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Foreign exchange market pressure and capital controls

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ABSTRACT

This novel empirical study contributes to the literature on the foreign exchange market and financial liberalisation. We examine the determinants of exchange market pressure (EMP) in a panel of forty countries, using a statistical approach to measure market pressure, with particular focus upon the impact of capital controls. We also consider whether EMP is related to a range of other macroeconomic indicators, policy variables and trade openness. We find that capital controls are associated with weaker currencies, especially for advanced countries. Our results are robust to potential endogeneity and different measures of exchange market pressure.

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1. Introduction

A long standing academic literature has recommended using capital controls to deal with the challenges of financial globalisation, see inter alia [Tobin \(1978\)](#), [Eichengreen and Wyplosz \(1993\)](#), [Krugman \(1998\)](#) and [Stiglitz \(1999\)](#). With the global financial crisis and a recent surge in capital inflows to emerging markets, capital controls are back on the academic and policy agenda, see [Baba and Kokenyne \(2011\)](#), [Schmitt-Grohé and Uribe \(2012a,b\)](#), [De Paoli and Lipinska \(2013\)](#), and [Eichengreen and Rose \(2014a,b\)](#). The former Brazilian Finance Minister Guido Mantega was, for example, a vociferous critic of other countries' competitive devaluations. He went so far as to label them "international currency wars" and responded with a series of controls to avoid the impact upon the Brazilian Real¹. Brazil is not alone in recently re-introducing controls. Cyprus and Iceland have also implemented different forms of capital controls, see [Eichengreen and Rose \(2014b\)](#). Overall IMF member countries have increased their use of capital controls from 164 measures by July 2012 to 202 measures by August 2013, see IMF ([International Monetary Fund, 2012–2013](#), [International Monetary Fund, 2012a](#), [2012](#), [2013](#)).²

Given this context, it is relevant to ask the following questions. What is the impact of capital controls upon the exchange rate? Shall the impact be different across advanced and emerging market economies? And do capital controls matter more or less during crisis periods in the FX market? In principle, controls may be associated with weaker or stronger currencies. Some believe capital controls may counter capital inflows that appreciate the domestic currency, and also fuel a consumption boom

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¹ See [Financial Times \(2010\)](#), [Stiglitz \(2012\)](#), [Ostry et al. \(2012\)](#), [Chamon and Garcia \(2013\)](#) and [Table A](#) in the appendix for more details on Brazil's recent experience with capital controls.

² Capital controls have always been permissible by the IMF ([Gallagher, 2011](#)), but it was surprising that the IMF recently expressed the institutional view that "in certain circumstances, capital flow management measures can be useful," [IMF \(2012a\)](#).

and asset price bubbles, see [Chamon and Garcia \(2013\)](#). In contrast the currency crisis literature has widely documented a link between capital account liberalization and domestic currency stability.³ The existing empirical literature rejects the hypothesis that capital controls insulate an economy from external shocks. This evidence requires reinvestigation, given the recent revival of capital controls and the earlier literature's limitation that it models FX market pressure using a simple dummy variable approach, see [Edwards \(2006\)](#); [Glick et al. \(2006\)](#); and [Glick and Hutchison \(2011\)](#).

This paper's main objective consequently is to empirically model the main determinants of exchange market pressure (EMP), using measures from [Eichengreen et al. \(1996\)](#) and [Girton and Roper \(1977\)](#). Exchange market pressure is the sum of changes in the exchange rate, foreign reserves and/or interest rates. We seek to add to evidence on the effectiveness of capital controls in insulating an economy from destabilising capital inflows. We are unaware of any other studies that evaluate the effects of capital account liberalization on a continuous measure of exchange market pressure, with a large panel dataset of advanced and emerging market economies. Our continuous measure of EMP conveys more information than a simple discrete speculative attack dummy; see [Mandilaras and Bird \(2008\)](#). This paper models capital controls using the [Chinn and Ito \(2008\)](#) index of capital account openness. Furthermore, a number of control variables are used to evaluate the effects of trade openness, policy regimes and macroeconomic fundamentals. This paper endeavours to account for the potential endogeneity of capital controls and EMP by using Instrumental Variables. Our large panel dataset helpfully allows us to consider whether capital controls have a different impact across advanced economies and emerging markets. Finally, we examine whether crisis periods are especially related to capital control measures by using Probit analysis for our sample of forty countries. Hence, we contribute to the literature on the FX market and the impact of country characteristics.

This paper proceeds as follows. First, we set out our methodology: our continuous measure of exchange market pressure and the empirical methods used in the paper. In the third section we discuss our panel dataset and present our Instrumental Variable and Probit empirical results. The last section concludes and offers some policy prescriptions.

2. Methodology

2.1. Exchange market pressure index

We begin with a discussion of issues related to our key variable of interest. Our preferred measure of exchange market pressure (EMP) consists of a weighted average of the exchange rate, relative interest rates and foreign exchange reserves. It is sometimes argued that the components of an exchange market pressure index depend on the structure of the economy and therefore, must be derived from a structural macroeconomic model of exchange rate determination. However, structural exchange rate models that link the exchange rate to macroeconomic variables have found it challenging to forecast better than a random walk, see [Meese and Rogoff \(1983\)](#). Due to the controversial nature of exchange rate models, we adopt [Eichengreen's et al. \(1996\)](#) statistical approach to construct an exchange market pressure index for a panel of forty countries as follows:

$$EMP_{it} \equiv [(\alpha_i \Delta s_{it}) + (\beta_i \Delta (i_{it} - i_{it}^*)) - (\gamma_i \Delta (f_{it} - f_{it}^*))] \quad (1)$$

This exchange market pressure index EMP_{it} for country i at time t is therefore a weighted sum of spot exchange rate changes (Δs_{it}), relative interest rate change $\Delta(i_{it} - i_{it}^*)$ and relative foreign exchange reserve changes $\Delta(f_{it} - f_{it}^*)$. Lower case variables have been transformed into logarithmic form and the Greek letter Δ denotes the first difference operator. The spot exchange rate (s_{it}) is defined as the log price of the US\$ in domestic currency units. Hence, a rise in s_{it} is a domestic currency depreciation. An asterisks (*) denotes the foreign counterpart of domestic variables.

Modelling exchange market pressure using only exchange rate changes is not enough as monetary authorities may alleviate upward pressure for example by raising interest rate and/or spending foreign exchange reserves. Therefore, interest rate and foreign exchange reserve changes constitute valid components of an exchange market pressure index. An increase in the exchange rate, a rise in interest rate and a loss of foreign exchange reserves imply an increase in exchange market pressure. The parameters α_i , β_i and γ_i in Eq. (1) are weights assigned to components of the exchange market pressure index and are based on the inverse of their volatilities. This assigns a low weight to more volatile components and thus ensures equal importance of all components. This approach also has the advantage that it is not conditional upon implicit macroeconomic assumptions, for example those made by [Girton and Roper \(1977\)](#) and [Weymark \(1995\)](#). Nevertheless, in our empirical analysis we assess the robustness of our results by also using a measure of exchange market pressure from [Girton and Roper \(1977\)](#).

[Girton and Roper \(1977\)](#), hereafter GR, first used a monetary model of exchange rate determination and derived an exchange market pressure index which is a simple sum of exchange rate and foreign exchange reserve changes. It assigns equal weights to both exchange rate and foreign exchange reserve changes; it does not require the estimation of any model parameters to derive the weights of the index. [Roper and Turnovsky \(1980\)](#) on the other hand, used a macroeconomic model to derive the trade-off that monetary authorities face between targeting domestic credit and the exchange rate when stabilizing domestic output. The derived exchange market pressure index is the sum of exchange rate and foreign exchange reserves changes. However, both index components are not equally important, requiring the estimation of six parameters

³ More generally see [Edison et al. \(2002\)](#) for a survey of literature on capital account liberalization and economic performance.

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