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# *Comment*

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I very much enjoyed reading this paper, which addresses an important policy-relevant issue. The paper begins by presenting empirical evidence on the impact of currency unions and exchange rate pegs on the intensive and extensive margins of trade. The paper then moves on to develop a stochastic general equilibrium model that provides a natural explanation for the empirical results. The main finding of the paper is that currency unions raise aggregate bilateral trade flows through the extensive margin whereas direct exchange rate pegs raise bilateral trade through the intensive margin.

The empirical analysis begins with a decomposition of aggregate bilateral trade into an extensive and intensive margin following Hummels and Klenow (2005). In this decomposition, the *extensive margin* is defined as the count of goods $i$ exported by source $j$ to destination $m$ weighted by their importance for world exports:

$$\text{EM}_m^j = \frac{\sum_{i \in I_m^j} X_{mi}^W}{X_m^W}.$$

In contrast, the *intensive margin* is defined as country $j$'s exports to destination $m$ relative to world exports to destination $m$ for the same set of goods:

$$\text{IM}_m^j = \frac{X_m^j}{\sum_{i \in I_m^j} X_{mi}^W}.$$

Based on this decomposition, the paper estimates a gravity equation specification for the impact of exchange rate regimes on aggregate bilateral trade and the extensive and intensive margins separately. One key feature of the gravity equation for aggregate bilateral trade is that it can be derived from explicit microeconomic foundations, as, for

example, in Anderson and van Wincoop (2003). While the authors estimate several gravity specifications for aggregate bilateral trade, the gravity equation's microeconomic foundations suggest that exporter-year and importer-year fixed effects should be included. Their inclusion allows for changes over time in exporter and importer price indices ("multilateral resistance"). Therefore, of the specifications considered by the authors, those with exporter-year and importer-year fixed effects are the more compelling. Additionally, although there are explicit microeconomic foundations for the gravity equation for aggregate bilateral trade, the gravity equations for the extensive and intensive margins are not explicitly derived from such microeconomic foundations. Although the model developed later in the paper yields theoretical measures of the intensive and extensive margins, these do not directly correspond to the empirical measures used in the authors' econometric specifications. Therefore, while the model is necessarily an abstraction, there is some scope for taking the theoretical measures of the extensive and intensive margins to the data in a more structured way.

Using a gravity equation specification to identify the impact of currency unions or exchange rate pegs on international trade raises a number of empirical issues. At the heart of these issues is the *program evaluation problem*: we do not observe the counterfactual of what international trade would have been without the currency union or exchange rate peg. A particular concern is that the formation of currency unions and exchange rate pegs is endogenous and there is likely to be selection on observables and/or unobservables into such exchange rate regimes. The limited number of time series changes in exchange rate regime in the authors' data precludes the inclusion of bilateral exporter-importer pair fixed effects as considered by Glick and Rose (2002), which control for time-invariant differences between bilateral trade pairs with a currency union or bilateral peg and those without. Nonetheless, matching estimators could be used to examine the robustness of the empirical results to controlling for selection on observables. Indeed, Persson (2001) finds that the use of such matching estimators yields quite different estimates of the impact of currency unions on bilateral trade from ordinary least squares specifications. In terms of the authors' findings, one specific concern is that bilateral trade pairs with currency unions are systematically different from bilateral trade pairs with exchange rate pegs and that such nonrandom selection is responsible for the different roles of the extensive and intensive margins for these two types of exchange rate regime.

To explain the empirical finding of a greater role of the extensive margin for currency unions than for exchange rate pegs, the paper develops an elegant three-period stochastic general equilibrium model. In period $t_0$ firms decide whether to enter the domestic and foreign markets, while in period $t_1$ firms choose their prices for domestic and foreign sales and in period $t_2$ production and sales take place. The key assumption of the model is that currency unions adopted in $t_0$ last through $t_1$ and $t_2$ but exchange rate pegs last for only one period. Therefore currency unions and exchange rate pegs have different effects because only currency unions affect firms' entry decisions.

While the idea that only long-lasting policies affect the entry decisions of firms is clearly important, the differential effects of currency unions and pegs do follow somewhat mechanically from the assumptions about timing made in the model. Natural questions are, why do currency unions last longer than exchange rate pegs and what happens when the decision to join a currency union/peg is made endogenous? Another dimension of the model that would be interesting to explore is country asymmetries. While solving the model under symmetry is analytically convenient, many currency unions involve small and poor countries, which are likely to differ on a number of dimensions from their larger and richer counterparts.

Nonetheless a key contribution of the paper is to provide microeconomic foundations for the effects of currency unions and exchange rate pegs on international trade and its constituent margins through the impact of exchange rate uncertainty on firms' entry and pricing decisions. Furthermore, these effects are derived without assuming a direct impact of currency unions or exchange rate pegs on the fixed and variable costs of trade. Such research on microeconomic foundations is crucial for making further progress in understanding the impact of exchange rate regimes on the extent and pattern of international trade.

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