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Central banks and macroeconomic policy choices: Relaxing the trilemma ☆

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ABSTRACT

Macroeconomic policy choices in open economies are constrained by the trilemma according to which the objectives of exchange rate stability, monetary independence and capital mobility cannot be attained jointly. This paper shows that foreign exchange interventions provide an effective instrument to relax the trilemma. An active reserve policy allows central banks to pursue independent monetary and exchange rate policies when the capital account is liberalised.

We use the framework of the portfolio balance model to show that exchange market interventions may substitute for capital controls. Both allow a country to achieve the other two objectives of the trilemma. Our empirical analysis of a large country panel data set covering the period 1970–2010 confirms this theoretical insight: the weighted sum of the three trilemma objectives increases in the degree of foreign exchange market intervention. The capacity to relax the trilemma constraint has increased over time and has been most effective in emerging markets.

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1. Introduction

The macroeconomic policy space in open economies is constrained by the trilemma, also known as impossible trinity. According to this tenet, the objectives of exchange rate stability, monetary independence and capital mobility are mutually inconsistent. Only two out of these three objectives can be attained jointly.

This paper shows in the theoretical framework of the portfolio balance model that foreign exchange interventions relax the trilemma constraint. Foreign exchange interventions are a substitute for capital controls: both allow a country to combine an independent monetary policy with a pegged exchange rate. This assertion is confirmed by our empirical analysis, which shows that the trilemma constraint is the looser, the stronger the degree of exchange market intervention.

While the trilemma suggests that central banks have binary choices, in practice, they can choose the degrees of exchange rate flexibility and of capital flow restrictions. Hence, in a world of intermediate regimes – managed exchange rates and imperfect capital controls – central banks face a trade-off: if they approach one trilemma variable, the weighted average of the other two variables decreases.

The trilemma can be derived from the Mundell–Fleming framework, in which the effectiveness of monetary policy depends on the exchange rate regime and the degree of capital mobility.[1] When the Nobel price was awarded to Robert Mundell, the Royal Swedish Academy of Science noted that the presence of the trilemma constraint "has become self-evident for academic economists" and its "insight is also shared by the majority of participants in the practical debate on stabilization policy" (Swedish Academy of Sciences,

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[1] The trilemma is indirectly present in models of currency crises. In the first generation of currency crisis models an inconsistency between monetary and exchange rate policy, which ignores the trilemma constraint, leads to a continuous loss of reserves and, consequently, to a currency crisis. If, in turn, international capital is not mobile, this inconsistency does not lead to a crisis.

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1999, p. 8). In sharp contrast to its practical influence, approaches testing its empirical validity have been scarce until recently.

Empirical evidence in support of the trilemma is provided by Aizenman et al. (2010, 2011, 2013), Obstfeld et al. (2005) and Popper et al. (2013). The first authors show empirically that a move towards one goal of the trilemma induces a shift away from at least one of the other two policy objectives.

This paper contributes to this recent literature by examining the strictness of the trilemma constraint. It shows that the trilemma constrains economic policy only in the long run. All three objectives are jointly attainable in the short run if they are supported by accompanying policies. Changes in international reserves are such a policy to reconcile the trilemma.

If a central bank absorbs changes in the relative demand for domestic and foreign assets by proportional changes in reserves, it can neutralise the effects of an open capital account. This is possible if assets are imperfect substitutes or if capital mobility is restricted.

The contribution of this paper is twofold. It provides the theoretical framework and offers empirical evidence for our hypothesis that foreign exchange interventions relax the trilemma. First, we integrate central banks as additional actors in the portfolio balance model and show that foreign exchange intervention may substitute for capital controls. Foreign exchange intervention spans the same policy space as capital controls even if capital is perfectly mobile. Second, using data on the trilemma variables we provide empirical evidence that foreign exchange intervention relaxes the trilemma constraint and "achieves the impossible". More precisely, we show that the weighted sum of the trilemma variables increases in the degree of foreign exchange intervention. To this end, we provide new indexes of the degree of exchange market intervention.

Given a trend towards increasing capital mobility in industrialised, emerging and developing countries alike (see, for example, Aizenman et al., 2010), countries are left with the choice between a stable exchange rate and an independent monetary policy. "Fear of floating" (Calvo and Reinhart, 2002), in turn, induces emerging and developing countries to manage exchange rates.[2] As a consequence, monetary policy may become increasingly constrained.

As long as domestic policy choices go hand in hand with limited net capital flows, the trilemma may not be felt as restrictive. The constraint becomes evident in the face of large net capital flows, which besides domestic pull factors may result from abundant global liquidity and low interest rates in industrialised countries like in the recent financial crisis. This explains the renewed interest in the adequate policy response to capital inflows (see, among others, Bordo et al., 2015; Forbes and Warnock, 2012; Jinjarak et al., 2013; Korinek, 2010; Ostry et al., 2011).

The trilemma reflects a scarcity of instruments a la Tinbergen[3]: since a central bank has one policy instrument – the interest rate – it can only pursue one target – an exchange rate target or a monetary target – provided that capital is mobile. This paper argues that central banks are equipped with a second policy instrument: foreign exchange intervention.[4] Interventions enable a central bank to implement the same exchange rate and monetary targets as with capital controls.

The Reserve Bank of India (RBI) provides an example that central bank interventions do not only lean against the wind, but also against the trilemma. In the face of net capital inflows the trilemma is relaxed as long as reserves are accumulated. Since the late 1990s the RBI has engaged in sterilized foreign exchange market interventions to reduce the pressures on the Rupee: it continuously replaced domestic assets by foreign exchange reserves in its balance sheet (see Fig. 1). As a consequence, the stock of government bonds held with RBI had sharply fallen until 2004. This restricted the RBI's ability to engage in further sterilized purchases of reserves. To gain some leeway, the *Market Stabilisation Scheme* was launched in 2004. It allows the RBI to absorb liquidity from the domestic money market through the issue of government bonds. Government, in turn, is committed to deposit cash at the central bank equivalent to the amount of debt issued. This mechanism enables the central bank to sterilize the accumulation of international reserves even after its domestic assets have fallen to zero. This was indeed the case in 2007 when net domestic assets of the central bank turned negative. The intention of the mechanism is to broaden the central bank's ability to "maintain stability in the foreign exchange market and enable it to conduct monetary policy in accordance with its stated objectives" (Reserve Bank of India, 2004). In other words, it enables the central bank to relax the trilemma given that the Indian capital account is relatively open.

The remainder of the paper is structured as follows. The following section surveys the empirical literature on the trilemma focusing on its empirical validity and its relation to international reserve hoardings. Section 3 shows in the framework of the portfolio balance model that interventions in the foreign exchange market allow central banks to achieve all three goals of the trilemma jointly. Using the trilemma indexes, Section 4 examines empirically whether foreign exchange interventions soften the trilemma constraint. The final section concludes.

2. Literature review

2.1. Empirical tests of the trilemma constraint

Empirical tests of the trilemma constraint typically examine whether there is a negative relationship between exchange rate stability and the degree of monetary independence. The findings are inconclusive.

Shambaugh (2004) and Obstfeld et al. (2004, 2005) find strong evidence for the validity of the trilemma constraint: under pegged exchange rates interest rates follow more closely base country rates than in flexible exchange rate regimes. This holds for the eras of open capital markets, namely the gold era (1870–1914) and post Bretton Woods era. During the Bretton Woods period monetary policy is not found to be constrained, which might be explained by the presence of capital controls.

The findings of Rose (1996) are less favourable. While the relationship between monetary independence and exchange rate volatility is positive, it is neither statistically nor economically significant. Frankel et al. (2004) show that in the long run domestic interest rates are determined by international ones independently of the exchange rate regime. According to Bluedorn and Bowdler (2010) the nature of the interest rate change is crucial for its transmission: exogenous interest rate shocks show a greater concordance with the trilemma prediction than anticipated changes. Obstfeld (2014) emphasises that short-term interest rates are more independent than long-term rates and that despite financial globalisation monetary independence increases if exchange rates are pegged.

While the results of Klein and Shambaugh (2013) support the trilemma constraint, the authors focus on intermediate policies, namely managed exchange rates and partial capital controls. Their empirical results show that these "rounded corners" of the

[2] This reduces the trilemma to a dilemma as noted by Shambaugh (2004).

[3] The Tinbergen rule states that for each policy target there must be at least one policy instrument.

[4] In a similar vein, Ostry et al. (2012) emphasise that sterilized foreign exchange market intervention constitutes a second instrument, which enables a central bank to limit currency movements in the context of an inflation targeting framework.

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