

# Micro-Foundations of International Trade, Global Imbalances and Implications on Monetary Policy

By Jian Wang



Researchers from the U.S., Canada and China gathered in Shanghai to explore exchange rates, offshoring and trade policies. Research presented at the conference employed microdata of trade volumes and prices at the firm and product levels, which provide valuable information on crucial global economic issues such as trade imbalances, economic development and wage inequality.

Conference organizers were Jian Wang of the Federal Reserve Bank of Dallas and Zhi Yu of the Shanghai University of Finance and Economics (SHUFE). Presenters' institutions included the University of British Columbia, Johns Hopkins University, Dartmouth College, Chinese University of Hong Kong, SHUFE and the Dallas Fed.

## Session One: Exchange Rates and Capital Goods

The first session considered exchange rate determination, the pass-through of exchange rate changes to prices and international trade in capital goods. Viktoria Hnatkovska, an associate professor at the University of British Columbia, presented "The Exchange Rate Response Puzzle," coauthored with Amartya Lahiri, a professor of economics at the University of British Columbia, and Carlos Vegh, a professor of economics at the University of Maryland. The authors investigated the effect of monetary tightening on the nominal exchange rate. Various theoretical models predict that the exchange rate appreciates following a rise in the policy rate, and that prediction has been widely confirmed in previous empirical studies that use the data from advanced countries. Hnatkovska, Lahiri and Vegh document that the exchange rate depreciates in developing countries following a monetary tightening, while it appreciates in industrial countries. The authors referred to these

empirical findings as the exchange rate response puzzle. It suggests that developing and advanced economies' transmission mechanisms may differ.

Furthermore, Hnatkovska, Lahiri and Vegh modify standard international macroeconomic models to introduce three impacts of monetary policy: the liquidity demand effect, fiscal effect and output effect. These three work in differing ways on the exchange rate following monetary tightening. The authors argue that the exchange rate response puzzle is attributable to the difference between developing and developed economies in the relative strength of these three effects.

Under the liquidity demand effect, an increase in the interest rate reduces the amount of the money in circulation, appreciating the exchange rate. However, under the fiscal and output effects, an increase in the current interest rate will raise the fiscal burden either through a higher interest rate on government debt or reduced government revenue in the future. The increase in the fiscal burden could be balanced by an increase in the inflation rate (inflation tax), which depreciates a country's currency. Hnatkovska, Lahiri and Vegh argue that the fiscal and output effects are stronger in developing countries than in industrial economies because emerging economies rely more on inflation tax—accounting for why the exchange rate responds differently to monetary tightening.

Xiang Gao, an assistant professor of economics at SHUFE, provided commentary, noting that reverse causality may exist in the data. Many central banks in emerging economies take action to stabilize their currencies. For instance, they often raise the interest rate when the exchange rate depreciates and vice versa. He recommended the authors consider alternative strategies to identify exogenous monetary shocks as robustness checks

## 2014 Conference Summary

**When:** March 15–16

**Where:** Shanghai University of Finance and Economics (SHUFE), Shanghai, China

**Sponsors:** Federal Reserve Bank of Dallas' Globalization and Monetary Policy Institute; School of International Business Administration at Shanghai University of Finance and Economics

of their empirical findings.

Wang of the Dallas Fed presented the session's second paper, "International Trade Price Stickiness and Exchange Rate Pass-Through in Micro Data: A Case Study on U.S.–China Trade," coauthored with Mina Kim, a research economist at the Bureau of Labor Statistics (BLS); Deokwoo Nam, an assistant professor at Hanyang University in Seoul, South Korea; and Jason Wu, a section chief at the Board of Governors of the Federal Reserve System. The paper examined the effect of the renminbi appreciation on trade prices between the U.S. and China. Using goods-level prices collected by the BLS, two empirical findings were proposed. First, firms changed prices more frequently after China abandoned its hard peg to the U.S. dollar in June 2005, allowing the Chinese currency to appreciate against the dollar. The duration of U.S.–China trade prices declined almost 30 percent after June 2005. A benchmark menu

cost model calibrated to the data can replicate the decrease in price stickiness.

Second, data on goods-level prices shed additional light on the manner in which renminbi appreciation has been passed on to U.S. import prices—exchange rate pass-through, or ERPT. Using goods-level price data, the paper documented that around 40 percent of U.S. imported goods from China were replaced without a single price change. These goods are more likely to change prices through product replacement rather than regular price adjustment. ERPT becomes much higher after exclusion of goods with no price change in the data, indicating that studies that do not consider product replacement bias may underestimate the effect of renminbi appreciation on U.S. import prices.

Shu Lin, a professor of economics at Fudan University, discussed the paper, finding the increase in the occurrence of price changes very

**Most world capital goods production is concentrated in a small number of countries, and poor countries mainly rely on imported capital goods for their capital accumulation.**



Participants in the micro-foundations conference

interesting and wondering if the frequency of product replacements also increased after China abandoned the hard currency peg. Lin also recommended that the authors investigate other potential reasons for low ERPT. For instance, China imports a large fraction of its inputs for producing final exports. When the Chinese currency appreciated, the prices of imported inputs became cheaper, reducing pressure on Chinese exporters to increase their prices.

Michael Sposi, a research economist at the Dallas Fed, presented “Capital Goods Trade and Economic Development,” coauthored with Piyusha Mutreja, an assistant professor of economics at Syracuse University, and B. Ravikumar, a vice president at the Federal Reserve Bank of St. Louis. Most world capital goods production is concentrated in a small number of countries, and poor countries mainly rely on imported capital goods for their capital accumulation. Mutreja, Ravikumar and Sposi argue that trade barriers will hinder developing countries from importing capital goods and slow their economic growth.

The authors introduce a multicountry, multisector Ricardian model of trade, in which one country has comparative advantage producing capital goods, into a neoclassical growth framework and calibrate the model to bilateral trade flows, prices and income per worker. Their model can match the data in multiple dimen-

sions such as the world distribution of capital goods production and the variation in capital per worker across countries. The model predicts that the cross-country income differences fall by more than 50 percent when distortions to capital goods trade are removed.

David Cook, a professor of economics at Hong Kong University of Science and Technology, noted during his discussion of the paper that the authors challenge the conventional view on the low investment rates in less-developed countries. It is believed that the high relative cost of capital goods contributes most to low investment in developing countries. Cook recommended that the authors empirically test their explanation based on trade barriers against an explanation based on high investment cost.

### **Session Two: Trade, Offshoring and Wage Inequality**

The second session featured three papers on international trade and offshoring and their implications on wage inequality. Heiwai Tang, an assistant professor of economics at Johns Hopkins University, presented “Learning to Export from Neighbors,” coauthored with Ana Fernandes, a lecturer in economics at the University of Exeter. Tang and Fernandes noticed that uncertainty in the exporting business is large and self-experimentation is costly. Based on the belief that



Professor Emily Blanchard speaking to the conference

exporters gain knowledge about foreign demand from their neighbors, the researchers developed a statistical decision model to examine how learning shapes new exporters' dynamics and performance.

Using transaction-level data of all Chinese exporters, Tang and Fernandes studied how learning from neighbors affects new exporters' entry decisions, initial sales, survival rates and post-entry growth. The authors found that a firm's export entry decision and post-entry performance depend on several key factors predicted by their learning-from-neighbor model. For instance, the neighbors' export performance may serve as a signal when a firm makes its exporting decision. Tang and Fernandes document that a larger number of neighbor signals leads to more firm entries and better post-entry performance.

The paper was discussed by Tuan Luong, an assistant professor of economics at SHUFE. Luong noticed that there are two types of signals in Tang and Fernandes' model and noise from these signals independently appears. Luong suggested the authors consider a case with correlated noise in which the model will become more general but remain tractable.

The session's second paper, "Offshoring and Wage Inequality: Theory and Evidence from China," was presented by Liugang Sheng, an assistant professor of economics at Chinese University of Hong Kong. The paper's coauthor is Denis Tao Yang, a professor at the Darden School of Business at the University of Virginia. Trade in intermediate goods accounts for a large proportion of international trade. Sheng and Yang examine the effect of two forms of intermediate-goods trade—offshoring and arm's length transactions—on wage inequality. The authors argue that foreign direct investment (FDI) offshoring is more skill intensive than arm's length transactions and, thus, has a greater effect on upgrading skills in FDI-recipient developing countries.

Sheng and Yang tested their theory with China's data when it removed foreign ownership restrictions prior to membership in the World Trade Organization in 2001. Following the policy change, wholly foreign-owned firms began playing a more important role than joint ventures in China's FDI inflows and exports. The authors

found that increases in FDI offshoring significantly contributed to a greater wage premium for college graduates after 2001.

Zhiyuan Li, an associate professor of economics at SHUFE, discussed the paper, noting that it remains puzzling that the wage premium of college graduates increased among wholly foreign-owned firms, but not with joint ventures, if both types of FDI offshoring are skill intensive. Li proposed that processing trade may be the answer. In processing trade, firms import all or part of their inputs to produce final goods that will be exported to foreign countries. It is well-documented that processing trade is usually labor intensive and requires few skills. The situation the authors document is consistent with the reality that joint ventures mainly focus on processing trade, while wholly foreign-owned FDI firms do not. Li recommended that the authors take into account processing trade in their theoretical model and empirical exercises.

Bo Chen, an associate professor of economics at SHUFE, presented the session's last paper, "Wage Inequality and Input Trade Liberalization: Firm-Level Evidence from China," coauthored with Miaojie Yu, a professor of economics at Beijing University, and Zhihao Yu, a professor of economics at Carleton University. Chen, Yu and Yu studied the effect of input tariff reductions on wage inequality within a firm. Using Chinese firm-level data, the authors found that input tariff reductions widened within-firm wage inequality because high-skill labor enjoys a larger proportion of the incremental profit than low-skill labor.

Yifan Zhang, an associate professor of economics at Lingnan University, discussed the paper, arguing that the profit increase following a tariff reduction is unrelated to worker productivity. Thus, it is unclear whether skilled labor will enjoy a larger share of additional profit than unskilled labor. He suggested the authors also consider other factors, such as bargaining power, in their tests.

### **Session Three: Trade Policy, Offshoring and FDI**

The last conference session featured papers on international market access, tariff reduction and international organization of production. Emily Blanchard, an assistant professor of business

**It remains puzzling that the wage premium of college graduates increased among wholly foreign-owned firms, but not with joint ventures, if both types of FDI offshoring are skill intensive.**

**If a foreign country exports intermediate inputs to China that are then used to produce final export goods sold to the same foreign country, the foreign country may have a strong incentive to reduce tariffs on China's finished goods.**

administration at Dartmouth College, presented “U.S. Multinationals and Preferential Market Access,” coauthored with Xenia Matschke, a professor of economics at Universität Trier.

Blanchard and Matschke examined the relation between U.S. multinational companies' offshoring and U.S. preferential trade agreements, using data covering 84 industries and 184 U.S. trading partners over 10 years. The authors found that industries and countries with greater U.S. foreign affiliate exports to the U.S. enjoy more preferential duty-free access to the U.S. The findings hold even after controlling for the endogeneity issue of U.S. multinational companies' choice of offshoring activity, suggesting that the pattern of international investment by U.S. firms may play a key role in shaping U.S. trade policy preferences.

Wei-Chih Chen, an assistant professor of economics at SHUFE, commented on the paper, noting that the authors may want to check the robustness of their empirical findings. Blanchard and Matschke note that the positive relation between U.S. foreign affiliate exports and preferential trade agreements may simply reflect market-seeking investment by U.S. companies: The multinationals will invest and sell in countries with preferential trade agreements with the U.S. To control for this issue, the authors used U.S. affiliates' sales to the local markets as an instrumental variable that helps identify the causal effect of U.S. foreign affiliate exports on preferential trade agreements. Chen argued that U.S. foreign affiliates' sales to the rest of the world may also correlate with U.S. preferential trade agreements, and the authors may also want to consider this factor in their empirical study.

The second paper, “Technology and Production Fragmentation: Domestic versus Foreign Sourcing,” was presented by Teresa Fort, an assistant professor of business administration at Dartmouth College. Fort empirically investigated the effect of changes in communication and information technology (CIT) on firms' production processes using firm-level data of the U.S. manufacturing entities. First, it has been shown that firms using more CIT outsource production across more locations. Second, Fort provided causal evidence that CIT lowers the costs of outsourcing and the effect is stronger for domestic

outsourcing than foreign outsourcing.

Linke Zhu, an assistant professor of economics at SHUFE, discussed the paper. Zhu would like to see more empirical evidence of the author's implicit assumption that the cost of adopting CIT is mainly a fixed sunk cost.

Zhi Yu, an assistant professor of economics at SHUFE, presented “Input Export Promotion and Output Tariff Reduction,” coauthored with Rodney Ludema and Anna Maria Mayda, associate professors of economics at Georgetown University, and Miaojie Yu, a professor of economics at Beijing University. The authors, drawing on Chinese transaction-level trade data, investigate if the import of intermediate inputs from a foreign country helps reduce tariffs on home country exports of final goods to the foreign country. If a foreign country exports intermediate inputs to China that are then used to produce final export goods sold to the same foreign country, the foreign country may have a strong incentive to reduce tariffs on China's finished goods. The tariff reduction will benefit both countries since it encourages intermediate-goods imports from China.

Discussing the paper, Blanchard pointed out that the effect of vertical linkages between final-goods producers and intermediate-goods producers operates through prices. She suggested that, if the data are available, the authors investigate how a decrease in the final-goods tariff increases the price and profits of intermediate-goods producers in the foreign country.

### **Current Issues and Future Study**

Participants of the 1½-day conference exchanged ideas about understanding international trade and related macroeconomic issues by using microlevel data. The discussions shed light on important current issues and also inspired future research topics.

First, the microlevel data provide a foundation to study important macro issues, such as monetary policy, inflation and trade imbalances. Wang and his coauthors found that exporting-firm behaviors change with exchange rate policy. Specifically, aggregate price indexes may underestimate the pass-through of the renminbi appreciation on U.S. import prices. Hnatkovska and her coauthors showed that developing and

advanced economies have different transmission mechanisms for monetary tightening through its effects on the exchange rate.

Second, the benefits of international trade may be underappreciated in trade models based on aggregate-level data. As Sposi and coauthors pointed out, international trade plays a much more important role in economic growth once trade in capital goods is carefully incorporated in models as microdata suggest. This line of research provides microeconomic evidence of the importance of free trade in promoting economic growth.

Third, microlevel data provide information on how firms engage in international trade and FDI and the effects of these activities on issues such as wage inequality. Tang and his coauthor's research shed light on how firms learn to export from their neighbors. Policies that facilitate information sharing may reduce learning costs and help promote exports. While international trade and capital flows usually benefit overall economic growth and reduce cross-country income inequality, trade and capital market liberalization could induce an increase in income inequality within a country, which deserves policymakers' attention. Sheng and Yang documented that the significant increase in FDI offshoring after 2001 contributed to the sharp increase in the wage premium of college graduates. Chen and coauthors argue that input tariff reductions may increase wage inequalities between skilled and unskilled labors within a firm.

Finally, multinational companies' offshoring and trade activities shaped the trade policy in the home country. Blanchard and her coauthor found that industries and countries that have more U.S. foreign affiliate exports to the U.S. receive more preferential duty-free access to the U.S. Yu and coauthors document that China faces a lower tariff on final exports to a foreign country if that country exports to China more intermediate inputs used in final export production.

**While international trade and capital flows usually benefit overall economic growth and reduce cross-country income inequality, trade and capital market liberalization could induce an increase in income inequality within a country, which deserves policymakers' attention.**