

Discussion of

Obstfeld and Rogoff's International Macro Puzzles: A Quantitative Assessment

By

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1 Introduction

There are numerous ‘puzzles’ or ‘anomalies’ (i.e. stylized facts at odds with the predictions of leading models) in international economics. A non-exhaustive list includes 1. the Home bias in consumption and investment demand; 2. the high correlation of domestic investment and domestic saving (Feldstein-Horioka puzzle); 3. the Home bias in equity portfolio (generalized to other asset classes); 4. the low international correlation of consumption (lower than that of output—the quantity puzzle); 5. the failure of purchasing power parity and the law of one price (the PPP puzzle), sometimes discussed in connection to the strong correlation between nominal and real exchange rate volatility (the Mussa puzzle) or the low elasticity of import prices to the exchange-rate (the pass-through puzzle); 6. the low or negative correlation between relative consumption and the real exchange rate (the Backus-Smith-Kollman puzzle); 7. the seemingly disconnected behavior of exchange rates from fundamentals. To this list, one could also add the ‘elasticities puzzle,’ arising from divergent estimates of the extent to which trade quantities respond to prices. These puzzles arise not only in the context of the international real business cycle, but also in the New Open Economy Macroeconomics or New Keynesian literature—although some of them may be mitigated in versions of these models allowing for real and financial ‘frictions’ and/or richer specification of tastes and technology. Individually and altogether, they have long been motivating new directions for the development of the quantitative literature.

In their influential 2001 paper—“six puzzles”—Obstfeld and Rogoff (henceforth OR) use a series of stylized models/examples to call attention on trade frictions as a potential “unified explanation” of many puzzles at once—i.e. the single “friction” that could cover most ground in bringing international macro theory closer to the data. As I argue below, since 2001, the literature has made significant progress in understanding the general equilibrium ramifications of trade frictions. Eaton, Kortum and Neiman (henceforth EKN) contribute to the literature offering an impressive, multi-country, multi-sector quantitative reconsideration of OR 2001.

Based on dynamic equilibrium accounting—with seven shocks fully explaining the data—, EKN traces the global effects of eliminating frictions affecting the cross-border trade of (manufacturing) goods. In the spirit of OR, they assume away financial and nominal frictions: in their model, financial markets are complete both within and across borders, prices are flexible. The key friction is trade costs, which, like in the original OR contribution, are modelled as iceberg costs. Using the model calibrated to the data from a large panel of countries, they show that trade costs reduce the

gap between theory and evidence for four of the puzzles listed above, namely, puzzles number 1, 2, 4 and 5.

In this text, I elaborate on three points. The first concerns methodology. The authors analyze the consequences of eliminating trade costs assuming that trade distortions are unexpectedly eliminated in from the second period on, while all other shocks are maintained at their estimated values. The quantitative consequences on the “puzzles” are thus analyzed along the transition from the initial steady state with trade frictions, to a new, frictionless steady state. As a consequence, some of the results could be driven by trade and capital adjustment along the transition.

My second comment concerns how to model ‘trade frictions.’ OR assumes iceberg costs, which may be appropriate for transportation and tariffs, but not necessarily suitable to account for trade “frictions” in general. Many recent contributions have indeed re-focused on distribution costs or ‘distributive trade.’ Distribution margins are quite relevant from a quantitative standpoint—way larger than transportation costs narrowly defined. Distributive trade consists of the many services required to bring goods to their final users. These services are very poor substitute with the goods manufacturing firms produce, and are typically not traded across borders—hence they may be traded at different prices (reflecting local production costs and market conditions) denominated in different currencies. Modelling trade “frictions” this way has proven to be quite more fruitful, in pursuing the task of explaining “many puzzles at once”, than relying exclusively on iceberg costs.

My third comment concerns the lessons to be drawn from EKN. OR and EKN convincingly argue that trade frictions should be given proper attention in quantitative analyses. This message is well taken. But trade and other (financial, nominal) frictions should not be treated as competing building blocks for modelling the international economy. As shown by recent literature, there can be significant gains from focusing on significant interactions across frictions.

My comments are organized as follows. A first section briefly summarizes the model, discusses the counterfactual exercise and the main results of the paper, trying to connect them to each other. A second section raises issues on how to model trade frictions. The third section points to potentially useful interactions between trade and financial frictions. A short section concludes.

2 On the counterfactual

It is worth summarizing, if only briefly, the main features of the EKN model—as a way to appreciate the rich trade structure underlying their exercise. In a nutshell, the authors rely on a multi-country model, where each country has four productive sectors, two producing tradables (consumer and producer durables), and two producing nontradables (construction and services). Firms employ labor (immobile across countries); capital and intermediate inputs produced by different sectors. There are input-output links across sectors and borders: so import prices affect marginal costs in every sectors.

In the model, if there were no trade costs, the price and the shares of each traded goods produced by a country would be equalized across destinations. Namely, let π_{ni}^j denote the share that country n spends on the product j produced by country i , traded at the price p_n^j . Without trade frictions,

it must be the case $p_n^j = p_i^j$ and $\pi_{ni}^j = \pi_{ii}^j$, so that the following holds

$$d_{ni}^j = \left(\frac{\pi_{ni}^j}{\pi_{ii}^j} \right)^{-\frac{1}{\theta}} \frac{p_n^j}{p_i^j} = 1$$

where θ is a measure of the ‘dispersion of efficiencies’ (inverse). As long as there are trade frictions, in general $d_{ni}^j \neq 1$. Indeed, when the model is fitted to the data, the value of d_{ni}^j fluctuates along the dynamic of the world economy. So, starting from $d_{ni,t}^j$ in the initial date, $\widehat{d}_{ni,t+1}^j$ synthesizes the observable changes in trade shares and relative price of tradables between t and $t + 1$. In light of the model, this can be taken as a synthetic indicator of the extent to which trade frictions affect the equilibrium allocation—thus treated as a ‘trade shock’, along with other shocks to (2) productivity, (3) investment efficiency, (4) intertemporal preferences, (5) relative demand for non-durable services, and (6) labor supply. Overall, the author assume seven shocks, the ones listed above plus a ‘balancing trade shock’ (shock #7), which allows the model to account for the external surplus/deficit in services observed in the data (recall that services are assumed to be not traded across borders in the model). Based on these seven shocks, the authors fit the model to the evidence for 19 economies (18 OECD countries plus an aggregate for the rest of the world) over the period 2000 Q1 - 2014 Q4: the seven shocks explain the data completely.

To carry out a quantitative assessment of the OR 2001 paper, the authors propose the following exercise. Starting from value of d_{ni}^j estimated above, they calculate the counterfactual time series of the trade-cost shocks that would equate the trade friction indicator to 1 over each period, that is

$$d_{ni,t}^j \widehat{d}_{ni,t+1}^j = 1.$$

They then replace $\widehat{d}_{ni,t+1}^j$ with the counterfactual time series from the second period on, basically assuming that the new series of shock materializes unexpectedly at that point, and is anticipated over the entire sample period. All the other shocks estimated in the data remain the same. As a terminal condition, in both the baseline and the counterfactual, the authors impose a steady state after the last observation, basically setting all the seven shocks equal to their constant steady state value of 1. Comparing the two economies, with the original trade-friction shock series and with the counterfactual, provides insight on the extent to which trade frictions may help explaining some of the puzzles.

2.1 Methodology

The exercise in the paper provides a quantification of the general equilibrium effects of trade frictions in the *transition* between one economy with those frictions, to another without. This is conceptually distinct from a theoretical comparison of economies under different trade-friction regimes.

The reason why this observation is relevant for the purpose of the paper is that investment decisions and thus trade patterns may specifically responds to anticipation of the counterfactual (relative to the baseline) shocks. This may specifically impinge on the results concerning the

Feldstein-Horioka puzzle—as the series of trade deficits and surpluses will reflect differences in the time evolution of shocks, i.e. to the unexpected elimination of trade-frictions over the sample period, rather than to their elimination per se.

As a side note, it could be interesting to re-define the initial conditions using a model with incomplete markets and/or nominal rigidities. While the exercise may become more involved, the results would be informative on whether trade frictions interact with other frictions.

2.2 Results

The results of the paper can be synthesized as follows. First and foremost, zeroing trade costs causes the price of tradable goods to converge across borders. This convergence in turn explains the decline in home bias in tradables, with consequences also for non-tradables. Because of the input-output structure, a reduction in trade costs that raise openness is bound to affect the costs of production in all sector, as well as of investment, via the price of imported inputs. Thus, a general convergence towards PPP may also result from this channel.

In a complete market model, a move towards PPP is bound to raise consumption correlation (for given taste shocks): in the limit case of PPP, indeed, marginal utility growth is equated across locations. Correlation of consumption is higher in the counterfactual, but not perfect, since one of the seven shocks is to preferences. Most remarkable is the quantitative effects on the Feldstein-Horioka puzzle—although, as explained above, the results may in part reflect the fact that the counterfactual is ‘transition-based’.

It is unfortunate that, because of the complete market assumption, the model cannot be brought to bear on the home bias in equity portfolio—as OR 2001 devote a section on a specific mechanism by which trade costs may create an incentive to hold domestic assets, after early work by Couerdacier, see Coeurdacier [2009]. Since the contribution by OR, there have been a number of significant advances in the open macro literature, that make it possible to address this issue more thoroughly—see the method to solve endogenously for the financial portfolio allocation in DSGE models pioneered by Devereux and Sutherland [2010]). Also, we have become increasingly aware that home bias in the demand for investment goods may play a key role in determining a high degree of home bias in equity portfolios—see Heathcote and Perri [2013].

3 Modelling trade frictions

OR 2001 elaborate on the idea that trade frictions may play an important role in addressing open-economy puzzles, focusing exclusively on iceberg costs. While these are well in the tradition of the trade and (more recently) macro literature, there are good reasons to think of trade frictions in more general terms. An important instance is provided by the literature that, starting with Burstein et al. [2003], has modelled “distributive trade.”

To bring their tradable goods to final users, firms must use domestic and foreign services that usually have a high degree of complementarity to the goods exchanged. To the extent that these services are non-traded across borders, they may be have different prices (denominated in different

currencies). So, a non-negligible share of the consumer price of imports consists of distribution, which may reflect local demand and costs conditions for nontradable services—wholesale, retailing, insurance etc.. On average, distributive margins make up more than 50 percent of the final good prices.

By raising the share of nontradable inputs in the final goods, distributive trade naturally help addressing the PPP puzzle. In addition, as shown in joint work with Luca Dedola, vertical interactions between upstream producers and downstream distributors may impinge on trade elasticities, thus on optimal pricing and exchange rate pass through—see Corsetti and Dedola [2005]. Everything else equal, because of the complementarity between trade goods and distribution services, the trade elasticity faced by exporters can be expected to be increasing in the border price they charge at the border. This means that it will tend to adjust markups in response to costs shocks—implying strategic complementarity in the New-Keynesian terminology. With sticky wages, exchange rate pass through on import prices at the border will be incomplete even if prices are perfectly flexible.

In addition, when distribution capacity is modelled as a capital stock which may be adjusted over time in response to persistent shocks, variation in this stock naturally tends to raise trade elasticity in the long run, relative to the short run—a point stressed by Crucini and Scott [2013] as well as by Drozd and Nosal [2012], who however model the friction as the need for a firm to sell using a ‘costumer list’, which can be adjusted over time at a cost.

The above are examples of puzzles (exchange rate pass through, elasticities) which trade costs may help explain, provided that they are appropriately specified. The lesson is straightforward. International models indeed work much better once we have a convincing account of trade technology and market structure. Iceberg costs are a component of trade-costs specification, but not necessarily the main one.

4 Financial and trade frictions

With complete markets, independently of trade frictions, taxes, nominal rigidities, trade in financial markets equalizes the marginal utility of a unit of currency across borders. Assuming symmetry in initial conditions, for simplicity

$$\frac{1}{P}U'(C) = \frac{1}{\mathcal{E}P^*}U'(C^*)$$

where P 's are price level and \mathcal{E} is the exchange rate. This can be rearranged as

$$\frac{\mathcal{E}P^*}{P} = \frac{U'(C^*)}{U'(C)}$$

establishing that, with perfect risk sharing, a rise in home consumption relative to foreign consumption should tend to be correlated with an exchange rate depreciation (unless taste shocks are quite large and tends to boost marginal utility whenever there is a consumption boom in a country).

Casual observation and econometric analysis suggest that a rise in domestic absorption (demand C) in a country is associated with real appreciation—at odds with the predictions of complete market models. Trade costs per se cannot improve our understanding of this puzzle—the so called

Backus-Smith puzzle.

In this respect, Obstfeld and Rogoff write “In our view, incompleteness of asset markets is the major reason why the [above] condition fails so miserably in practice. Indeed, given the volatility of exchange rates, the size of transfers required for the [above] condition to hold would require a level of risk sharing even greater than we observe in domestic markets. [...] for us the complete-markets assumption was only a useful device for calibration, and not a conviction. Trade costs would play essentially the same role in a world with, say, trade in debt and equities but not a complete set of Arrow-Debreu securities. Indeed, in the context of this paper, the [...] interesting issue is not why international consumption correlations are difficult to replicate in a complete-markets model.” (OR 2001 page 366-367).

Since OR 2001, nonetheless, the literature has covered quite a bit of ground in the direction of integrating different types of frictions, and rethinking ways of reconnecting trade and macro theory. By way of example, in the quantitative models developed in joint with Luca Dedola and Sylvain Leduc, vertical interactions between producers and distributors impinge on trade elasticities, which in turn affect the equilibrium consequences of financial frictions—see Corsetti et al. 2008a,b. Ghironi and Melitz [2005] provides a related but different perspective on how to integrate trade and macro, trade and financial frictions.

This research agenda has already produced important results, but is really only at an early stage. To wit: the same mechanism determining elasticities and pricing with distributive trade may also be active in the interactions between producers located at different points on a supply chain. Modelling pricing and risk sharing along supply chain in general equilibrium is clearly an outstanding priority for the field.

5 Conclusions

A reconsideration of the original OR claim is quite timely, and the EKN paper is bound to motivate more work on the topic. A non-trivial issue is that, despite the ongoing process of financial and trade globalization, most of the international “puzzles” listed in the introduction have not attenuated. To the extent that globalization has been driven by (and resulted in) lower trade frictions in the markets for goods, services and assets, one may have expected substantial improvement in the match between theory and data.

The field of international macroeconomics has undergone substantial developments in the last few years. An increasing number of contributions have been pursuing the integration of international macro, finance and trade theory. Trade “frictions”, in different specifications, appear to be an essential building block for models of the international economy “we can more or less believe in”, and thus rely on as credible frameworks for policy assessment and design. It is not too difficult to predict that this paper by EKN will have a positive, important impact in the field.

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