Why are Real Interest Rates in New Zealand so High? Evidence and Drivers

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Foreword

The Treasury's vision statement focuses on higher living standards for New Zealanders. While a range of factors underpin well-being, raising New Zealand's economic performance is a central driver of permanently higher standards of living. New Zealand faces two key economic challenges that need to be addressed if our economic performance is to lift. These are:

- accelerating productivity growth to raise average incomes per person and to close the income gap with other wealthier countries; and
- reducing imbalances in order to better position us to weather the inevitable economic or financial shocks that will impact our economy in the future.

This paper is one of a suite of four papers that examine key elements of New Zealand's economic performance and the macro- and micro-economic factors that are inhibiting productivity growth and contributing to economic imbalances.

These papers follow on from the Treasury's earlier suite of papers examining New Zealand's productivity performance.[1]

The four papers in the series are:

- *Why are Real Interest Rates in New Zealand so High? Evidence and Drivers* — examining interest rates in New Zealand, the apparent premium relative to overseas rates, potential drivers of this interest rate differential and the impact this might be having on investment.
- *Economic Imbalances: New Zealand's Structural Challenge* — examining the imbalances in New Zealand's economy and their implications for resilience;
- *New Zealand's Exchange Rate Cycles: Evidence and Drivers* — with a key focus on examining the nature of New Zealand's exchange rate cycle over the medium-term and possible drivers for this cycle; and
- *New Zealand's Exchange Rate Cycles: Impacts and Policy* — focusing on the impact that New Zealand's exchange rate cycle has on the tradable sector and wider economic performance and possible policy responses.

The papers are being published to articulate the Treasury's current thinking on these issues. Our hope is that these papers will spark further debate on these important topics and stimulate further research that further advances our collective understanding of New Zealand's economic performance and possible policy change that may lift it.

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1 http://www.treasury.govt.nz/publications/research-policy/tprp

Abstract

New Zealand real interest rates have on average over the past two decades been high relative to most other countries in the Organisation for Economic Co-operation and Development (OECD). This paper argues that New Zealand's relatively high interest rates are currently the outcome of domestic saving and investment imbalances, and are less due to a risk premium being imposed by foreign investors. That is, New Zealand's low rate of saving relative to investment make higher real interest rates necessary to maintain inflation within the target range in the face of higher domestic spending. Foreign inflows seek out the interest rate premium, rather than demand it as compensation for risk. Seeking out the higher yield, foreign capital flows into New Zealand and this puts upward pressure on the exchange rate. It is this relationship between the real exchange rate, exchange rate expectations and the real interest rate that has helped to cause New Zealand's interest rate to deviate from the "world" rate for most of the past two decades.

JEL CLASSIFICATION E43 Determination of Interest Rates

KEYWORDS Real interest rates, neutral interest rate, real exchange rates, Uncovered Interest Parity, internal balance, external balance, saving

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Why are Real Interest Rates in New Zealand so High? Evidence and Drivers

1 Introduction

New Zealand real interest rates have on average over the past two decades been high relative to most other Organisation for Economic Co-operation and Development (OECD) countries. The purpose of this paper is to ask, and answer, why that is. One explanation often cited for this interest-rate premium is that the premium is necessary to attract foreign funds to New Zealand to finance the domestic saving shortfall. That is, investors will lend to New Zealand only at those higher rates as compensation for the risk borne when investing in New Zealand. The types of risk being compensated for could include *currency risk* (the risk associated with currency volatility), *default risk* (the risk of default associated with New Zealand's high level of indebtedness), *inflation risk* (the risk associated with inflation volatility) and *liquidity risk* (associated with the lower liquidity of the New Zealand market).

This "risk-premia" explanation of New Zealand's higher real interest rates treats New Zealand as a "price-taker" on the world market. That is, as a small, open economy, New Zealand can not affect the "world" real interest rate. If country risk premia are zero and capital markets are fully integrated, then any deviation in New Zealand's long-term interest rates from the "world" rate could not be permanent because capital is assumed to flow from low-yield currencies to high yield currencies until the gap in country rates is eliminated. In this standard neoclassical model, domestic saving and investment imbalances can not drive the level of domestic real interest rates.

This paper will argue that even if capital markets are fully integrated and capital is highly mobile, that it is possible for New Zealand real interest rates to deviate from the "world" rate for many years even in the absence of externally-imposed country risk premia.

The framework presented in this paper uses the theory of Uncovered Interest Parity (UIP) together with evidence on the carry trade to show how New Zealand interest rates can deviate from the "world" rate for many years. Under this explanation for New Zealand's relatively high interest rates, New Zealand's low rate of saving relative to investment make higher real interest rates necessary to maintain inflation within the official target range compared to the situation where households and government saved more. The interest-rate premium is not exogenously imposed by foreign investors. Instead, foreign inflows seek out (rather than demand) the interest rate premium. Seeking out the higher yield, foreign capital flows into New Zealand and this puts upward pressure on the exchange rate until the dollar appreciation "forces" a change in expectations that eliminates arbitrage opportunities. At this point, capital inflows that are seeking out the higher yield will cease, preventing the gap between New Zealand real interest rates and the "world" rate from being eliminated.

Overall, this combination of higher interest rates and an exchange rate above its long-run equilibrium in New Zealand has hindered the tradeable sector's (including exports) performance relative to the non-tradeable sector.[2] To put it another way, domestic resources have shifted from exporting and the production of import-competing goods to supplying non-tradeable output to satisfy government and household consumption. Higher imports have also been necessary to meet this demand.

A permanent increase in national saving, all else equal, would reduce domestic imbalances and take pressure off domestic resources, which would permit the inflation target to be achieved with lower average domestic interest rates *ex ante*. As the premium on New Zealand interest rates relative to interest rates elsewhere would be smaller, it would be expected that the exchange rate would also be lower on average too – at least for a few years.

Lower real interest rates would be beneficial for investment. Investment not only adds to the capital stock (which is an important influence on labour productivity) but investment itself can help to drive additional productivity growth through improvements in technology and business practices that enable labour and capital to be combined more effectively.

Lower real interest rates could also indirectly benefit the export sector through a lower exchange rate. Whether a sustained increase in exports will itself enhance productivity depends on a number of micro-economic factors, but the evidence suggests that a lower exchange rate creates opportunities for high productivity firms to grow and achieve scale through exporting.

The remainder of this paper is organised as follows. Section 2 introduces the interest rate concepts used in this paper. Section 3 provides some evidence as to the premium on New Zealand real interest rates. In Section 4 the basic framework is introduced and we ask whether New Zealand's low saving rate relative to investment could be driving the interest rate premium. The role of country risk premia is also explored. Section 5 briefly discusses the implications of the interest rate premium for the costs of capital and labour productivity. Section 6 concludes.

2 Interest rate concepts

The interest rates that are observed in day-to-day life are almost always expressed in nominal terms. This allows a saver to determine how much their savings will accumulate at the end of a specified period of time, but it does not tell them how much the return on their savings will be worth in terms of actual goods and services. In order to do this, savers must determine the expected real interest rate – they must subtract expected inflation (for the period over which the money is to be saved) from the nominal rate.

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2 The tradeable sector is estimated as the volume of output (ie, real GDP) in primary and manufacturing industries (highly exposed to overseas trade) combined with the volume of services exports (as it is difficult to estimate what services are tradeable). Non-tradeable output is estimated as a residual with total real GDP.

Assuming that it is real interest rates that drive our economic decision-making, this paper distinguishes between the OCR and two real interest rate concepts: the neutral real rate (NRR) and the actual real interest rate.

The NRR is not observable. It is a theoretical concept that draws heavily on the theory of the *natural rate of interest* developed by Knut Wicksell in 1907. Wicksell defined the *natural rate of interest* as the rate of interest that (1) equates saving with investment; (2) is equal to the marginal productivity of capital; and (3) is consistent with aggregate price stability.

Monetary policy decision-making implicitly takes a view about the prevailing level of the NRR. That is, it takes a view about the required level of real interest rates associated with price stability.

Based on its view of the NRR, the RBNZ sets the OCR either to stimulate the economy and prevent deflationary forces from gathering momentum or to constrain the economy and prevent inflation from accelerating (Björksten and Karagedikli, 2003). For the purposes of this paper, it is assumed that in setting the OCR, the RBNZ “gets it right” on average – that is, inflation and inflation expectations are generally stable around the inflation target. Internal balance, or price stability, is maintained. This assumption seems appropriate given the historical performance of the RBNZ.

The level at which the OCR is set by the RBNZ will affect the level of short-term interest rates in the economy. However, much economic activity, for example investment, depends on long-term interest rates. Moreover, actual interest rates differ not only in their term (short, medium or long) but also according to their risk type (government rates, mortgage rates, etc.). Each risk type can be represented along a yield curve. A yield curve is a plot of interest rates or yields with different maturities (but otherwise almost identical characteristics) observed at a single point in time (RBNZ, 2010).

The gap between the OCR and the observed actual real interest rate will depend on the risk type and term of that particular actual rate. It is likely that the long-term rate (for a particular risk type) includes a term premia (not to be confused with country risk premia) to compensate for holding an asset of longer maturity.

The actual real rate in the context of this paper is a “catch-all” for all *observed* real rates with different terms and risk types. In order to justify the usage of one single actual real interest rate in the framework that follows, the expectations hypothesis about the term structure of interest rates (for a given risk type) is invoked. The term structure of interest rates is of fundamental importance in macroeconomics because theories about the term structure of interest rates thus become theories about the connection between monetary policy (that affects short-term interest rates) and economic activity, specifically investment, which depends on longer-term interest rates.

The expectations hypothesis takes the view that the setting of the OCR (based on an assumption about the level of the NRR) ultimately “sets” actual rates (of a given risk type) along the yield curve. That is, any increase or decrease in the OCR level will be followed by a shift in the yield curve in the same direction as the OCR. Although the direction of change is assumed to be the same, the magnitude of the change does not have to be one-for-one.[3]

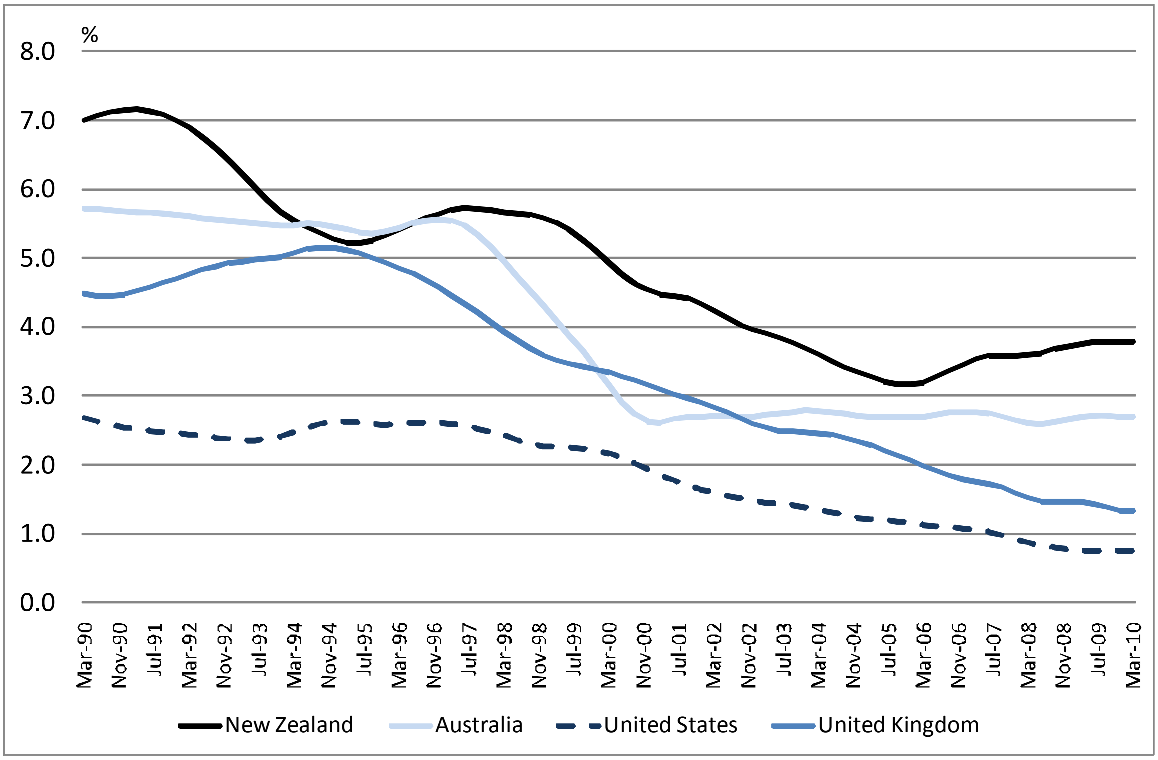
Finally, the premia associated with a specific risk type are more-or-less independent of the term structure of the rates and so the relationship between risk types can be considered more or less stable along their yield curves (refer to RBNZ, 2010 for a thorough exposition of New Zealand yield curves across risk types).

This "stable" relationship between the yield curves of different risk types of interest rates, along with the expectations hypothesis, allows us to assume, for simplicity, one real interest rate in the framework that follows.

3 The premium on New Zealand's real rates of interest

As stated above, the NRR is a theoretical concept that is not observable in practice. There have been several attempts to estimate a point (Archibald and Hunter, 2001) or time-varying NRR for New Zealand (Basdevant, Björksten and Karagedikli, 2004; Plantier, 2003). In Figure 1, estimates of New Zealand's (90 day) NRR and that of other countries is shown (refer to Appendix A for the methodology of the estimation).

Figure 1 - Estimates of NRRs in comparator countries[4]



Source: Björksten and Karagedikli, 2003 (updated by the authors)

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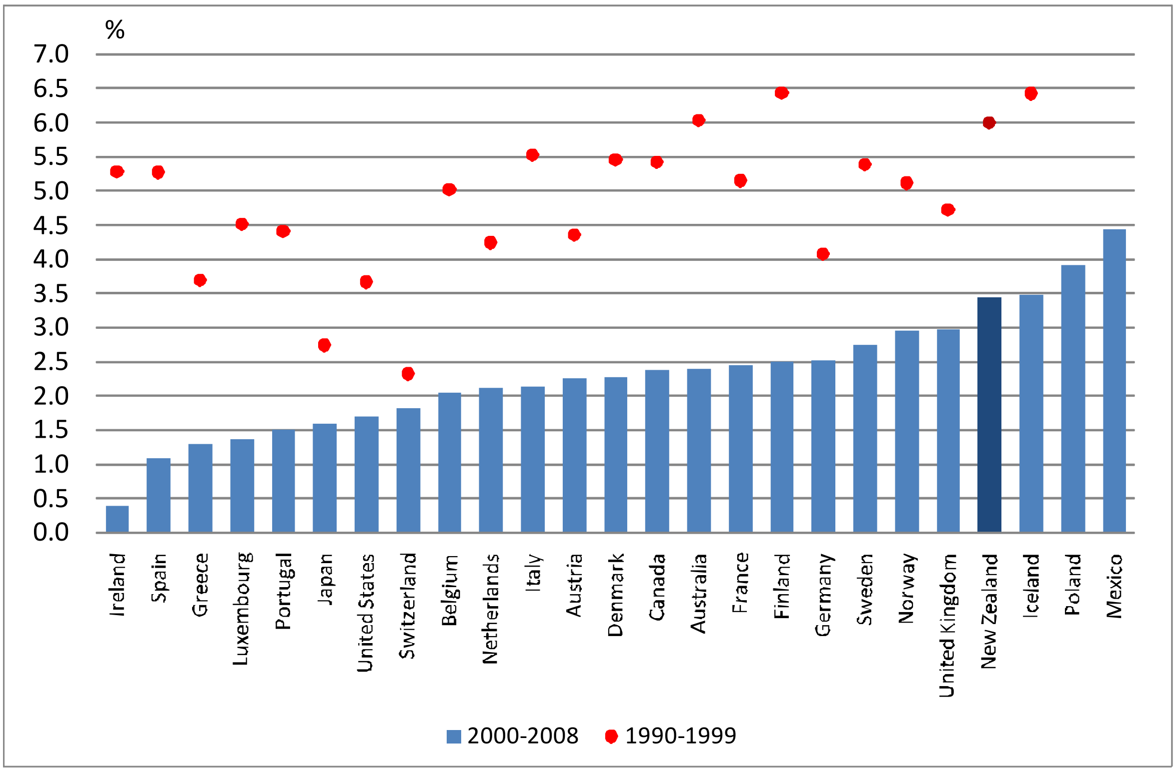
[3] More specifically, the expectations hypothesis assumes that assets (such as bonds) of different maturities are perfect substitutes for each other. Assuming no arbitrage opportunities, rates on a long-term instrument are equal to the geometric mean of the yield on a series of short-term instruments. Given that investors have an expectation of the short-term rate; this is enough information to construct the yield curve.

[4] Figure 1 is an updated version of Figure 9 in Reserve Bank of New Zealand (2003) using the same methodology.

Between 1997 and 2006 New Zealand's NRR declined by around 200 basis points (bps), but along with similar declines in the NRR of the United States, the United Kingdom and Australia.[5] Since around 2005, the premium on the New Zealand NRR increased relative to that of all three comparator countries.

Over the past two decades, New Zealand has on average had higher long-term real interest rates compared with most other OECD countries (except for Iceland, Poland and Mexico) (Figure 2).

Figure 2 - Average long-term real rates for selected OECD countries



Source: OECD

4 Drivers of the New Zealand real interest rate premium

The previous section provided evidence of New Zealand's real interest rate premium. Despite higher interest rates, New Zealand as a whole appears to save less than other countries in the OECD. New Zealand's net national saving rate has been consistently and materially below the median of OECD countries.[6] Low rates of national saving relative to domestic investment are reflected in New Zealand's persistent annual current account deficits (refer to Box 1).

5 The general downward trend in estimated NRRs has been empirically linked to falling inflation volatility and the stabilisation of inflation expectations, a fall in public debt ratios in many countries and, in Europe, it is also thought that lower productivity and population growth over this period may have been a factor.

6 For a detailed analysis of New Zealand saving and a policy discussion, refer to the Treasury's discussion document *Saving in New Zealand: Issues and Options (2010)*.

Box 1: Saving in the national accounts

The main measure of saving is derived from the national accounts. In the national accounts, saving is a flow measure and is measured as the difference between some measure of income and some measure of expenditure or consumption (both public and private). The usual macroeconomic notation is to define national saving as

$S = Y_{net} – C$

where S is net national saving, Y_{net} is national disposable income (net of consumption of fixed capital) and C is private plus government consumption expenditure. Income also excludes capital gains or losses. Using the familiar national accounts identity,

$GDP + NIT – C = I + [X – M] + NIT$

NIT is net income and transfers paid abroad, I represents gross investment, X is exports, M is imports and the term [X – M] + NIT is the current account balance (CAB). It can be shown that:

$Y_{gross} - C = I + CAB$

Deducting consumption of fixed capital from Y_{gross} (gross national income) and I gives:

$S – I_{net} = CAB$

New Zealand's current account balance is in deficit. This identity shows that investment in New Zealand is financed from a combination of national saving and foreign saving.

Statistics New Zealand (2007)

Given that national investment exceeds saving, foreign investment is a necessary and important source of funding to maintain current investment levels (all else equal). However, it is commonly argued that real interest rates are on average higher in New Zealand than in other OECD countries because investors will lend to New Zealand only at those higher rates as compensation for the risk borne when investing in New Zealand. The types of risk being compensated for could include *currency risk*, *default risk*, *inflation risk* and *liquidity risk*. That is, it is these country risk premia that prevent New Zealand from accessing the lower "world" real interest rate.

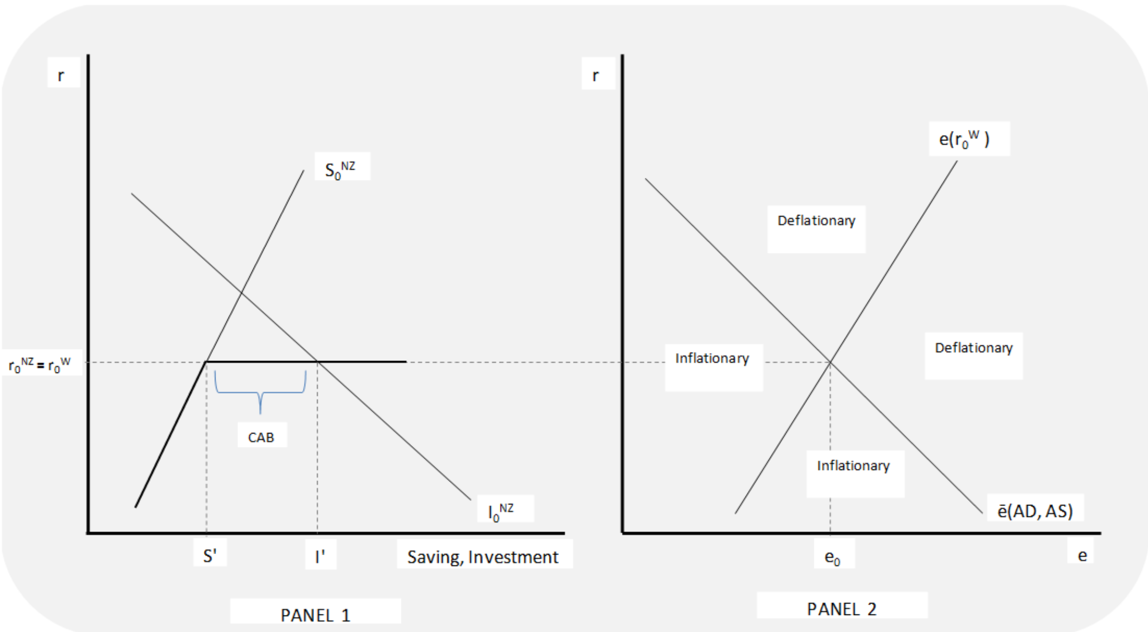
This paper argues, however, that for most of the past two decades, this premium on New Zealand real interest rates relative to the "world" rate has been less about externally-imposed country risk premia and more about domestic saving and investment imbalances.

This section presents a basic framework for thinking about these alternative views of the drivers of the interest rate premium. This framework is not intended to be a rigorous model, but it captures some of the stylised facts about the New Zealand economy discussed above, including elevated interest rates and exchange rates.

4.1. The basic framework

The basic framework is introduced in Figure 3 below. In Panel 1, the saving (S_0^{NZ}) and investment (I_0^{NZ}) schedules for New Zealand are shown. The investment schedule decreases in the actual real interest rate (*r*), because a lower interest rate implies a lower cost of capital, all else equal. The saving schedule increases in the interest rate, because people are willing to save more, the higher the interest rate. Domestic saving is assumed here to be relatively inelastic in response to interest rates.

Figure 3 - The basic framework



New Zealand borrowers can also access a practically unlimited supply of foreign funds at the "world interest rate", r_0^w. The domestic and foreign sources of funds can be added horizontally to give the aggregate saving schedule (bold and kinked at r_0^w).

In the long-run, where all factors of production are fully mobile across borders, and assuming no risk or uncertainty, actual real interest rates across countries are assumed to equalise at $r_0^{w.}$ At $r_0^{NZ} = r_0^{w}$, aggregate (domestic plus foreign) saving equals domestic investment at *I'*, and the excess domestic demand for funds over the domestic supply, is the current account balance (CAB) which is in deficit, that is, New Zealand invests more than it saves and is a capital importer.

Ignoring Panel 2 for the time being, any change in the world interest rate that leads to a decrease (increase) in domestic saving *ex post* and an increase (decrease) in investment *ex post*, will result in a larger (smaller) current account deficit. Moreover, any shift in the saving and investment schedules *ex ante* will not alter the world rate. New Zealand is a "price taker" on international capital markets.

However, the static model in Panel 1 is relatively unhelpful in explaining a range of dynamic effects that are taking place in the economy. More specifically, Panel 1 implicitly assumes that all factors of production, even capital and labour, are perfectly mobile across borders. In this scenario, a small, open economy like New Zealand would be subject to the (theoretical) price-homogenising effects of trade and cross-border flows in capital and labour.

In practice, however, factors of production are not perfectly mobile and prices appear to converge slowly across economies, even those that are very open to trade and capital flows. First, large deviations from the "law of one price" for traded goods appear to be pervasive, suggesting that frictions at the border, such as culture, languages and information asymmetries, continue to segment markets (Friberg, 2001). Standard estimates of price transmission speed suggest that the price-homogenising effect of trade operates very slowly – so slowly that many find the domestic-foreign price gap to be a random walk (Anderton *et al.*, 2003). Some of these frictions can be reduced through a reduction in exchange rate variability, an increase in trade volumes or through monetary union (Friberg, 2001). Second, and perhaps more importantly, a large proportion of prices (of non-traded goods) are determined domestically and not on world markets.

It is these characteristics of any economy - risk, unexpected shocks and friction at the borders - that make autonomous monetary policy generally desirable. Simply put, $r_0^{NZ} = r_0^{w}$ in Panel 1 may not actually be consistent with New Zealand internal balance (price stability) in the medium-term. This is because different interest rate levels have very different implications for domestic resource and inflation pressures.

Internal Balance

In order to capture the dynamic effects of this argument, Panel 2 introduces, what will be referred to as, the *internal balance schedule*, *ē(AD,AS)*. This schedule is the combination of the real exchange rate and the real interest rate that is consistent with internal balance. By internal balance, we mean that inflation and inflation expectations are stable at the inflation target and the RBNZ does not need to take any action to constrain inflationary forces, or alleviate deflationary forces.

The internal balance schedule is a function of aggregate demand (AD) and aggregate supply (AS). Aggregate supply (potential output) is assumed to change quite slowly over time, which is consistent with the evidence for most countries. Aggregate demand includes consumption (public and private), investment and net exports (as per Box 1).

The real exchange rate is denoted in foreign currency units per one New Zealand dollar and so the internal balance schedule is downward sloping, that is a lower level of the real interest rate is consistent with a higher real exchange rate (an appreciation). A lower interest rate stimulates investment and consumption and in order for internal balance to be maintained, the higher exchange rate is needed to increase imports and decrease exports.

Traditional models, like Mundell-Fleming, have the real interest rates of small, open economies converging to the world rate because with open capital markets, capital flows from low-yield currencies to high-yield currencies until gaps are eliminated. In such models, imperfect capital mobility or country risk premia are the only reasons for a divergence in cross-country interest rates. The following scenarios will show however that it is possible for the real interest rate of a small open economy like New Zealand to deviate from the world real rate, even assuming perfect capital mobility and zero country risk premia.

The actual exchange rate and external balance

So, given open capital markets, what is the mechanism that determines whether r_0^{NZ} can deviate from r_0^{w} over a significant length of time? Simply put, it is the *actual* exchange rate and expectations regarding future exchange rate movements.

It is very likely that the actual exchange rate at any particular interest rate may not be the *equilibrium* exchange rate needed to achieve both internal *and* external balance.

The long-run equilibrium real exchange rate is a theoretical concept based on the idea that the real exchange rate will, in the long-run, tend to move towards a level that reflects fundamental factors in the economy. The equilibrium exchange rate is not observable in practice and there are several analytical approaches that can be used to estimate the level of the equilibrium real exchange rate (MacDonald, 2000).

One of these is the Macroeconomic Balance (MB) approach. This approach attempts to identify the level of the real exchange rate that would be consistent with both internal and external balance in the economy. Internal balance is achieved when the economy is operating at potential output and the inflation rate is stable. External balance is achieved when the current account deficit is being financed by a sustainable rate of capital flow. According to this approach, any internal or external imbalances in the economy will lead to an adjustment, in either the exchange rate or in the domestic economy, until balance is achieved. For example, because New Zealand has run persistent current account deficits for some time and has accumulated a large stock of net foreign liabilities, this should put downward pressure on the equilibrium exchange rate because a larger surplus on the balance of goods and services is required (Brook and Hargreaves, 2000).

Recent International Monetary Fund (IMF) estimates using the MB approach suggest that the New Zealand dollar could be overvalued by around 15 to 25 percent (the current deviation from its *long-run equilibrium*) (IMF, 2010). This is consistent with more recent evidence on New Zealand dollar misalignment in Cline and Williamson (2010) where the New Zealand dollar is included among the most overvalued of currencies in a group of more than 30 countries.

Historical evidence suggests that actual exchange rates may move away from the equilibrium level for long periods of time. The long-run equilibrium real exchange rate for

New Zealand is likely to have been well below the average real exchange rate level for the past 20 years.

In the framework above, this deviation between the actual and equilibrium exchange rate is captured by the introduction of an upward sloping schedule $e(r_0^w)$ in Panel 2. This upward sloping schedule is a depiction of the uncovered interest parity (UIP) hypothesis.

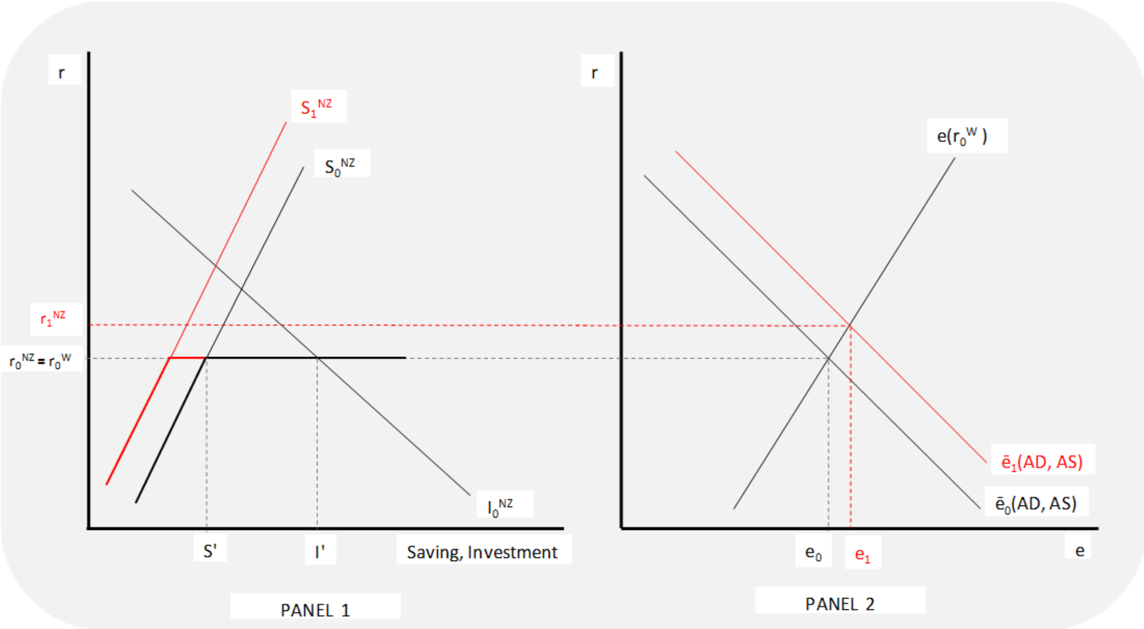
UIP is a no-arbitrage hypothesis that relates the expected change in the actual exchange rate to the interest rate differential. UIP predicts that high yield currencies should be *expected* to depreciate to eliminate any profitable opportunity (arbitrage) from holding the higher yield currency. UIP also predicts that, *ceteris paribus,* a New Zealand real interest rate increase should cause the New Zealand dollar to appreciate (Bekaert, Wei, and Xing, 2007). If the New Zealand interest rate increases, *ceteris paribus*, then capital should flow into New Zealand to exploit arbitrage opportunities. The New Zealand dollar would appreciate until the appreciation "forces" a change in expectations that eliminates arbitrage opportunities. That is, the currency is *expected* to depreciate enough to offset the gain from the interest differential. Even though the currency is expected to depreciate, this depreciation may not happen for some time (expanded upon later). Panel 2 in Figure 3 is drawn so that at r_0^w, the actual real exchange rate, e_0, determined along the UIP schedule, is consistent with internal balance along ē.

4.2. Could a low saving rate be driving the premium?

This section shows that New Zealand's low saving rate (given current policy settings) could drive a wedge between New Zealand interest rates and the "world" rate, even without a country risk premium. This wedge could exist for many years.

Start with the basic framework above, where the New Zealand actual real interest rate (r_0^{NZ}) is assumed equal to the world interest rate (r_0^w) and the actual exchange rate, e_0, is consistent with internal balance. Assume an *ex ante* decline in the New Zealand saving rate (either public or private) as in Figure 4.

Figure 4 - New Zealand imbalances and the interest-rate premium



The supply of domestic funds/saving schedule moves left. In a risk-free, frictionless world, the domestic rate would remain equal to r_0^w and the only impact would be a larger supply of foreign-sourced funds to make up for the decline in domestic funds, and the current account deficit would increase. However, a decline in saving means that there has been an increase in aggregate demand and as a result, the internal balance ($\bar{e}$) schedule shifts right – for every level of the real exchange rate, a higher real interest rate is necessary to maintain internal balance.

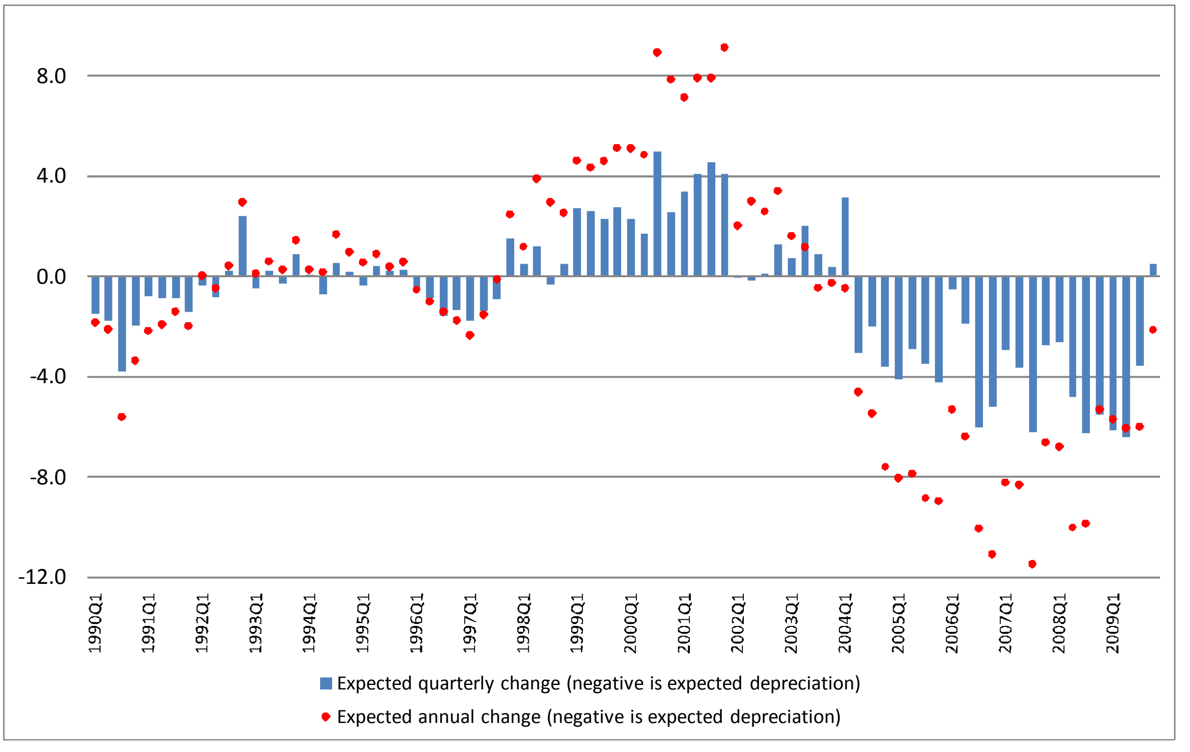
At $r^{NZ} = r_0^w$, the actual exchange rate e_0 is now too low for internal balance and inflation pressures would build. Domestic interest rates must increase. As real interest rates increase, aggregate demand will decrease (savings will increase, while investment will decrease).

However, as interest rates increase, the gap between New Zealand interest rates and the world rate, all else equal, implies an arbitrage opportunity. That is, investors will demand the higher yield New Zealand dollar. This pushes up the exchange rate, which is reflected as an upward shift *along* the UIP schedule. The new interest rate and exchange rate combination is (r_1^{NZ}, e_1). At the higher interest rate, the lower rate of investment could lead to a reduction in aggregate supply, which would shift the internal balance schedule even further to the right, necessitating an even higher interest rate and exchange rate combination to maintain internal balance.

Given the arbitrage opportunity associated with the interest differential, all else equal, capital should continue to flow into New Zealand until the interest differential is eliminated. So what prevents this from happening?

In order for the no-arbitrage UIP to hold, expectations about New Zealand dollar depreciation will have to change. That is, investors will seek out the higher yielding currency up until the point where the expected depreciation eliminates (expected) arbitrage opportunities. These exchange rate expectations allow the New Zealand real interest rate to deviate from the "world" rate and can be maintained for a significant number of years, without an actual depreciation occurring, which allows the wedge between New Zealand interest rates and "world" rates to also be maintained for many years. For example, since 2001, the New Zealand dollar appreciated on average relative to the United States dollar. However over this period, the New Zealand dollar was *expected* to depreciate. In Figure 5, estimates of exchange rate expectations since 1990 are presented.

Figure 5 - Expected change in the US/NZ exchange rate



Source: RBNZ, Bank of England

Although e_1 is consistent with internal balance, it may not be consistent with the equilibrium exchange rate, which is unaffected by the level of the interest rate and demands both internal *and* external balance (using the Macroeconomic Balance approach). As stated above, the long-run equilibrium real exchange rate for New Zealand is likely to be well below the average real exchange rate level for the past 20 years. This deviation of the actual exchange rate from the level suggested by economic fundamentals is likely to be known by sophisticated currency traders, supporting the view of an expected depreciation.

This relationship between actual interest rate differentials across countries, actual real exchange rates and exchange rate expectations are consistent with the empirical evidence on the carry trade. The carry trade is the name of the strategy where investors borrow a low-interest rate currency such as the Japanese yen, and simultaneously lend in a high-interest rate currency such as the New Zealand dollar so as to exploit the arbitrage opportunity (Frankel, 2007). A thorough exposition of the carry trade is beyond the scope of this paper, but Galati *et al* (2007) examine the extent to which carry trade positions can be traced in various sources of data, including for New Zealand and document the associated appreciation of the currencies that are targeted by carry traders, such as the New Zealand dollar, the Australian dollar, the South African rand and the Brazilian real. Burnside *et al* (2008) provide evidence of the gains from a diversified carry-trade strategy (that is, applied to a portfolio of currencies). Since 2002, the gains from a carry trade strategy applied only to the New Zealand dollar, have tracked the gains from the more profitable diversified strategy.

In conclusion, as real interest rates in New Zealand are driven up to maintain internal balance, the saving rate increases *ex post*. However, New Zealand's low saving rate *ex ante* relative to investment drives the wedge between New Zealand real interest rates and the world real interest rate even without the existence of country risk premia. This New Zealand interest rate premium could be sustained for many years (not arbitraged away via capital inflows) given an assumed UIP relationship where arbitrage opportunities are *expected* to be zero, even when those expectations are not fulfilled for many years.

Although the framework presented is not able to speak to the length of the period over which the real interest rate premium can be maintained, stylised facts as to the deviation of the real exchange rate from equilibrium levels provides some tentative support for the framework's conclusions.

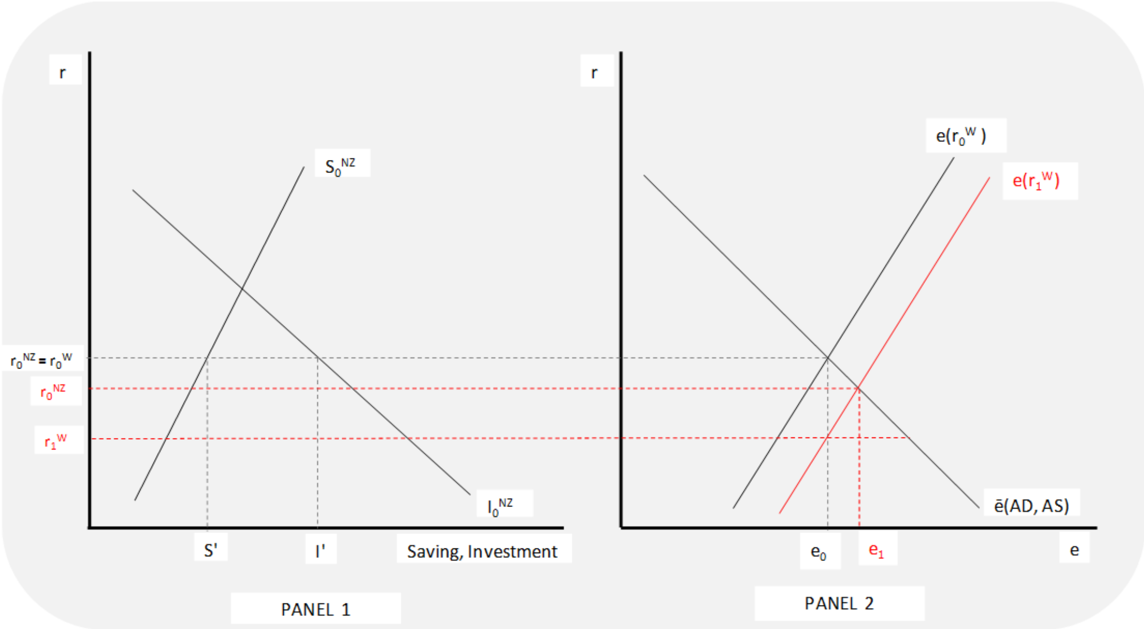
4.3. A foreign shock and New Zealand real interest rates

The previous section has shown that domestic saving and investment fundamentals can be responsible for driving a wedge between New Zealand real interest rates and the "world" rate and that this wedge may last for some time even without the existence of country risk premia. However, this section shows that foreign shocks that impact on the level of foreign real interest rates (the "world" rate excluding New Zealand), will impact on New Zealand real interest rates in the same direction, but not necessarily of the same magnitude. That is, while domestic economic fundamentals are important determinants of the level of New Zealand real interest rates, they are not independent of global factors.

Assume a foreign shock (such as an increase in the global supply of funds) that lowers the global actual real interest rate to r_1^w as in Figure 6. Assuming all else equal, in order for the New Zealand exchange rate to be unaffected at e_0 and still meeting the UIP condition, the New Zealand actual real interest rate would have to adjust instantaneously to the new "world" rate. This would be represented by a downward shift of the UIP schedule. To put it another way, at every level of the exchange rate, a lower interest rate is needed to attract the requisite capital inflows because foreign interest rates are less attractive. But this exchange rate-interest rate combination (r_1^w, e_0) would not be consistent with internal balance since nothing fundamentally has changed in the New Zealand economy, except that funds are now available at a lower rate. This would put upward pressure on domestic resources and inflation, as investment and consumption increase.

Similarly, r_0^{NZ} would no longer be consistent with internal stability. The gap between foreign and New Zealand interest rates would put upward pressure on the exchange rate which would be inconsistent with internal balance because of lower aggregate demand.

Figure 6 - A foreign shock that lowers the global interest rate



Instead, internal balance will be achieved through a combination of a higher exchange rate (e_1) and an interest rate (r_1^{NZ}) somewhere between r_0^{NZ} and r_1^W. Thus, the RBNZ will lower the OCR (which will flow through to actual real interest rates in the economy), but the drop in New Zealand interest rates will not match the decline in foreign rates. Further reductions in the interest rate below r_1^{NZ} would be inconsistent with internal balance, because the exchange rate would be too low and inflation pressures would build up as described above.

The previous two sub-sections have highlighted that while foreign forces do drive the *direction* of domestic interest rate movements, the magnitude will be constrained by domestic saving and investment rates. That is, full convergence of domestic interest rates to the world level may not be possible.

4.4. The role of a default risk premium

Most of the literature on New Zealand's interest rate premium has attempted to measure the different types of country risk premia (see for example Lally, 2000; Hawkesby, Smith and Tether, 2000). Country-specific risk premia (CRP) include:

- currency risk premia, that compensate for currency volatility;
- inflation risk premia, that compensate for inflation volatility;
- default risk premia imposed by creditors to compensate for the higher default risk implied by New Zealand's high net indebtedness; and,
- liquidity premia to compensate for the lower liquidity of small markets such as New Zealand.

There is little evidence to support the view of inflation or liquidity risk premia. Actual and expected inflation is quite similar across OECD countries. New Zealand inflation and inflation variability has (since 2000 at least) been within the median of comparator countries and is not a significant outlier. It is also not obvious that liquidity premia could explain the (around 100 basis points on average) divergence between Australian and New Zealand rates.

Hawkesby, Tether and Smith (2000), in evaluating the New Zealand interest rate premium relative to Australia and the United States, assume no significant difference in liquidity risk between New Zealand and Australia. This assumption is based on the predominance of Australian banks in the New Zealand financial market. For the United States, they assume that the liquidity premium is relevant only in the long-run (10-year rates) and is around 50 basis points. The remainder (the residual) of the premium is then assumed to be explained by currency risk premia. Relative to Australia, the premium is estimated to be around 150 basis points (but only for short-term interest rates, not long-term). Relative to the United States, the premium is estimated to be between 100 and 400 basis points.

However, over the last decade at least, it is not obvious that currency risk premia can explain the premium on New Zealand interest rates. Mabin (forthcoming) concludes that while New Zealand dollar short-term volatility is high, it is also high for countries like Australia and the United States. A similar story can be told in terms of medium-term exchange rate variability.

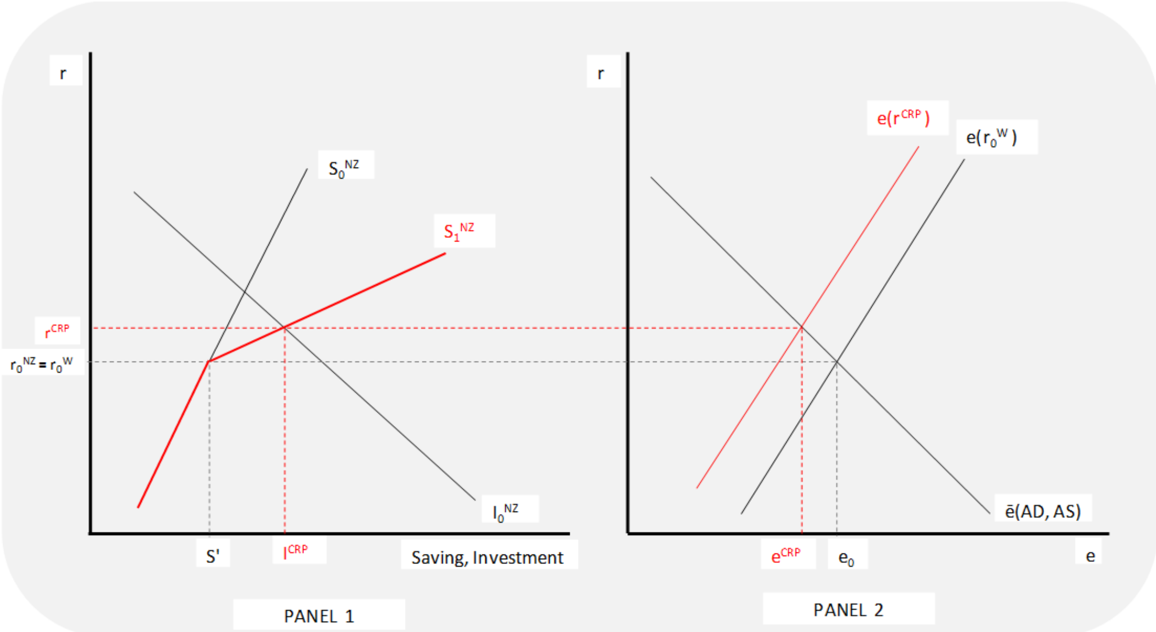
Accepting that premia for liquidity, inflation volatility or currency risk are not especially relevant here, the remainder of this section focuses on the role that a default premium could play in New Zealand's interest rate premium.

Consider the basic framework as in Figure 3. At $r^{NZ} = r_0^w$, the actual real exchange rate, e_0 determined along the UIP schedule, is consistent with internal balance along $\bar{e}$. Assume now that because of New Zealand's high stock of country debt (New Zealand's NIIP is currently around negative 86%), that foreign investors demand a higher return for lending to New Zealand. This would imply a new aggregate supply of funds schedule such as the bolded (red) line in Figure 7 kinked at r_0^w. Assume that this foreign supply of funds schedule is more elastic to interest rates than the domestic saving curve. If this were not the case, New Zealand would rely solely on domestic funds – there would be no international capital market which would be the extreme "sudden-stop" case.

From the perspective of the New Zealand borrower, the "world rate" has increased and so the UIP schedule shifts left. That is, at every level of the exchange rate, the interest rate must be higher, because foreign investors now demand to be paid a premium to invest in New Zealand. The domestic interest rate will increase to reflect the new conditions on world markets. The new combination will have a *lower* exchange rate level and a higher interest rate (r^{crp}).

Note that in this scenario, the RBNZ has not adjusted the OCR to maintain internal balance. The imposition of the risk premium implies that the gap between the OCR and long-rates has widened. In the previous sections, a widening gap between the OCR and actual rates resulted in pressures on internal balance that had to be managed by changing the OCR. In this case, the exchange rate and interest rate both move in the right (opposite) directions to maintain internal balance without the RBNZ necessarily having to react.

Figure 7 - The role of a default risk premium



This scenario illustrates that a default premium could be a driver of the New Zealand interest rate premium. However, the following two stylised facts would seem to suggest that default risk is not currently the primary driver of New Zealand's interest rate premium, but that the conditions for internal balance matter more:

First, a default premium would likely see a New Zealand exchange rate closer to its long-run equilibrium level or below it. Instead, the New Zealand dollar appears to be overvalued and has been for some time. This is consistent with the carry trade story where foreign investors are seeking out a higher yield currency, rather than reluctantly lending to a country perceived to be overly risky.

Second, the imposition of a default premium would likely over time see New Zealand households and business deleveraging (as costs of borrowing increase). Instead households have tended to leverage more which suggests that domestic conditions are more relevant to driving interest rates up. Of course, global conditions have been important in driving interest rates down across many OECD countries over the past two decades, including in New Zealand despite the on-going premium, which would encourage further leveraging by New Zealand households and businesses.

Furthermore, from Figure 7 it is worth noting that the extent to which default risk premia would "bite" still depends on the saving rate. That is, increased saving at the national level would lower the premium through two channels. First, higher saving would eventually translate into lower foreign debt levels (other things equal), and as a result, the default premium (perceived riskiness) would decrease. Second, given a perceived level of riskiness, a higher level of national saving would lower the demand for foreign capital and would therefore indirectly lower the default premium. That is, $e(r^{crp})$ would sit somewhere to the right of where it is sitting in Figure 7. To put it another way, for the same level of capital inflows and the exchange rate, foreign investors can be compensated at a lower premium.

To conclude this section, while the stylised facts and framework are not inconsistent with the existence of default risk premia, the framework does highlight the importance of low domestic saving rates relative to investment as a driver of the real interest rate premium in New Zealand over the past two decades. Furthermore, should perceived risk increase, country risk premia could matter more in the future.

5 The interest rate premium and economic performance

The previous section has argued that the premium on New Zealand real interest rates is likely to have been primarily driven by low domestic saving relative to investment rates. That is, the interest rate premium can be seen as a symptom of New Zealand imbalances. This section provides indicative evidence of the impact of the premium, which is expected to be important, but moderate.

The decision to invest in capital depends on the return the investment is expected to generate relative to its cost of capital. The cost of capital (*C*) can be thought of as a pre-tax, real gross rate of return on an investment that is required to earn a given rate of return after tax and depreciation. If the investment is fully debt-financed:

$$C = r + \delta = \frac{R}{(1-t)} + \delta$$

where r is the pre-tax actual real return that will need to be paid to lenders/investors that demand an after-tax real return R and δ is depreciation (and is tax-deductible, where t is the tax rate).[7]

Modelling by the Treasury (Szeto and Ryan, 2009), based on the New Zealand Treasury model (NZTM) production block estimations, indicate that a 1 percent decrease in the cost of capital would lead to a 0.8 percent increase in the capital stock.[8] In NZTM, the capital stock refers to the private business sector capital stock. What would this mean in terms of labour productivity and growth?

Assume the following:

δ= 10%

r = 6%

We can not say exactly how elastic R would be to a change in net national saving, but assume that r drops from 6 percent to 5 percent. The 1 percentage point drop in the costs of capital lifts the business capital stock by 5 percent. GDP is expected to increase moderately by around 1.1 percent in the long-run. These results do not allow for a positive spillover from higher capital stocks into multi-factor productivity (MFP) which may be one reason for the moderate impact.[9]

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7 For ease of exposition, we assume inflation is zero, but this does not alter the conclusions of this section.

8 The functional form of the production function in the NZTM is a CES (constant elasticity of substitution) equation.

9 The NZTM results suggest a more moderate GDP impact from a reduction in the costs of capital than those estimated by the NZIER (2010) using a dynamic CGE model.

Although the results from NZTM are not directly comparable with the international growth literature, the latter would similarly suggest that the growth impact from a reduction in the costs of capital are likely to be moderate. There is some controversy in the international literature about how much the costs of capital actually matter for investment and growth however, with the range of elasticities of investment to costs of capital ranging from very high to very low (Chirinko *et al,* 2002). From the OECD literature, the GDP impact of a 1 percentage point increase in the investment-GDP-ratio, could increase GDP per capita in the long-run by between 1.3 percent and 1.5 percent (Bassanini, Scarpetta and Hemmings, 2001).

6 Conclusion

This paper has presented a framework that leads us to the following conclusions.

"World" convergence factors drive the direction of New Zealand interest rates. That is, if foreign real interest rates drop, this will apply downward pressure to interest rates in New Zealand, all else equal.

Domestic demand conditions in New Zealand determine the extent to which these world forces matter. That is, the achievement of internal balance could drive a wedge between New Zealand actual interest rates and the "world" rate. The relationship between the interest rate differential, the actual real exchange rate and exchange rate expectations can sustain the interest rate differential even with open capital markets and perfect capital mobility.

Country risk premia (in particular, default risk premia), could potentially drive a wedge between New Zealand actual interest rates and the "world" rate. However, the evidence for New Zealand suggests that this has not been a material driver of the interest rate premium over the past two decades. The overvalued New Zealand dollar is consistent with foreign inflows seeking out a higher yield currency, rather than foreign investors reluctantly lending to a risky debtor.

Even if country risk premia are responsible for driving the interest rate premium, the size of this wedge depends on domestic saving rates relative to investment both directly (in terms of debt and perceived riskiness) and indirectly via the operation of monetary policy to maintain internal balance.

Overall, it is hard to escape the conclusion that low national saving rates relative to investment are an important driver of New Zealand's interest rate premia.

Appendix A

One way of modeling the time-varying NRR is to use both short-term and long-term interest rates to estimate the unobserved NRR that are embedded in both of these market prices. Assuming that the short-term interest rate is mainly determined by the central bank, and that the long-term interest rates are determined by economic fundamentals, and further assuming that the different agents in the economy know the same NRR, the NRR can be estimated in the following way:

$$i_t^s = r_t^* + \pi_t^e + e_t^s \qquad (1)$$

$$i_t^l = r_t^* + \pi_t^e + \omega + e_t^l \qquad (2)$$

where i_t^s are short-term interest rates, i_t^l are long-term interest rates (5 year-government bond yield), r_t^* is the unobserved neutral real interest rate, π_t^e the expected inflation term is the expectations for the period t+1 formed at period t, and ω is the term premium. The term premium is assumed to be a constant, although there is international evidence that the term premium varies at business cycle frequency.

Equation 1 and 2 are the measurement equations. The state variable r_t^* is assumed to follow the following:

$$r_t^* = r_{t-1}^* + \vartheta_t \qquad (3)$$

Equations (1) – (3), once put in state-space representation, can be estimated with the Kalman filter via the maximum likelihood.

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