, exchange rate and monetary policy on stability and growth

3.1.1 Fiscal policy

At a high level, fiscal policy refers to the Government's influence on the economy via its revenue collection and aggregate expenditure decisions. Aggregate expenditure can be decomposed into two components:⁴

- (1) Automated public expenditures, which include services that are usually provided by Government, e.g., payments made via Special Appropriations in Australia such as social security payments;⁵
- (2) Discretionary public expenditures such as non-operating expenses.⁶

⁴ For full details of these classifications as they relate to the Australian legislative system, we refer the reader to the Australian Department of Finance.

⁵ In Australia, this would also include annual appropriations approved via Appropriations Bill (No. 1), such as interest and finance expenses.

Large fiscal deficits can drive domestic inflation and high interest rates, negatively impacting national savings and long-term growth. Fiscal consolidation can combat some of these issues, however breeds its own unique consequences that depend on the composition of spending cuts and tax hikes^[12]. Generally speaking, by avoiding volatility in interest rates, inflation, employment and growth, a through-cycle target ratio for discretionary public expenditure to GDP is regarded as stability-enhancing^[13]. Under such a policy, boom cycles will coincide with: (1) a fall in the ratio of aggregate public consumption to GDP (because automated public expenditures [like unemployment benefits] fall while output increases above trend); and (2) an improved government budgetary position (if tax rates remain fixed). The converse of these two points then hold during a recession, i.e., the budgetary position is allowed to deteriorate because automated expenditures rise while tax rates are held fixed. Automated public expenditures are therefore inherently counter-cyclical. Counter-cyclicality is eroded if discretionary expenditures are positively correlated with GDP, e.g., via a discretionary fiscal expansion (contraction) during booms (recessions). In such a case, fiscal policy can become pro-cyclical.

3.1.1.1 VU-Nat specifications: Fiscal policy

In the VU-Nat model, we assume that real public consumption does not deviate from its baseline value in response to the increased superannuation guarantee rate. Discretionary fiscal expenditures are therefore assumed to remain broadly neutral in this case. In contrast, year-on-year levels for automated fiscal expenditures, e.g., social security benefits, are endogenously determined within the VU-Nat model and are therefore permitted to deviate from their baseline value. The VU-Nat model is sufficiently flexible as to allow for a formal discretionary fiscal expenditure response. This response can be endogenously determined within VU-Nat, or set exogenously by the modeller.

3.1.2 The exchange rate

Three main exchange rate regimes exist and each of these regimes have different implications for macroeconomic stability in response to market crises^[6, 14, 15],⁷:

- (1) The *fixed exchange rate*, where a country sets a target nominal exchange rate relative to either a basket of peer currencies (such as a trade-weighted index), or a single designated currency;
- (2) The *real targets approach*, where the nominal exchange rate is used as a policy tool and varied to achieve real-side economic targets^[16,17,18];
- (3) The *floating exchange rate* regime.

Fixed exchange rates were the foundation of the Bretton-Woods Agreement and post-war exchange rate and monetary policy^[15], however they have become less common following the collapse of Bretton-Woods in the early 1970's. As discussed by Obstfeld and Rogoff^[19], Obstfeld *et al.*^[20] and Ocampo^[6], economies that choose to fix their exchange rate must

⁶ By discretionary public consumption, we have in mind public consumption expenditures that generally move independently of the cycle^[72]. These include Departmental equity injections, e.g., for the purpose of asset purchases valued in excess of AU\$10 million.

⁷ Other regimes also exist however these are not discussed herein, such as the upper-bound cap implemented by Bolivia through the 1980's. For more details, see Howard^[74].

forego either monetary autonomy (i.e., their monetary policy is largely dictated by their hard peg target), or free financial capital flows (i.e., they must impose capital controls). Monetary policy, in particular, is widely regarded as a useful counter-cyclical policy tool^[21], particularly when coupled with some form of output or employment targeting^[6]. In contrast, fixed exchange rates can be prone to speculative attacks. While fixed exchange rate pegs can be maintained in the face of such attacks by raising domestic cash rates⁸, such policies can have devastating impacts on financial agents, in particular commercial banks, which finance (in part) long-term lending using short-term deposits. Such a policy therefore drives key pro-cyclical real-side impacts, such as a fall in investment and a rise in unemployment. This challenges the conviction of policymakers in maintaining the hard peg, particularly given the impact of interest rate volatility on their constituents^[19].

The real targets approach was originally contextualised by Corden^[14] as a distinct exchange rate policy relative to the nominal hard peg. As discussed by Zhang^[17] and Roberts and Tyers^[22], the real targets approach was most famously employed by China from the early 1980's through to the late 1990's. The real target rate for the nominal exchange rate in China was set in relation to the cost of earning a unit of foreign exchange through exports^[23]. The transition to a fixed-rate peg relative to the US dollar was motivated by the Asian-crisis, which fuelled speculative attacks on the Hong Kong dollar and the Hong Kong currency board. This resulted in HKD liquidity shortages, driving the overnight interbank cash rate in Hong Kong to 300 percent^[24]. The real targets approach is therefore also susceptible to speculative attacks, which can be negated by excessively high short-term cash rates. As previously discussed, this policy response is however pro-cyclical, which is an important shortcoming of the real targets approach with regard to macroeconomic stability.

3.1.2.1 *Australia: A brief history of exchange rate policy and the implications of a floating exchange rate for macroeconomic stability*

Australia provides an excellent case study with regard to the counter-cyclicity of a floating exchange rate^[25]. Exchange rate policy in Australia has undergone various regime shifts since the introduction of the Australian Pound in 1910, and later the Australian dollar in February 1966^[15]. From 1910 through to 1976, the Australian currency was officially pegged to various currencies, including the Great Britain Pound (1910 to 1971), the US dollar (1971 to 1974), and Australia's trade-weighted (TW) basket of currencies (1974 to 1976). For a brief period from 1976 through to 1983, the hard peg to Australia's TW currency index shifted to a crawling peg, i.e., regular revaluations as opposed to infrequent discrete valuations to the target exchange rate. The Australian dollar was then formally floated in 1983 during a period of significant financial deregulation^[26,27,28,29]. The benefits of this process were realised during the Asian and Global Financial Crises^[28]. As described by Makin^[30], the Australian dollar depreciated 28% in nominal terms on a trade-weighted basis and 33% relative to the US dollar from its pre-GFC high in June 2008 to its mid-crisis low point in January 2009. In the short-run where nominal wages are sticky, nominal depreciation of the currency lends support to the domestic price level. Firstly, import prices rise (which depresses domestic demand for imports relative to domestic

⁸ As discussed by Obstfeld and Rogoff^[19], this was the policy response in the currency crises faced by Europe in 1992, Mexico in 1994 and the Hong Kong Currency Board during the Asian Crisis^[24].

substitutes), while nominal depreciation also drives a downward movement along foreign demand curves for Australian exports. With nominal wages and capital stocks sticky in the short-run, this drives a fall in the real producer wage that buoys domestic employment, relative to its prevailing level under a fixed exchange rate.

For reasons such as these, the floating exchange rate regime is widely regarded as an important automatic short-run macroeconomic stabiliser for the Australian economy during market stress periods^[31]. In addition, as discussed by Obstfeld *et al.*^[20] and Ocampo^[6], a floating exchange rate facilitates monetary autonomy. The role monetary policy plays in macroeconomic stability is the focus of our discussion in section 3.1.3.

3.1.2.2 *VU-Nat specifications: The nominal exchange rate*

In the VU-Nat model, we formally model a floating exchange rate regime. This rate responds to relative-rate-of-return induced movements in the demand for Australian financial assets by foreign investors, and the demand for foreign financial assets by Australian investors. These rate-or-return movements drive changes in gross financial inflows and gross financial outflows, and the nominal exchange rate then adjusts to balance the net impact of these competing capital inflows and outflows on the current account. As described in detail by Nassios *et al.*^[3], the exchange rate channel in VU-Nat anticipates similar impacts on real-side variables as those outlined by Mishkin^[32].

3.1.3 Monetary policy in a floating rate regime

Monetary autonomy refers to the capacity of a sovereignty (via their Central Bank) to manage and set its domestic money supply and cash rate^[20]. While monetary autonomy affords policy makers the capacity to set monetary policy based on domestic factors^[6], this does not necessarily imply that monetary policy is counter-cyclical under a floating exchange rate regime. This is highlighted by Kaminsky *et al.*^[33], who used statistical techniques to study monetary policy across 104 countries over two time periods (1960 - 1979 and 1980 - 2003). The authors show that monetary policy (measured by the correlation of the lending rate with real GDP) is generally counter-cyclical for OECD countries, while non-OECD (particularly low and medium-to-high income) countries generally implement pro-cyclical monetary policies.⁹

Ocampo^[6] offers two possible explanations, both of which assume that autonomy is exercised with a pure inflation target¹⁰, i.e., a regime where the cash rate is set using a target criteria involving only the projected inflation path^[34]. Firstly, pure inflation targeting is pro-cyclical under a supply-side shock; see for example Ocampo^[6] and Friedman and Kuttner^[35]. The second example offered by Ocampo^[6] focuses on surges in foreign capital inflows. These inflows can drive credit booms^[36], with the effect of these credit booms on domestic aggregate demand particularly pronounced in developing economies^[6]. Using a pure inflation target, the expansion in aggregate demand would be met by contractionary

⁹ Fixed exchange rate regimes are shown to account for some of the observed pro-cyclicity in non-OECD country monetary policy.

¹⁰ Herein, we distinguish pure inflation targets from flexible inflation targets as per Otto and Voss^[75], which takes into account the inflation rate and some measure of the output gap, i.e., the deviation in real output/employment from baseline^[39] as per Taylor^[4].

monetary policy; however, this policy response will increase the rates-of-return on domestic financial assets, which may reinforce the foreign capital inflow.

The contrasting approach to monetary policy was discussed by Svensson^[37] in the context of a small open economy. Relative to pure inflation targeting, flexible inflation targeting¹¹ is more effective at stabilizing variability of the real exchange rate than pure inflation targeting, which can be a source of real exchange rate variability. This is generally undesirable from the perspective of macroeconomic growth and stability, because a volatile real exchange rate can affect an economy's international competitiveness. As discussed by McGettigan *et al.*^[38], monetary policy in both developed and developing economies has generally become more counter-cyclical over time, having benefitted from the adoption of flexible inflation targets which take into consideration deviations in real-side variables such as output and/or employment from their baselines^[39,40].

3.1.3.1 VU-Nat specifications: Monetary policy

For these reasons, the VU-Nat model utilises a flexible inflation targeting approach, where the Central Bank targets a level for the cash rate that is set according to: (i) the deviation of the private consumption (CPI) deflator from target; and (ii) a measure of the output gap, based upon the deviation in the level of employment from a target rate. The "classic Taylor rule" proposed by Taylor^[4] is:

$$r = (2 + p) + 0.5(p - 2) + 0.5y, \quad (1)$$

where r is the federal funds rate, p is the rate of inflation over the previous four quarters, "2" denotes an assumed natural real rate for the policy rate of 2 per cent per annum (in the first bracketed term) and a target inflation rate of 2 per cent per annum (in the second bracketed term), and y is an output gap measure calculated as the percent deviation of real GDP from potential (Y^*), i.e., $y = 100 (Y - Y^*) / Y^*$.

Within the FCGE model, we link movements in the policy interest rate to deviations in the price level from target and output from potential via the following adjustment process:

$$\left(\frac{R_{(CenB, DeposLoans, ComB) t}}{R_{(CenB, DeposLoans, ComB) t-1}} \right) = FR \left(\frac{P_t}{P_t^{(T)}} \right)^\alpha \left(\frac{ER_t}{ER_t^{(T)}} \right)^{(1-\alpha)}, \quad (2)$$

where $R_{(CenB, DeposLoans, ComB) t}$ and $R_{(CenB, DeposLoans, ComB) t-1}$ are the current and lagged powers of the interest rate offered by the central bank on settlement balances, P_t and $P_t^{(T)}$ are the actual and target levels for the consumer price index in year t , ER_t and $ER_t^{(T)}$ are the actual and target levels of the employment rate, i.e., $1 - UER_t$, in year t , FR is an exogenous shift variable, and α is a parameter (set at 0.5) governing the sensitivity of interest rate movements to deviations in prices and employment from target. Converting (14) to a percentage rate of change form, we have:

¹¹ As discussed previously, flexible inflation target takes into account both deviations of inflation from its target path, and some measure of the output/employment gap.

$$r_{(CenB, DeposLoans, ComB) t} = r_{(CenB, DeposLoans, ComB) t-1} + 0.5(p_t - p_t^{(T)}) + 0.5(er_t - er_t^{(T)}) + fr, \quad (3)$$

where $r_{(CenB, DeposLoans, ComB) t}$ and $r_{(CenB, DeposLoans, ComB) t-1}$ are the current and lagged percentage changes in the power of the interest rate offered by the central bank on settlement balances, p_t and $p_t^{(T)}$ are the actual and target rates of consumer price inflation in year t , er_t and $er_t^{(T)}$ are the actual and target percentage changes in the employment rate, i.e., $1-uer_t$, in year t , and fr is a shift variable that is endogenous when the policy rule is inactive and exogenous (and typically unshocked) when the rule is activated.

3.2 Financial Capital Flow Controls versus Institutional Development

The link between economic growth and a nation's dependence on foreign capital is an area of ongoing academic debate^[41,42]. Proponents of foreign direct investment (FDI) as a growth-promoter suggest FDI is an imperfect substitute for domestic investment, which helps an economy experiencing a capital shortfall increase the productivity of its labour force^[43]. FDI may also bring new technology, which has a direct impact on primary factor productivity^[44,45]. Opponents of FDI-driven growth argue that higher FDI penetration (which we define as the stock of FDI relative to domestic GDP) and its detrimental impact on national income have long-run detrimental impacts on welfare^[42,46]. Nier *et al.*^[47] also showed that capital outflows, e.g., via sudden-stop¹² episodes, from emerging market economies increase markedly during periods of market stress, well beyond the levels implied by statistical analyses of longer-term correlations between capital flows and economic fundamentals. This negatively impacts macroeconomic stability. The effect of this phenomenon on stability is compounded when FDI penetration is significant^[42], and in general is not significantly mitigated^[42] by changes in capital flow management measures^[49].

In managing capital in- and outflows, economies should therefore place a high premium on economic fundamentals and credibility, which includes an emphasis on public debt management^[50]. Developing strong institutions, reducing liability dollarization, and policy reforms that promote domestic financial deepening^[51,13], are also critical in managing sudden-stop episodes and their pro-cyclical properties^[48,52].

3.2.1 VU-Nat specifications: Cross-border capital flows

Cross-border financial capital flows are explicitly modelled in VU-Nat, as described by Dixon *et al.*^[53]. We provide a brief summary herein. In VU-Nat, financial capital inflows are determined by the foreign investors' demand for Australian financial assets. This demand function arises from a utility maximisation problem. As a result of this maximisation problem, foreign inflows are driven by movements in two key variables: (1) The foreign-currency value of the foreign investor's Australian financial asset portfolio, with movements in this value due in large part to nominal exchange rate volatility; and (2) Movements in relative rates-of-return on Australian financial assets, and the sensitivity of the foreign agent to these rate-of-return movements^[54]. The decision by Australian financial asset agents to

¹² Calvo and Talvi^[48] define a sudden-stop to be a systemic and significant interruption in external financial capital flows. We adopt the same definition herein.

¹³ By financial deepening, we refer to the development of the domestic financial sector and domestic financial markets (both primary and secondary) to stimulate the demand and for and supply of local-currency denominated financial liabilities.

invest offshore is determined in a similar way, based upon the Australian-dollar value of their aggregate financial asset portfolio and movements in relative rates-of-return. As discussed, no capital controls are imposed in VU-Nat.

3.3 Domestic agent balance sheet factors

Beyond fiscal policy, the prevailing exchange rate regime, financial capital controls, financial deepening and institutional strength, there are many other factors that can affect macroeconomic stability and future growth prospects. In this report, we follow previous work by Gadanecz and Jayaram^[55] and classify these as *domestic financial agent balance sheet factors*. These factors include, but are not limited to:

- (i) ratios of debt to equity in the corporate sector;
- (ii) ratios of corporate earnings to interest expense and principal repayments;
- (iii) household indebtedness and income;
- (iv) commercial bank credit growth, capital adequacy, liquidity and leverage ratios; and
- (v) financial sector balance sheet diversification.

The focus of points (i) – (iii) is indebtedness. As we shall discuss in section 3.3.1, empirical studies and macroeconomic models indicate that higher debt levels have detrimental impacts on macroeconomic stability and future growth prospects. Point (iv) focuses more explicitly on the strength of commercial bank balance sheets and is not discussed here; for a summary of how commercial bank capital adequacy is modelled in VU-Nat, we refer the reader to Giesecke *et al.*^[2]. For a broader discussion of the impact of changes in bank capital adequacy requirements in Australia and the United States, see Giesecke *et al.*^[2] and Nassios *et al.*^[56]. Point (v) is more general and will be mentioned in passing.

3.3.1 Macroeconomic stability and debt

The cross-country relationship between the strength of financial agent balance sheets and macroeconomic stability and growth was studied by the OECD^[57]. They found that indebtedness enhances the pro-cyclical properties of several macroeconomic vulnerabilities. With high debt levels, macroeconomic vulnerabilities are more likely to cascade and migrate through the financial system. Sutherland *et al.*^[58] propose three avenues via which high levels of debt affect macroeconomic stability:

- (1) **Augmented exposure to income shocks:** The capacity of a financial agent to service their financial liabilities can be negatively impacted by high debt levels, which can magnify the difficulties created by several types of mismatches and related problems. For example, maturity mismatches (such as those that arise when a financial agent attempts to roll maturing debt for new long-term liabilities) are more difficult when the size of the roll is large in dollar terms. Financial agents experiencing maturity mismatches may be compelled to offer higher rates-of-return on new long-term liabilities, which amplifies their exposure to income shocks. Currency mismatches (e.g., liability dollarization, where an agent is heavily reliant on offshore debt to finance domestic activity and that debt is not appropriately hedged) can drive their own income shocks, because while the

foreign currency value of interest payments on an agent's debt may be fixed, the domestic value can move with movements in the exchange rate.

- (2) **Greater exposure to asset price movements:** Higher debt levels or high debt-to-equity ratios can enhance real consumption volatility, thus magnifying the macroeconomic impact of adverse shocks^[57]. For example, some households rely on a redraw facility tied to their residential or investment property mortgage to smooth real consumption or service debt repayments during market stress periods where income has fallen. Large negative movements in asset prices or valuations can limit the mortgage redraw capacity of households, constraining their capacity to smooth consumption. This is inherently pro-cyclical, because the asset price movement with drive household consumption down via an increased real debt burden, thus reinforcing the impact of the income shock.
- (3) **Higher financial sector instability:** Highly leveraged banks are less able to damp economic shocks^[59]. With insufficient capital buffers contagion risk grows, and this can enhance the possibility of strongly pro-cyclical events such as sudden-stops^{14,[48]}, which lead to falls in domestic investment and thus employment and consumption. More broadly, the OECD^[57] studied how higher economy-wide debt levels affect the severity of the business cycle, and showed that countries with higher debt levels tend to experience longer below-trend periods of growth following economic downturns, relative to countries with lower gross debt levels. Prolonged below-trend growth occurs (in part) because counterparty risks in the commercial bank and non-bank financial sector grow proportionately with heightened concerns regarding the health of domestic balance sheets. For example, sovereign solvency fears were a key driver behind Euro-area bank runs and the concerns these runs generated during the Greek debt crisis in 2010^[57].

The OECD^[57] highlights two debt ratios that can act as warning signals with regard to diminished macroeconomic stability, namely: (i) the ratio of gross private sector debt to household disposable income; and, (ii) the ratio of gross private sector debt to GDP. Other measures of leverage, such as debt-to-equity ratios, tend to deteriorate after the onset of recession due to asset price movements, and thus are coincident or lagging indicators of macroeconomic stability. With regard to mitigating or managing the risk of excessive indebtedness on stability and growth, Sutherland *et al.*^[58] suggest that policymakers focus on the development of both automatic stabilisers that respond to these warning signals, and macro-prudential policies aimed at reducing excessive credit growth.

Tax reform is also regarded as being an important step in reducing the advantage of debt finance relative to equity finance, particularly for non-bank financial intermediaries and households^[58]. With regard to non-bank financial intermediaries, interest expenses are typically tax deductible in most OECD countries, whereas equity payments are not. In contrast, dividend payments by Australian corporates are partially tax deductible, in the sense that payments to Australian residents for taxation purposes carry with them franking credits^[60]. Multinationals are however incentivized by significant internal versus external

¹⁴ Calvo and Talvi^[48] define a sudden-stop to be a systemic and significant interruption in external financial capital flows. We adopt the same definition herein.

financing wedges, and these incentives have material impacts on leverage ratios and debt levels^[61,62]. For households, preferential tax treatments with regard to owner-occupied housing and mortgage interest deductibility can also increase leverage^[58,63], and should therefore come under consideration in any taxation reforms aimed at reducing tax-induced biases towards debt.

3.3.2 Financial sector balance sheet diversification

While high debt levels in general can have a detrimental impact on macroeconomic stability in the event of an adverse shock, details of financial agent balance sheets, such as sectoral and regional exposures, credit quality, maturity profiles, and liquidity, are important in determining the rate at which shocks propagate, and the degree to which they mute the impact of automatic stabilisers^[55]. These risks are typically managed by financial regulators such as the Australian Prudential Regulatory Authority (APRA), via their ongoing stress testing and monitoring procedures. For a discussion of Australian commercial bank stress testing, see Byres^[64]. We also refer the reader to Australian Superannuation Prudential Standard (SPS) 530^[65] for a detailed discussion of Australian superannuation fund stress testing and liquidity management requirements, and Summerhayes^[66] for a discussion of the results of recent Australian life and general insurer stress testing by APRA.

3.3.3 VU-Nat specifications: Modelling changes in agent balance sheets

VU-Nat models change in the structure of both the liability and asset sides of domestic financial agent balance sheets. These changes are driven by: (i) a substitution term, that accounts for rebalancing due to movements in relative returns (subject to conditions that restrict agents from migrating to corner solutions where a single financial instrument is used to finance all activity or held as the sole financial asset, for example); and (ii) an expansion term, i.e., in the absence of movements in relative returns, agents maintain their current capital structure or asset allocation weights. In this sense, the model permits an analysis of the impact of policy shifts on debt levels, and the various warning ratios highlighted by the OECD^[57] (see our discussion of these in section 3.3.1). For full details of the optimisation behaviour of asset and liability financial agents in VU-Nat, we refer the reader to Dixon *et al.*^[53].

4 How does expansion of the superannuation sector affect indicators of macroeconomic stability?

In this section, we revisit the structural shifts identified by Nassios *et al.*^[3] that were summarised in section 2, and consider their impact on macroeconomic stability in the context of our literature survey in section 3.

As discussed in section 2, Nassios *et al.*^[3] showed that a rise in the superannuation guarantee rate is expected to drive five main long-run structural shifts. These are caused by the intermediation effect, and are either partially offset or reinforced by the savings effect (see section 2 for a definition of these effects).

- (1) A rise in the debt-to-equity ratios of the Australian reproducible and non-reproducible housing sectors;

- (2) A rise in ratio of gross-private-debt-to-household-income;
- (3) A fall in Australia's net foreign financing requirement, measured as a reduction in the current account deficit relative to GDP;
- (4) A change in the capital structure of commercial banks, with a reduced reliance on bank deposits and a greater share of financial capital secured via bond and equity finance; and,
- (5) An expansion in non-bank financial intermediaries and the life insurance sector.

In addition, the commercial banks are found to expand in the long-run as the superannuation guarantee rate rises, however this expansion is contingent on the savings effect.

Outcome (1) is consistent with an analysis of the Netherlands conducted by the OECD^[57], which showed that high pension savings were accompanied by an expansion in the use of debt by households to finance investments, such as housing. As discussed in section 3.3.1, macroeconomic stability is generally negatively impacted by a rise in indebtedness because of enhanced asset price movement and income shock risks.

As we discuss in section 3.3.1, the OECD^[57] suggests that rises in the ratios of private sector debt to household income and to GDP are indicators of diminished macroeconomic stability.

Outcome (2) is therefore consistent with a reduction in macroeconomic stability, and arises under both the intermediation and savings effects.

- (i) The intermediation effect drives a general rise in the level of gross private debt in the long-run, which is caused by a reduction in the supply of equity finance by households to the housing sector and concomitant increase in the supply of debt finance by banks to the sector;
- (ii) The savings effect buoys the level of gross private debt. A rise in household savings drives up bank deposit levels and this increase in the supply of financial capital to commercial banks leading them to expand their risk-weighted asset base. This stimulates lending for both dwelling and non-dwelling investment. Real GDP and household income also expand in the long-run, albeit at a rate that trails the expansion in gross private debt. Private debt therefore also grows relative to household income and GDP under the savings effect.

With both the gross-private-debt-to-income and private-debt-to-GDP ratios increasing, the analysis and findings by the OECD^[57] indicate that an expanded superannuation sector may inhibit macroeconomic stability, because the growth in private debt levels exceeds the growth in income (or the through-cycle capacity to service repayments on this higher level of debt).

Outcome (3) is generally consistent with studies by Vittas^[67] and Reisen and Williamson^[68], who each find that historically, an expansion of the domestic superannuation sector in several emerging economies typically coincide with an increase in the supply of domestic relative to foreign financial capital. But does the reduction in Australia's *net* foreign financing requirement promote financial stability, or do the underlying gross flows matter more? D'Arcy and Ossolinski^[69] examined Australia's foreign capital inflows/outflows during the GFC. They showed that while foreign capital flows into Australia became more volatile during the GFC, the volatility was typically localised to private capital inflows; specifically, to private capital flows

from internationally-domiciled commercial bank debt^[69]. Australian commercial banks therefore found it more difficult to raise corporate bond finance offshore, which drove volatility in foreign capital inflows to Australia.

This suggests that a reduction in Australia's *net* foreign financing requirement (i.e., the movement in the current account deficit) is a less important consideration than the foreign ownership share of Australian financial liabilities (which places a greater emphasis on changes in gross foreign financial capital provision). From Nassios *et al.*^[3], the intermediation effect causes a nominal depreciation because the superannuation sector has a stronger affinity for foreign financial assets than households do. This drives an increase in gross financial capital inflows¹⁵. We also observe an increase in gross financial inflows as a result of the savings effect. The increase in gross financial inflows only partially offset an increase in gross financial capital outflows from Australia under both the savings and intermediation effects (thus driving the current account towards surplus).

Does this increase in gross capital inflows drive certain domestic financial agents to become *more* dependent on raising their financial capital from foreign agents? Figure 1 shows that the foreign ownership shares of the various liabilities issued by Australian financial asset agents *all fall* in response to a rise in the superannuation guarantee rate (see the black diamonds and the data labels included in Figure 1).¹⁶ That is, while the impact of the intermediation effect (as denoted by the white diamonds in Figure 1) reduces the foreign ownership shares for some financial liabilities, e.g., commercial bank bonds¹⁷, it also increases the foreign ownership share of other financial liabilities, e.g., commercial bank deposits¹⁸. A countervailing reduction in the foreign ownership share of these financial instruments is however driven by the savings effect, which increases the supply of financial capital by domestic asset agents and thus reduces the foreign ownership shares of financial liabilities issued by domestic liability agents. This is generally supportive of a reduction in the exposure of Australian financial agents to foreign capital flow volatility and supply shocks, which, based upon our definition of macroeconomic stability, is to be regarded as stability-enhancing.

Financial deepening, particularly in the domestic corporate bond market, was also emphasised as a high priority in the recent Financial System Inquiry.¹⁹ The modelling results suggest this will be facilitated by a rise in the superannuation guarantee rate for two reasons. Firstly, outcome (4) herein elucidates that a rise in the superannuation guarantee rate will drive a greater reliance on corporate bond finance by the commercial banks, which would necessitate deepening of the domestic corporate bond market. The foreign ownership shares of the

¹⁵ This increase is however insufficient to offset the increased gross capital outflow, so the current account moves towards surplus

¹⁶ Note that in Figure 1, we plot the change in the foreign ownership shares by agent and instrument in response to each of the savings and intermediation effects, together with the aggregate impact (savings *plus* intermediation effect).

¹⁷ This is because superannuation funds have a preference for corporate bonds issued by the commercial banks, relative to households.

¹⁸ This is because households supply a large portion of bank deposit finance, and the intermediation effect forces households to re-allocate their savings to superannuation and away from other financial assets.

¹⁹ See <http://fsi.gov.au/publications/interim-report/03-funding/the-corporate-bond-market/> for the full discussion.

commercial banks' bond liabilities are also shown to fall in Figure 1, supporting this assertion. The increase in supply of corporate bond liabilities extends beyond the commercial banks however, because the non-bank financial intermediaries and industries also increase their supply of corporate bond liabilities in the long-run (see Figure 2). On the demand-side, superannuation funds invest over AU\$40 billion in corporate bonds in the VU-Nat financial database, which far exceeds the holding by Australian households. The domestic market for corporate bonds therefore deepens via both an increase in supply of corporate bond liabilities, and an increase in demand for these liabilities.

The capital structure of the Australian commercial banks becomes more diverse as a result of a deeper domestic market for corporate bonds, as noted in outcome (4). Specifically, commercial banks reduce their reliance on bank deposit liabilities as a financing source (which accounts for two-thirds of the aggregate financial liabilities raised by Australian commercial banks) relative to bonds and equity. A rise in the superannuation guarantee rate therefore enhances the diversity of the liability-side of the commercial banks' balance sheet, and as discussed in section 3.3.2, reduced concentration risk is generally regarded to be stability-enhancing.

An increase in the superannuation guarantee rate also reduces the regional concentration risks faced by Australian households. This is because superannuation funds have an enhanced proclivity for offshore investment relative to Australian households. Consequently, when the superannuation guarantee rate is increased, the households' foreign asset portfolio weight increases.²⁰

5 Summary and Key Findings

This article builds on previous work by Giesecke *et al.*^[1] and Nassios *et al.*^[3], who (respectively) explored the macroeconomic and structural effects of an increase in the superannuation guarantee rate in Australia. Herein, we address the implication of the structural shifts identified by Nassios *et al.*^[3] for macroeconomic stability and Australia's future economic growth prospects.

Our exposition is facilitated by a broad review of literature regarding the impact that various macroeconomic policies and structural shifts have on macroeconomic stability. This review focused on the degree to which various approaches to fiscal and monetary policy, managing financial capital in/outflow volatility, and managing exchange rate risks, can reinforce or damp the impact of business cycles. In particular, we identified that macroeconomic stability is generally aided by: (i) through-cycle targets for discretionary fiscal policy and a more liberal approach to automated stabilisers, e.g., non-discretionary fiscal expenditures; (ii) a floating exchange rate; (iii) a flexible inflation targeting approach to monetary policy; (iv) an emphasis on strong institutions, deep domestic financial markets and economic credibility as a means for managing foreign capital flow volatility (as opposed to capital controls); and (v) reductions in the private-debt-to-income and private-debt-to-GDP ratios, which generally indicate enhanced stability because the capacity to service the (private) national debt improves. With regard to point (v), this approach to assessing changes in stability caused by changes in leverage is

²⁰ This is true on a look-through basis, where we apportion the households' superannuation assets as per the superannuation agents' portfolio asset allocation weights.

typically favoured compared to other measures, such as agent-specific leverage measures (e.g., debt-to-equity ratios), which typically deteriorate after an economic recession begins.

Our analysis of the results in Nassios *et al.*^[3] in the context of points (i) – (v) above highlight channels via which a rise in the superannuation guarantee rate may positively and negatively impact macroeconomic stability. For example, as we summarised in section 2, Nassios *et al.*^[3] show that a rise in the superannuation guarantee rate drives an increase in both Australia's private-debt-to-income and private-debt-to-GDP ratio. These shifts arise due to both the intermediation and savings effects, and commensurate with point (v) above, imply that an expanded superannuation sector may not aid macroeconomic stability based on this measure.

Nassios *et al.*^[3] do however show that Australia's net foreign financing requirement is reduced by a rise in the superannuation guarantee rate. As we demonstrate herein, this reduction manifests as a fall in the foreign ownership share of the financial liabilities that all domestic liability agents use to finance their economic and financial activity. This outcome generally aids macroeconomic stability, via a reduction in Australia's exposure to foreign credit supply shocks. We also find some evidence that an expanded superannuation sector generally drives a deepening of the domestic market for corporate bonds. This was put forward as an important reform agenda item by the commercial banks in their recent Financial System Inquiry submissions. Furthermore, as we outline in section 3.2, deeper domestic financial markets generally reduce a nation's exposure to foreign financial credit supply shocks, such as sudden stops, and are thus stability-enhancing. Diversification benefits are also identified, via a reduction in the reliance of the commercial banks on bank deposit financing, and enhanced regional diversification in the financial asset portfolio of Australian households.

6 Further Work

In future work, we intend to extend our analysis via a study of member switching. An interesting research question may be to consider the impact of this member switching during stress periods on macroeconomic stability. In a study of industry superannuation fund member switching behaviour over a three-year period centred around the GFC, Gerrans^[70] found that the proportion of investment strategy switching by older members (greater than 57 years of age) was higher than members within other age cohorts at the GFC's height (defined as October 2008).²¹ More specifically, Gerrans^[70] showed that 7.5% of members aged from 57 onwards made an active investment decision during October 2008 alone. Using APRA data^[71], we calculated that the account balance for members aged between 55 and 64 on 30 June 2015 accounted for 30.25% of total assets under management of the superannuation industry. Based on this analysis, switching of the kind alluded to in Gerrans^[70] by older fund members would therefore require a de-risking of around 2.3% of the aggregate assets under management of the superannuation industry during a market crisis. To understand whether this switching benefits or hinders macroeconomic stability, we aim to explore the consequences of this crisis-induced switching for the supply of and demand for domestic defensive financial assets (e.g., government bonds), relative to higher-risk equity and high-yield credit (which finances private

²¹ Over a broader three-year period centred around October 2008, the proportion of superannuation fund members who made a change to their investment strategy was between 5 and 6.5% of the aggregate industry (non-retail) funds membership base.

investment). Our ambition is to elucidate whether shifts in instrument-specific capital supply by superannuation members during crises act as an automatic stabiliser, or are inherently procyclical.

7 References

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8 Figures

Figure 1: Change in foreign ownership shares for various Australian financial agent liabilities (by liability agent and financial instrument), percentage deviation from baseline

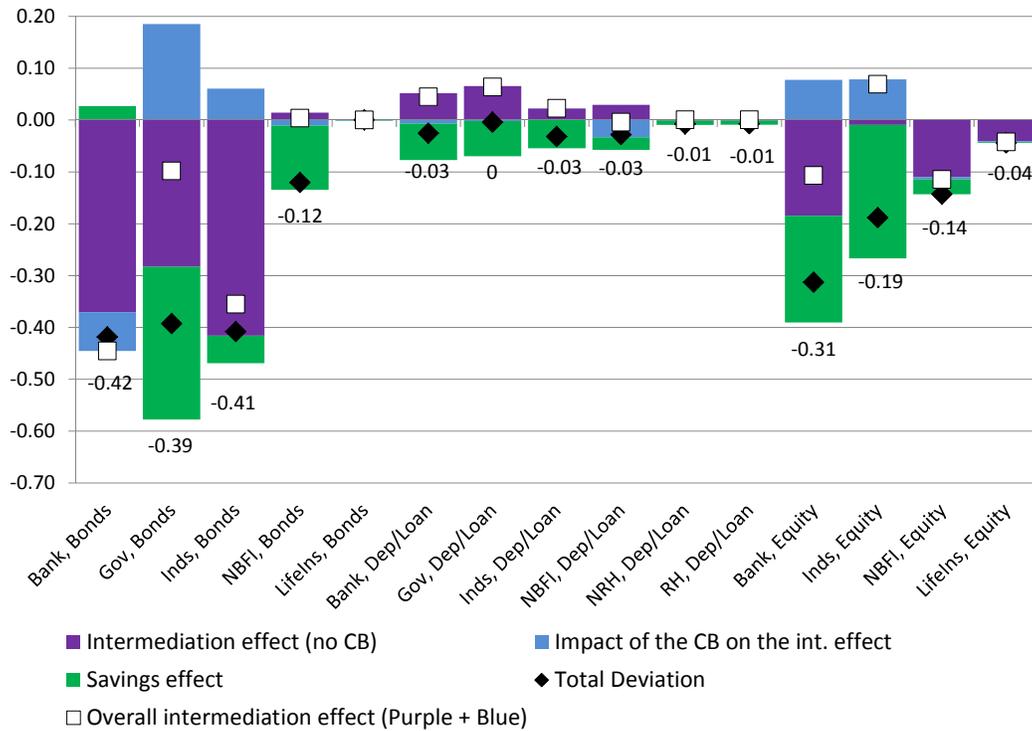


Figure 2: Change in long-run use of Bond finance by various financial liability agents, percentage deviation from baseline

