Journal of International Economics 87 (2012) 191–204

Contents lists available at SciVerse ScienceDirect

Journal of International Economics

journal homepage: www.elsevier.com/locate/jie

The dynamic effects of a currency union on trade ☆

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ARTICLE INFO

Article history:
Received 7 August 2010
Received in revised form 27 December 2011
Accepted 11 January 2012
Available online 20 January 2012

JEL classification:
F41

Keywords:
Currency union
Extensive margin of trade
Trade costs

ABSTRACT

The response of trade to a monetary union is a dynamic process. An empirical study of the European monetary union finds that the extensive margin of trade in new goods responded several years ahead of EMU implementation and ahead of overall trade volume. A dynamic rational expectations trade model shows that early entry of new firms in anticipation is explainable as a rational forward-looking response to news. The model helps identify which types of trading frictions are reduced by a currency union, and shows how new entry can be affected by uncertainty about EMU.

1. Introduction

One of the benefits promised for Europe's monetary union was increased trade among member countries. A currency union's ability to increase trade has been one of the most debated questions in international macroeconomics, with recent empirical studies generally finding effects that are modest in size but statistically significant.[1] This paper studies the dynamics of these trade effects. It begins by identifying new stylized facts about the timing of effects at the various margins of trade.[2] Its theoretical contribution is to construct a dynamic rational expectations trade model that explains these dynamics as a rational forward-looking response to news. The theoretical model is used to interpret the empirical evidence and evaluate conjectures about how monetary unions lower trade costs.[3]

As motivation, the paper uses panel regressions of disaggregated trade data to study the dynamics of trade before and after the implementation of Economic and Monetary Union in Europe (EMU). Estimates indicate that the extensive margin (measured as the entry of new goods categories) responds surprisingly aggressively. There is a statistically significant rise in the extensive margin already four years ahead of actual EMU adoption, and ahead of any rise in overall trade in our main samples. The extensive margin appears to overshoot in its response, building up to a maximum shortly after the implementation of the monetary union and declining afterward, at which point the rise in overall trade volume catches up.

☆ We thank for the comments: James Anderson, Jeffrey Bergstrand, Caroline Freund, Keith Head, Thomas Lubik, Christopher Meissner, Dennis Novy, Kim Ruhl, Ina Simonovska, Wing-Leong Teo and participants of the summer 2011 meeting of the Society for Economic Dynamics in Ghent Belgium, economics department seminar at the University of California San Diego, the 2010 Warwick Trade Cost conference in Venice, and the 2010 DSGE Conference in National Taiwan University.

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[1] Initially very large estimates were found by Rose (2000) using data from monetary unions predating EMU; support for large estimates is found in Glick and Rose (2002) and Frankel and Rose (2002). For critiques of this view see Persson (2001) and Baldwin (2006). For a sampling of empirical studies of the EMU, see Micco et al. (2003), Baldwin and DiNino (2006), Flam and Nordstrom (2006), Berthou and Fontagne (2008), and Frankel, 2010. Estimates for the effect on trade in the EMU range from 5% to 20%. Papers studying the effect of EMU on the extensive margin of trade, including Baldwin and DiNino (2006), Flam and Nordstrom (2006), and Berthou and Fontagne (2008), and Baldwin et al. (2008), estimate a rise in the extensive margin in the range of 2% to 19%. Studies using firm level data, such as Fontagné et al. (2009) for a subset of countries, are less supportive of an extensive margin effect, depending on how it is measured and the control group used.

[2] While Micco et al. (2003) consider the timing of overall trade effects, finding that effects begin in 1998, they do not consider the extensive margin. While Flam and Nordstrom(2006) measure the extensive margin for years prior to EMU, their objective is to compare the pre-EMU (1995–1998) period to post-EMU (2002–2005), taking the earlier period as a benchmark rather than considering the possibility that these early periods could themselves show an increase in the extensive margin. Berger and Nitsch (2008) study the dynamics of EMU trade effects empirically by including an EMU time-trend in gravity regressions.

[3] For influential examples of models of this type, see Ghironi and Melitz (2005, 2007), Ruhl (2008), and Atkeson and Burstein (2008).

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doi:10.1016/j.jinteco.2012.01.005

Some previous papers have discussed the need for dynamics to account for gradual adjustment to new trade opportunities, such as time to build to generate a sluggish response of new entry. But the evidence here is the opposite; rather than being sluggish, entry instead anticipates the future trade opportunities created by EMU. It is true that EMU did not become certain until a year before adoption, with announcement in 1998 of those countries satisfying the convergence criteria. However, when firms respond to shifts in expectations, the future profit opportunities need not be known with certainty; a simple shift in probabilities of uncertain events can induce changes in firm decisions. These facts suggest a need for trade models augmented with expectations and forward looking behavior in response to news about the future.

The theoretical contribution of the paper is to construct a trade model to understand the role of news and shifts in expectations. The model focuses on real variables and abstracts from money and nominal exchange rates. Because the countries joining EMU previously belonged to a system of mutually fixed exchange rates, EMU is not associated with a significant reduction in exchange rate volatility, or a significant change in monetary policy rules or shocks. Instead the model studies the adoption of a common currency as the elimination of trade costs of various types, frictions associated with currency conversion or other reduction in the significance of national borders. These trade frictions can take one of several forms in the model: iceberg trade costs proportional to trade volume, fixed costs paid each period, and a one-time sunk cost. The model studies the effect of an announcement about a future reduction in these trade costs. The model differs from Ghironi and Melitz (2005) and most models in the literature in assuming a distinct sunk cost for exporting, which makes the entry decision forward looking and responsive to news.

The model considers a congestion externality, whereby an increase in the number of market participants raises the sunk cost of new entry. See Berentsen and Waller (2009), Vivien Lewis (2009), and Rocheteau and Wright (2005) for examples, motivated by search and advertising costs. This congestion provides an incentive for new entrants to enter early, while sunk costs remain low. This model is used to simulate the effects of news about various types of trade reforms. The main finding is that a reduction in iceberg costs of trade generate dynamics that are most consistent with the empirical facts outlined above. In contrast, news about reducing the sunk cost itself leads to an exit of firms prior to adoption rather than the early entry observed. Further, news about the fixed cost of trade fails to generate the observed rise in overall export volume upon adoption. Finally, a stochastic version of the model shows that substantial uncertainty about whether a future monetary union will actually be implemented need not preclude an entry response among firms.

This paper is closely related to portions of Burstein and Melitz (2011), which constructs a model where uncertainty about shocks implies an option value of waiting to enter. They show that news about a future trade liberalization may lead to early entry elegantly by reducing the option value of waiting. Our paper differs in the mechanism of early entry. A distinction is that our mechanism rooted in a congestion externality generates entry dynamics more similar to those observed in our particular empirical case, where early entry is large and reaches its maximum near the time of policy implementation. A mechanisms rooted in option value tends to raise entry more gradually, with much of the new entry delayed until well after trade reform occurs. In addition, Costantini and Melitz (2008) study the related issue of how firms may begin investment in technology innovation in anticipation of future trade liberalization.

The next section of the paper discusses the empirical methodology and new stylized facts. Section 3 defines the model, and Section 4 discusses simulation results.

2. Empirical motivation

The study uses a panel dataset which covers exports at an annual frequency from 1973 to 2004. The trade data of 1973–2000 come from the NBER-UN World Trade Data set, developed by Rob Feenstra and Robert Lipsey, documented in Feenstra et al. (2005). The trade data after 2000 come from the UN Comtrade Data set, developed as the same way as in Feenstra et al. (2005). This data set computes annual bilateral trade flows at the four-digit Standard International Trade Classification, by performing a series of adjustments on UN trade data.[4]

Following Hummels and Klenow (2005), the extensive margin is measured in a manner consistent with consumer price theory by adapting the methodology in Feenstra (1994).
The extensive margin of exports from country j to m, denoted by EM_m^j, is defined as

$$EM_m^j = \frac{\sum_{i \in I_m^j} X_{m,i}^W}{X_m^W} \tag{1}$$

where $X_{m,i}^W$ is the export value from the world to country m of category i. I_m^j is the set of observable categories in which country j has positive exports to country m, and X_m^W is the aggregate value of world exports to country m. The extensive margin is a weighted count of j's categories relative to all categories exported to m, where the categories are weighted by their importance in world's exports to country m.

The corresponding intensive margin of exports from country j to m, denoted as IM_m^j is defined as

$$IM_m^j = \frac{X_m^j}{\sum_{i \in I_m^j} X_{m,i}^W} \tag{2}$$

where X_m^j is the total export value from country j to country m. The intensive margin is measured as j's export value relative to the weighted categories in which country j exports to country m. Therefore, multiplying the intensive margin by the extensive margin can get country j's share of world exports to country m, $EXShare_m^j$:

$$EXShare_m^j = \frac{X_m^j}{X_m^W} = EM_m^j IM_m^j \tag{3}$$

The categories of goods exported might differ across exporters and change over time. With the same level of share of world exports to country m at time t, the measurement implies that country j would have a higher extensive margin measure if it exports many different categories of products to country m, whereas, it would have a higher intensive margin if country j only export a few categories to country m.

First consider some preliminary summary statistics. Trade volume as a share of GDP in our dataset increased among EMU pairs by an average of 4.9 percentage points between 1998 and 2004. Interestingly, this is nearly the same increase if one takes 1990 as the starting point, 5.5%. In contrast, the average extensive margin among EMU countries experienced much of its rise prior to EMU: the percentage rise in average extensive margin was 5.7% from 1998 to 2004, but 13.2% starting from 1990. Further, this is much larger than the increase in the extensive margin among EU countries that did not belong to EMU, which increased only 0.8% from 1998 to 2004 and 4.2% starting from 1990. Fig. 1 plots the average extensive margin among EMU country pairs. It shows that the rise in the extensive margin over time was not even; it seemed to accelerate in the second half of the 1990s, and it had periods of decline in the post EMU period. Of course,

[4] The data purchased from the UN for 1984–2000 only had values in excess of $100,000, for each bilateral flow. To be consistent, the cutoff of exports in this study is set as $100,000, which implies that goods are considered nontradable if an export value of the category is less than $100,000.