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Borrowing constraints and the trade balance–output comovement ☆

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ABSTRACT

The countercyclical trade balance ratio is among the key stylized facts about open economies. The magnitude of the correlation between the trade balance and output, however, differs from country to country. In particular, the trade balance ratio is more negatively correlated with output in emerging economies than in developed economies, suggesting that the trade balance is more sensitive to output changes in the former than in the latter. This paper explores whether this difference is caused by international borrowing constraints imposed on emerging economies.

By modeling borrowing constraints as conditional on macroeconomic performance, this paper shows that when there is a positive shock takes place in an emerging economy, *GDP* increases and the borrowing constraint becomes less binding, resulting in a decreased incentive to accumulate foreign assets. When there is a negative shock, by contrast, *GDP* falls, and the representative household must increase the trade balance to avoid possible binding borrowing constraints.

1. Introduction

The dynamics of the trade balance is one of the most important research topics in international economics. As the net of exports and imports, the trade balance reflects the terms of trade of a country in a given period. The trade balance has a direct effect on the exchange rate and on the level of the national debt. As world economies become increasingly integrated, the trade balance also has a substantial impact on almost all macroeconomic variables, including economic growth, the level of output, economic fluctuations and the unemployment rate. For this reason, it draws wide public attention and research on it has never waned.

Most studies of the trade balance focused on its cyclical behavior, which is a product of two main forces. The first is the insurance effect, which implies a procyclical trade balance: a country should increase its net foreign asset holdings in booms as precautionary savings and decrease its net foreign assets in recessions to smooth consumption. The second is the productivity effect. A country that experiences a positive shock should take advantage of enhanced productivity by importing more capital from abroad. This suggests a countercyclical trade balance. Assuming standard preferences, the insurance effect dominates such that the overall trade balance should be procyclical. This is, however, at odds with the data for most open economies. For this reason, generating a realistic trade balance–output comovement has been one of the major goals in the open economy literature, as in Mendoza (1991), Correia et al. (1995), Blankenau et al. (2001), and Letendre (2004).

To more accurately capture the cyclical pattern of the trade balance, one common approach has been to adopt GHH preferences, as proposed in Greenwood et al. (1988). As explained in the next section, GHH preferences minimize the insurance effect, so that the productivity effect dominates, making it possible to generate a countercyclical trade balance.

Although the trade balance has been extensively discussed, there remain some properties not yet investigated. Further examination of the trade balance across countries reveals not only that the trade balance is countercyclical in nearly all open economies, but also that it varies significantly from country to country. In particular, the trade balance is more negatively correlated with *GDP* in emerging economies than in developed ones. As shown in Table 1, Aguiar and Gopinath (2007) document that the average of the correlation coefficient is −0.51 for developing countries, and −0.17 for developed ones, indicating that the comovement between the trade balance and *GDP* is stronger in the former group than in the latter.[1] More recently, Boz et al. (2011) also find that the trade balance is more strongly countercyclical in developing economies than in developed ones.

Moreover, differences in trade balance–*GDP* comovements have grown in recent years for some countries. Table 1 covers the period of 1980–2003. Using the newly released Canadian and Mexican data through the year 2009, the correlation coefficients have become 0.0043 and −0.75, respectively. The small correlation in Canada

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[1] This table is excerpted from Aguiar and Gopinath (2007). $tb1_t$ is the ratio of the trade balance to *GDP*, i.e., $tb1_t = \frac{tb_t}{y_t}$.

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Table 1
$corr(tb1_t, y_t)$ across countries.

Emerging countries		Developed countries	
Country	$corr(tb1_t, y_t)$	Country	$corr(tb1_t, y_t)$
Argentina	−0.70	Australia	−0.43
Brazil	0.01	Austria	0.10
Ecuador	−0.79	Belgium	−0.04
Israel	0.12	Canada	−0.20
Korea	−0.70	Denmark	−0.08
Malaysia	0.01	Finland	−0.45
Mexico	−0.79	Netherlands	−0.19
Peru	0.12	New Zealand	−0.26
Philippines	−0.70	Norway	0.11
Slovak Republic	0.01	Portugal	−0.11
South Africa	−0.79	Spain	−0.60
Thailand	0.12	Sweden	0.01
Turkey	0.12	Switzerland	−0.17
Average = −0.51		Average = −0.17	

implies an almost zero comovement between the trade balance and output.

Fig. 1 plots the trade balance ratio and HP filtered real *GDP* (in logs) for Canada and Mexico. As Fig. 1 suggests, while a negative correlation between the trade balance ratio and output for Mexico is evident, the relationship between the trade balance ratio and output for Canada is more difficult to determine.[2]

The larger correlation coefficient (in absolute value) indicates that the trade balance in some countries, especially in some emerging economies, is highly responsive to *GDP* changes. Along with the fact that the trade balance is countercyclical, which suggests that the trade balance deteriorates more in booms, and improves more in recessions in emerging economies than in developed ones, one possible explanation for this difference in magnitude is that some countries face international borrowing constraints. Insofar as these borrowing constraints depend on *GDP*, a country may need to increase its trade balance during recessions to avoid a possibly binding borrowing constraint, and may not accumulate foreign assets during booms when the borrowing constraint is less binding.[3]

Since their introduction into the literature in Eaton and Gersovitz (1981), borrowing constraints have frequently been used in open economy macroeconomic models to study a wide range of topics, including currency crises, as in Aghion et al. (2001); foreign debt crises, as in Caballero and Krishnamurthy (2001); economic growth, as in De Gregorio (1996); "sudden stops", as in Mendoza (2001); and abnormally high consumption volatility in emerging economies, as in Resende (2006).[4] Arellano and Mendoza (2002) survey the literature on borrowing constraints in small open economy models and illustrate their effects. Their central findings are that borrowing constraints introduce large distortions to relative prices, including wages, the real interest rate, and the terms of trade, which in turn cause abrupt changes in the trade balance, even when the borrowing constraint is only "occasionally" binding.[5]

While the effects of a borrowing constraint on open economy macroeconomic models have been widely discussed, their effects on the correlation of the trade balance with *GDP* have yet to be investigated, especially for purpose of comparing business cycle statistics with the predictions of the standard model. This paper is concerned with the following question: to what extent can borrowing constraints explain the larger correlation coefficient in emerging economies?

As the main purpose of this paper is to illustrate the effect of borrowing constraints on business cycle statistics, I focus on the key question of whether borrowing constraints significantly affect the trade balance ratio–*GDP* comovement. To this end, the model below is constructed in as standard a way as possible, and the borrowing constraint is modeled in as generally a way as possible. This paper adopts the standard small open economy real business cycle framework, as presented by Schmitt-Grohe and Uribe (2003). In formulating the borrowing constraint, I adopt the "ability-to-pay" approach, following Arellano and Mendoza (2002), and thus optimal default is ruled out for simplicity. That is, the borrower always repays the debt if he has the ability. The lender is assumed to be risk-neutral and charges an interest premium to compensate for the default risk. The interest premium in this paper is modeled as conditional on the borrower's debt holdings.

More specifically, the borrowing constraint is modeled as a ceiling limit: existing debt cannot exceed a certain fraction of output. As Arellano and Mendoza (2002) put it, in international capital markets, the lender has incomplete information about the borrower and thus relies on some key economic indicators to assess potential risk. Monitoring output of the borrower serves this purpose well. Moreover, this simple setting reflects the lender's needs for default risk management. In particular, as there hardly exists forcible repayment mechanisms for sovereign debt, the lender is more concerned about the borrower's ability, rather than willingness under the "ability-to-pay" framework. A debt limit reduces the likelihood of overborrowing and falling into a foreign debt crisis trap, in which borrowers typically lose their ability to repay their debt.

With the assumption that it is chiefly emerging economies that face borrowing constraints, the methodology of this paper is to study one typical emerging economy and compare predictions of the credit-constrained and credit-unconstrained models. In the small open economy literature, Mexico is frequently chosen as a representative emerging market country. In this paper, Mexico is also chosen as the subject of analysis.

By including borrowing constraints in an otherwise standard small open economy real business cycle model, the paper confirms the aforementioned conjecture, i.e., that debt ceiling causes the trade balance to move more closely with output changes, and shows that borrowing constraints generate a more sensitive response of the trade balance to output changes. Whereas the correlation between the trade balance ratio and *GDP* is −0.22 for the model without constraints, it rises to −0.59 when a borrowing constraint is applied. Two factors contribute to this result. The first is that output becomes less volatile under borrowing constraints. When there is a negative shock, for example, the quantity of labor supply decreases by less in the constrained than in the unconstrained model and accordingly, output falls by less. A smaller decline in labor and output serves to increase the trade balance, which is also an optimal response to the borrowing constraint. The second factor is that the trade balance is more volatile in the model that includes a borrowing constraint. With a negative shock, the standard model without financial market

[2] The red line in Fig. 1 is the OLS fitting line.

[3] Economies with underdeveloped financial markets are more likely to face borrowing constraints. Taking the financial development index from Love (2003) (which roughly corresponds to the same period as Table 1), the correlation between $corr(tb1, y)$ and the financial development indicator is 0.12, suggesting that the more developed are an economy's financial markets, the smaller is the trade balance ratio–output comovement in absolute value.

[4] Eaton and Gersovitz (1981) outline the theory of borrowing ceilings to answer the question of why countries choose not to default even when there is no forcible debt repaying mechanism. According to Eaton and Gersovitz (1981), borrowers refrain from defaulting when the disutility of exclusion from outside capital markets in the future exceeds a certain limit. De Gregorio (1996) investigates the relationship between borrowing constraints and economic growth. De Gregorio (1996) argues that borrowing constraints increase saving, which increases growth; at the same time, borrowing constraints reduce the time devoted to human capital accumulation, which decreases growth.

[5] Arellano and Mendoza (2002) divide the various models into two categories: "ability-to-pay" models and "willingness-to-pay" models. The former rule out the possibility of voluntary default and assume that borrowers always repay whenever they have the ability. The latter permit the borrower to optimally default.