

Dynamics of Firms and Trade in General Equilibrium

Robert Dekle

University of Southern California

Hyeok Jeong

KDI School

Nobuhiro Kiyotaki

Princeton University, CEPR, and NBER

Discussion

Fabio Ghironi

University of Washington, CEPR, and NBER

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45" Summary

- This is a very interesting paper.
- Robert, Hyeok, and Nobu (DJK below) develop a small open economy model with endogenous producer entry into the domestic and export markets.
- The model extends Ghironi and Melitz (2005, *QJE*—GM below) to allow for idiosyncratic productivity shocks, fixed costs of productive opportunity maintenance, a congestion externality in entry, and other interesting features.
- DJK use the model to explain two apparently conflicting pieces of evidence:
 1. Aggregate gross trade does not appear to be strongly tied to real exchange rate (RER) movements (DJK refer to this as ER “disconnect”).
 2. But firm-level trade is—especially exports of marginally profitable exporters.
- Japanese data support the mechanisms and results of the model.

Exchange Rate Disconnect and the J-Curve

- DJK argue that the evidence they address is not related to the J-curve, because what they refer to as ER disconnect “is about gross trade, whereas the J-curve is about net trade.”
- This is important for the focus and structure of their exercise, but I am not sure it is fair or optimal.

Exchange Rate Disconnect

- In the IFM literature, ER disconnect is more broadly interpreted as the fact that nominal and real ERs are much more volatile than the fundamentals we think of as their determinants, while the volatility of other macro variables is roughly comparable to that of these fundamentals.
- The ER disconnect puzzle is connected to results in Baxter and Stockman (1989, *JME*) and Mussa (1986, *JIE*) on ER regimes and macro dynamics.
 - In more recent New Keynesian IFM literature, see for instance Devereux and Engel (2002, *JME*).
 - In ITM literature, see Rodríguez-López (2011, *ReStud*).
- For this paper to fit in the literature on the ER disconnect puzzle, I would broaden the analysis of ER volatility, volatility of ER determinants, and macro volatility generated by the model, not restricting it to ER and exports.

The J-Curve and Gross Trade

- I also do not think it is entirely fair to “disconnect” this paper from the issue of the J-curve by presenting the latter as related only to net trade.
- Backus, Kehoe, and Kydland (1994, *AER*) focused on net trade in their analysis of the S-shaped pattern of correlation between net trade and the terms of trade, but this does not mean that the role of gross flows should not be in the picture of this paper.
- In fact, the dynamics of gross trade in determining the trade balance are very much central to discussions of the J-curve.
- For instance, Dornbusch and Krugman (1976, *BPEA*) or Meade (1988, FRB St. Louis).

The J-Curve and Gross Trade, Continued

- In these and other papers, J-curve dynamics are explicitly tied to the roles of prices and quantities of exports and imports and the different timing of export and import adjustment to shocks in shaping the J-curve.
- This is tied to the Marshall-Lerner condition that ensures that RER depreciation improves the trade balance.

The Marshall-Lerner Condition

- Let X denote export quantity, IM imports, P_X the price of exports, and P_{IM} the price of imports (both in domestic currency).
- Then, the trade balance is:

$$TB_t = P_{X,t}X_t - P_{IM,t}IM_t.$$

- Using sans serif fonts to denote percent deviations from a steady state with balanced trade, and defining $TB_t \equiv dTB_t/Y$, where Y is steady-state GDP, we have:

$$TB_t = \frac{P_X X}{Y} (P_{X,t} + X_t - P_{IM,t} - IM_t).$$

The Marshall-Lerner Condition, Continued

- Assume

$$X_t = \left(\frac{P_{X,t}}{\varepsilon_t P_t^*} \right)^{-\sigma_X} C_t^* \quad \text{and} \quad IM_t = \left(\frac{P_{IM,t}}{P_t} \right)^{-\sigma_{IM}} C_t,$$

where ε_t is the nominal ER, P_t^* is the foreign price index, P_t is the home price index, and C_t and C_t^* are home and foreign consumptions.

- Assume further that

$$P_{X,t} = P_t \quad \text{and} \quad P_{IM,t} = \varepsilon_t P_t^*.$$

- Then,

$$X_t = \sigma_X Q_t + C_t^* \quad \text{and} \quad IM_t = -\sigma_{IM} Q_t + C_t,$$

where

$$Q_t \equiv \varepsilon_t + P_t^* - P_t$$

is the (log-linearized) RER.

The Marshall-Lerner Condition, Continued

- It follows that

$$TB_t = \frac{P_X X}{Y} [(\sigma_X + \sigma_{IM} - 1) Q_t + C_t^* - C_t].$$

- The Marshall-Lerner (M-L) condition is the condition that $\sigma_X + \sigma_{IM} > 1$.
 - For given consumption differential, RER depreciation improves the trade balance if this condition is satisfied.
- Accounting for relative consumption dynamics requires assumptions on the international asset market.
 - With complete asset markets and separable utility, $C_t^* - C_t$ would be proportional to Q_t , implying an adjusted M-L condition.

Back to the J-Curve and Gross Trade

- Underlying the M-L condition is the role of adjustments in prices and quantities of gross trade that determine the dynamics of gross trade.
- Hence, it does not seem appropriate to separate completely the issue of low correlation of RER and gross exports from the issue of correlation of RER and the trade balance.
- In fact, the model of this paper would lend itself naturally to a rich analysis of the correlation profile of RER, trade balance, and trade balance determinants over time.

Gross Trade, Net Trade, and the Role of Extensive Margins

- In the type of framework used in this paper, we can write (now in real terms):

$$TB_t = Q_t N_{x,t} \tilde{\rho}_{x,t} \tilde{y}_{x,t} - N_{x,t}^* \tilde{\rho}_{x,t}^* \tilde{y}_{x,t}^*$$

where:

- $N_{x,t} \equiv$ number of exported products, $N_{x,t}^* \equiv$ number of imported products;
 - $\tilde{\rho}_{x,t} \equiv$ average export price (relative to foreign price index), $\tilde{\rho}_{x,t}^* \equiv$ average import price (relative to home price index);
 - $\tilde{y}_{x,t} \equiv$ average export quantity per product, $\tilde{y}_{x,t}^* \equiv$ average import quantity per product.
- And we can disentangle the roles of extensive and intensive margins, as well as prices, for gross and net trade (aggregate or firm-level).

Gross Trade, Net Trade, and the Role of Extensive Margins, Continued

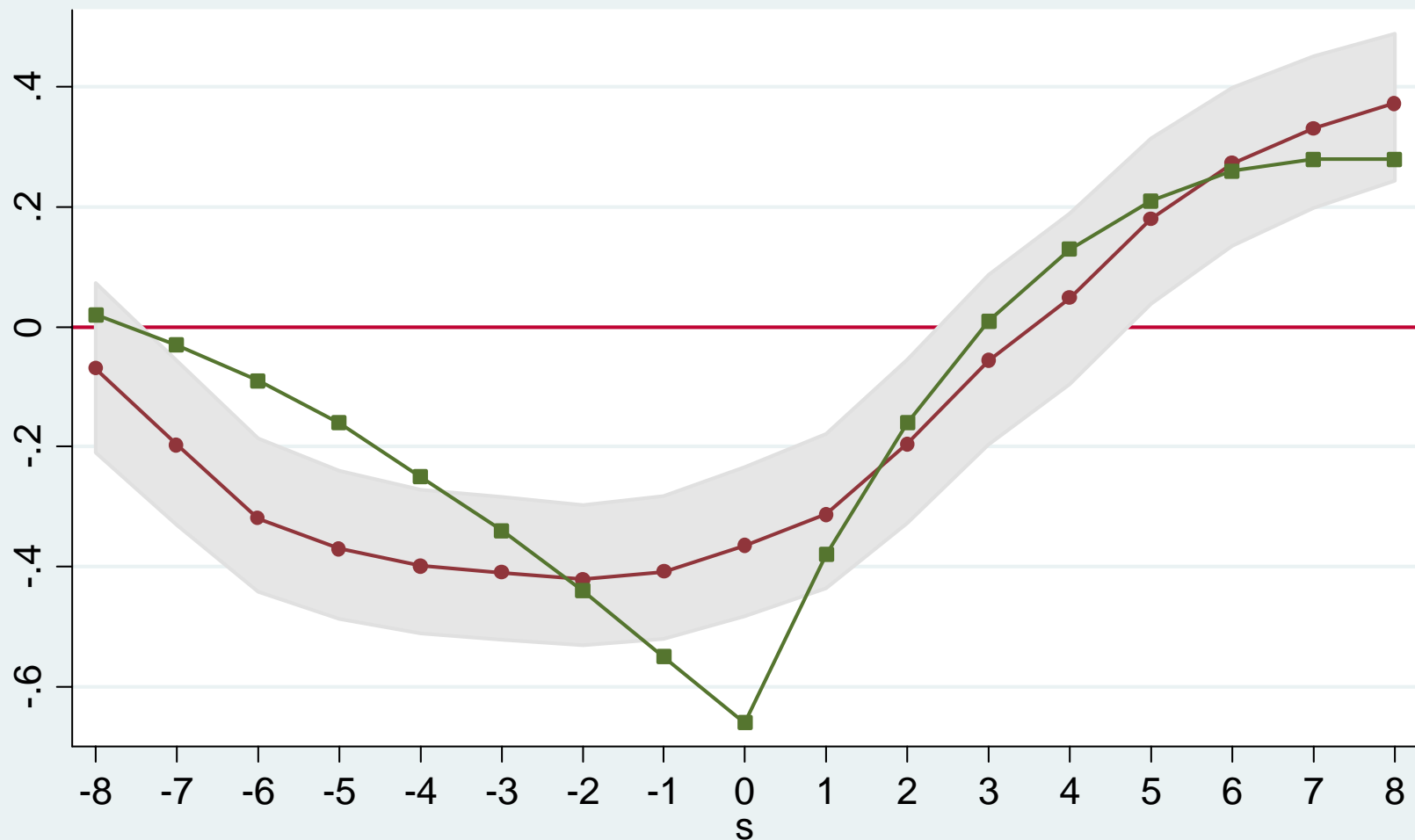
- Alessandria, Pratap, and Yue (2014, WP) do this kind of exercise in a model that builds on Alessandria and Choi (2007, *QJE*).
- The model features some of the ingredients in DJK (idiosyncratic productivity shocks and endogenous export entry subject to costs), but it does not feature endogenous domestic entry.
- Endogenous domestic entry is a key driver of results in GM and DJK.
- Alessandria, Choi, and Ruhl (2014, WP) include endogenous domestic entry in a model that shares many features with GM and DJK (as well as a richer quantitative specification of production and export entry), but they do not focus on cyclical properties of ERs and trade.
- Ghironi and Melitz (2007, *AER P&P*) use GM's model to focus on the cyclical properties of trade and provide some insights into the roles of extensive margins and different dynamics of gross trade adjustment in net trade.

Gross Trade, Net Trade, and the Role of Extensive Margins, Continued

- Sunk product development costs and time-to-build introduce persistence in gross trade dynamics:
 - The sluggish response of the number of producers to shocks is transmitted to the behavior of trade and generates asymmetries between the responses of exports and imports.
 - Exports respond much more sluggishly than imports.
 - This provides a novel channel for explaining S-curve dynamics of net trade in a model in which favorable productivity shocks do not necessarily deteriorate the TOT.
 - Evidence for the U.S. (for instance, Corsetti, Dedola, and Leduc, 2014, *JEEA*) suggests that productivity improvements are associated with appreciated rather than depreciated terms of trade.

Trade Flows and Product Variety Over the Business Cycle

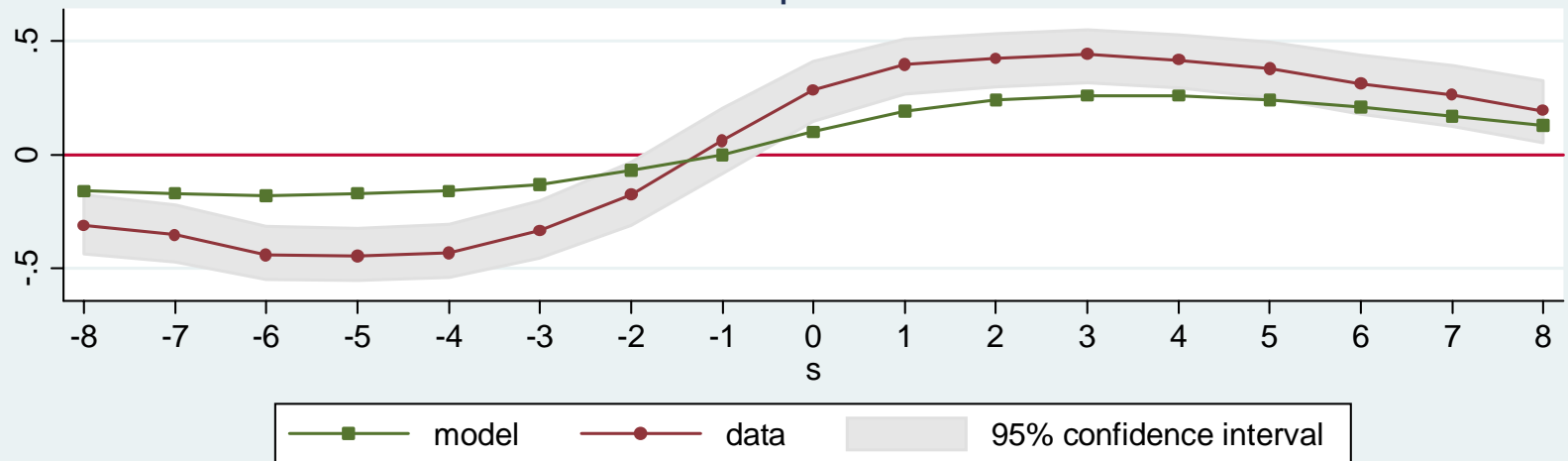
Cross-Correlation: Trade Balance/GDP at $t+s$ with GDP at t



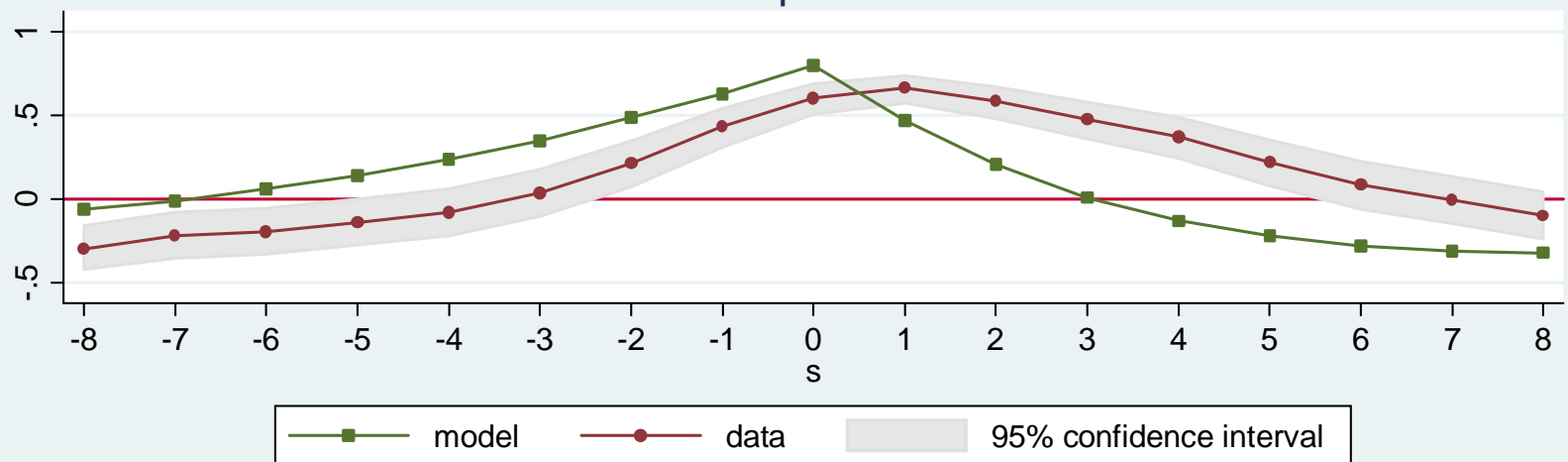
—■— model —●— data 95% confidence interval

Trade Flows and Product Variety Over the Business Cycle

Cross-Correlation: Exports at $t+s$ with GDP at t

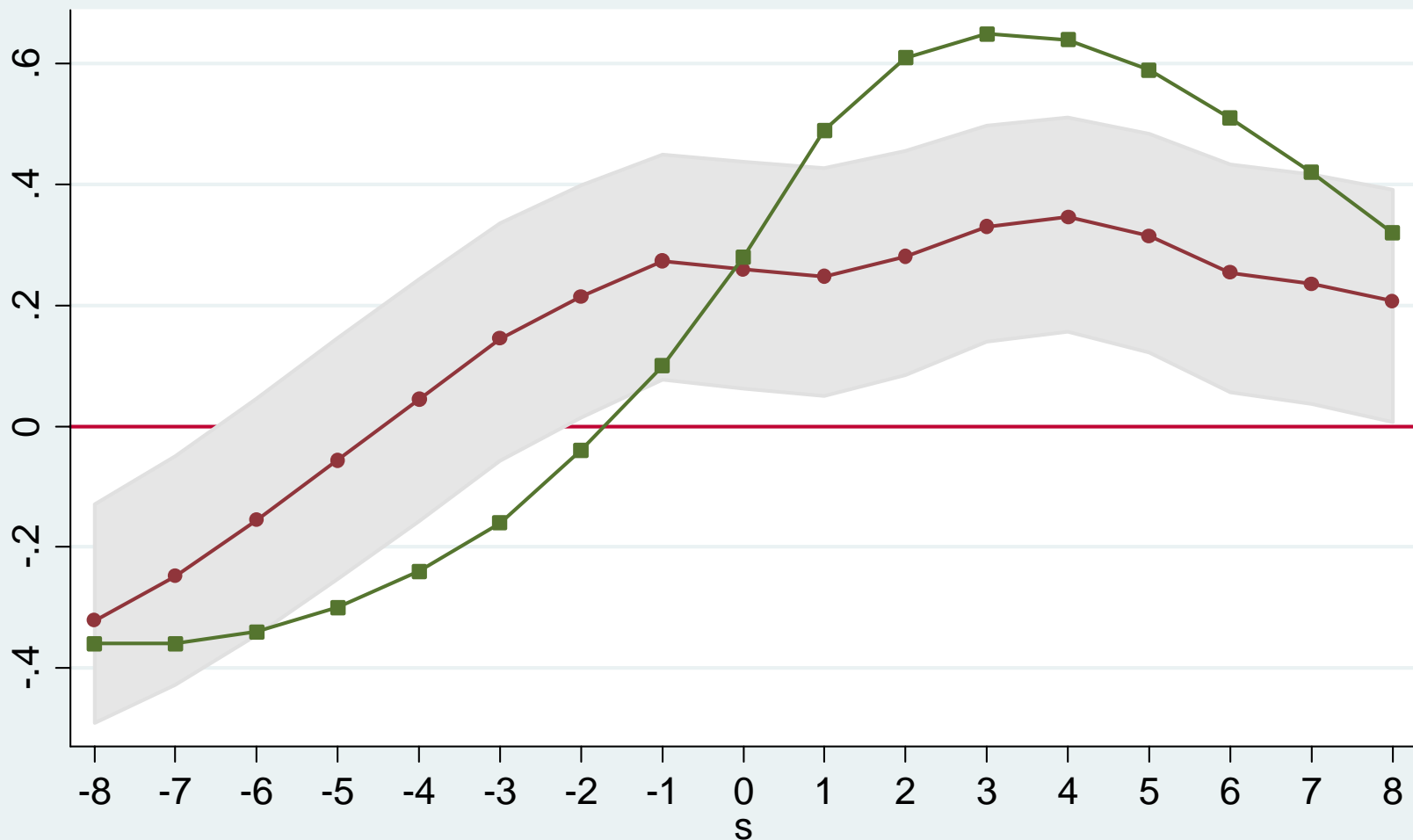


Cross-Correlation: Imports at $t+s$ with GDP at t



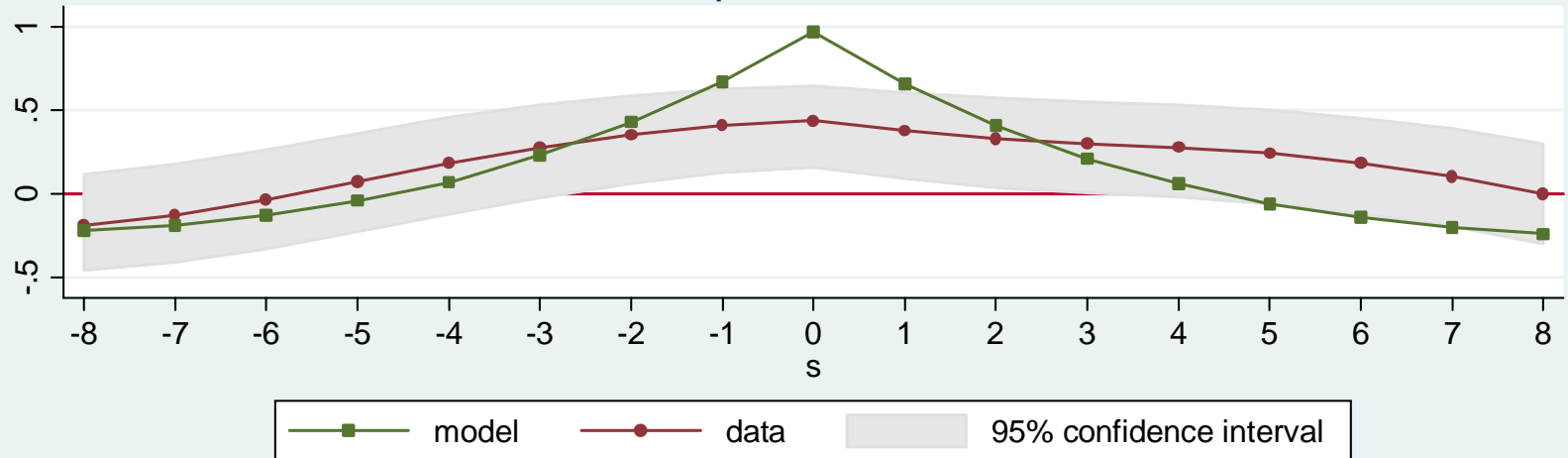
Trade Flows and Product Variety Over the Business Cycle

Cross-Correlation: # of Establishments at $t+s$ with GDP at t

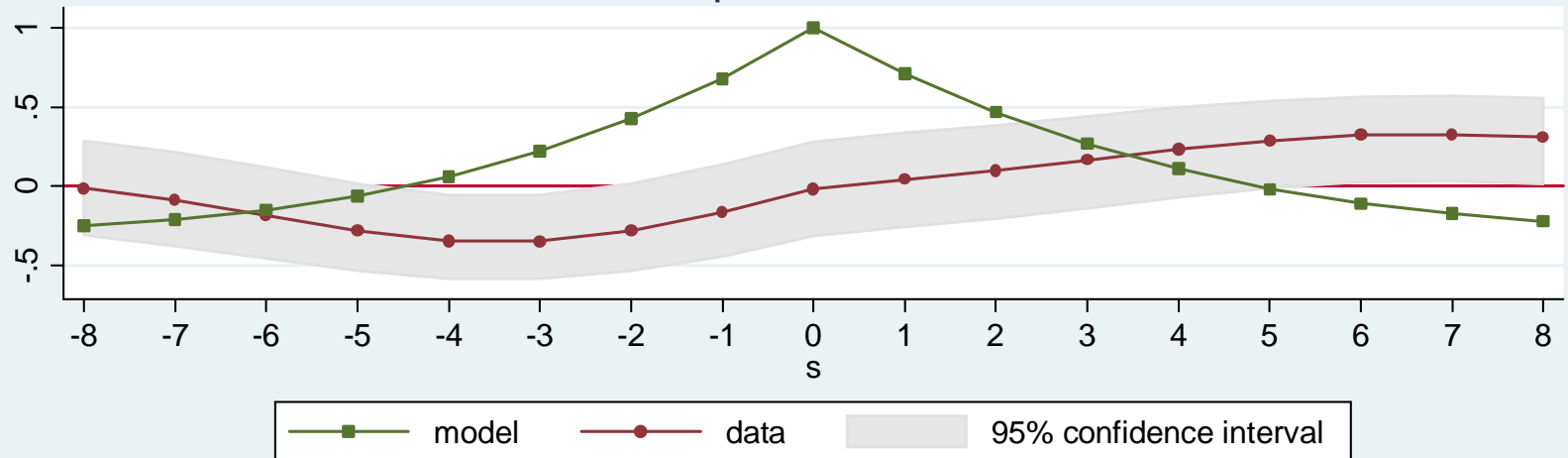


Trade Flows and Product Variety Over the Business Cycle

Cross-Correlation: # of Exported Products at $t+s$ with GDP at t



Cross-Correlation: # of Imported Products at $t+s$ with GDP at t



A Model in Search of a Question

- DJK have a very nice model, with a richer specification than GM.
- At some level, at the end of the paper, I was left with the impression that this is still a model “in search of a question” or exercise that would allow DJK to exploit its full potential.
- I would push the model harder on the cyclical properties of gross and net trade and the time profile of relevant correlations.
- I would use the structure of the model to go deeper into the role of firm heterogeneity and the role of small versus large firms in gross and net trade dynamics over time.
- I would exploit the data to explore the potential role of granularity for gross and net trade dynamics, expanding di Giovanni and Levchenko’s (2012, *JPE*) analysis of granularity, trade, and macro volatility.

A Simpler Model?

- There are some directions in which I would simplify the model.
- For instance, I would drop foreign bonds from the utility function.
- At most, I would consider that a device to pin down steady-state net foreign assets and ensure stationary responses to temporary shocks (Smets and Wouters, 1999, *De Economist*).
- A cost of adjusting foreign bond holdings would accomplish the same purpose (Turnovsky, 1985, *JIMF*) and would be more in line with recent literature (Schmitt-Grohé and Uribe, 2003, *JIE*; Benigno, 2009, *JMCB*).

A Simpler Model? Continued

- Even if foreign bonds were kept in the utility function, I would definitely drop shocks to this part of utility as an important determinant of dynamics.
- I do not think they capture the role of nominal or financial factors that are not in the model.
- It would be better to acknowledge that the model cannot replicate some features of evidence than to attribute so much importance to an *ad hoc* mechanism—especially when this mechanism is appended to such a carefully, elegantly designed model.

A Simpler Model? Continued

- Do the fixed costs of production opportunity maintenance really play a role in the solution?
- I thought such fixed costs—and the implied endogenous exit—would make it impossible to log-linearize the model.
 - That was the reason for no such fixed costs in GM, where we wanted to preserve the ability to log-linearize.
- If the fixed costs end up not implying endogenous exit in the calibration DJK focus on, should they just be removed?
 - A-cyclical, exogenous exit has some support in empirical evidence in the United States.
 - See the references in Bilbiie, Ghironi, and Melitz (2012, *JPE*).
 - Is there similar evidence for Japan?

A Simpler Model? Continued

- Also, is the assumption that entry costs are directly increasing in entry really important for results?
- If it acts only as an adjustment cost that dampens the response of entry to shocks, I would remove it from the benchmark model and present its implications in an “extensions” section.
- I would also consider dropping government spending shocks from the benchmark analysis and relegating them to the “extensions” section.

Conclusion

- This is a very nice paper, with an elegant model of international trade and macro dynamics and interesting data.
- I would:
 - broaden the scope of the exercise;
 - explore the data in some alternative directions;
 - simplify the benchmark model.
- I look forward to reading the next version.
- Thank you!