

IMF Publication



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Research Summaries

Is Foreign Direct Investment a Panacea?

Yuko Kinoshita



Foreign direct investment is generally believed to bring benefits to the host country by transferring new skills and technology, generating employment, and enhancing exports. In addition, it is the least volatile form of capital flows during financial crises. Thus, how to attract foreign direct investment is of prominent interest to academics as well as to policymakers from developing countries. This article briefly surveys recent IMF research on the determinants and consequences of foreign direct investment.

Foreign direct investment (FDI) has grown rapidly throughout the world in the last two decades, especially for developing countries, where it now accounts for almost half of total inflows (Kose and others, 2006). There is a strong presumption that FDI has a positive effect on economic growth and productivity through the transfer of technology and skills and by augmenting the recipient's domestic capital stock. *(continued on page 2)*

Trade Linkages and Business Cycles

Julian di Giovanni and Andrei A. Levchenko



As there has been exponential growth in world trade over the past few decades, the benefits and costs of increased integration remain a hotly debated topic. In particular, the relationship between trade openness and macroeconomic fluctuations has received a great deal of attention in the theoretical and empirical literature. This article reviews the most recent IMF research on two important macroeconomic outcomes that trade can affect—country volatility and cross-country business cycle synchronization. The article focuses on empirical studies that exploit sector-level data for a large group of countries.

Macroeconomic volatility is considered an important determinant of a wide variety of economic outcomes. Numerous studies identify its effects on long-run growth and welfare, as well as inequality and poverty.¹ The question of what are the main determinants of macroeconomic volatility has thus attracted a great deal of attention in the literature. In particular, it has been *(continued on page 8)*

¹On growth, see Ramey and Ramey (1995); on welfare, see Pallage and Robe (2003) in a developing country context, and Barlevy (2004) in an industrial country context; and for inequality and poverty, see Gavin and Hausmann (1998) and Laursen and Mahajan (2005).

Is Foreign Direct Investment a Panacea?

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The evidence from aggregate data on the positive effect of FDI on growth is rather mixed, however. In a cross-country study, Borensztein, Degregorio, and Lee (1998) find that FDI contributes to growth only in countries with a high level of human capital beyond a certain threshold. After controlling for schooling and other macroeconomic variables, Alfaro and others (2004) find that FDI has a significantly positive effect on growth when countries have well-developed financial markets. More recently, Kinoshita and Liu (2007) revisit the question in panel regressions. They find positive spillovers from FDI in countries with sufficient provision of infrastructure. Their finding is consistent with the consensus that in order to reap the benefits of FDI, it is crucial for the host country to raise absorptive capacity, as measured by either schooling, financial market development, or infrastructure (Mody, 2004).

FDI contributes to economic growth by augmenting capital accumulation. Mody and Murshid (2005) find evidence of a strong “crowding-in” effect of FDI on domestic investment in a panel of 60 developing countries between 1979 and 1999. The positive relationship between FDI and investment is reinforced by greater macroeconomic stability, low government deficits, and structural reforms.

The potential benefits of FDI are not limited to the industries that receive it. Recent studies using micro data emphasize the importance of inter-industry (vertical) linkages rather than intra-industry (horizontal) linkages as an avenue of positive spillovers. Javorcik (2004) finds that productivity spillovers in Lithuanian manufacturing firms result mostly from the backward linkages between multinational firms and their local suppliers of intermediate inputs. The sectoral composition of FDI also matters to the growth effect of FDI because positive externalities are realized through interactions between the sector receiving FDI and the rest of the economy. If FDI is limited to the primary sector, economy-wide productive spillovers are smaller than if FDI concentrates in the manufacturing sector. FDI in the resource sector tends to have less linkages to the domestic economy (Aykut and Sayek, 2007).

The recent literature on financial globalization finds that FDI, in addition to its growth effects, is the least volatile form of financial flows. Equity finance including FDI and equity portfolios is of a countercyclical nature (Prasad, Rajan, and Subramanian, 2007). Analyzing the behavior of various types of financial flows in instances of sudden stops, Levchenko and Mauro (2006) find that FDI remains strikingly stable and plays essentially no role at times of distress, suggesting that a greater share of FDI in foreign

capital flows can offer better crisis protection by reducing vulnerability to financial shocks.

These characteristics motivate policymakers around the world to consider policies to attract FDI. Cross-country studies of the determinants of FDI often include lists of FDI “pull” factors or country-specific factors that explain its geographical distribution and magnitude. These determinants consist of the factors of comparative advantage such as market size, market growth, labor cost, resource abundance, and distance from the investing countries. Other set of determinants reflects host-country policies such as macroeconomic stability, sufficient availability of infrastructure, trade policy regime, taxation, and restrictions on capital flows.

Demekas and others (2005) estimate a gravity equation to explain average bilateral FDI flows to central and south-eastern European countries. They find that, in addition to gravity factors, host country policies that affect relative unit labor costs, the corporate tax burden, infrastructure, and the trade regime also matter. They conclude that actual FDI flows in some countries in the region fall short of poten-

“Should countries seeking inward foreign direct investment promote it via tax and policy incentives? If so, what form should such incentives take?”

tial FDI, implying that they could attract more FDI if they improve their policies.

Trade policies and costs generally have a significant impact on FDI flows, depending on the final destination of sales by foreign firms. If the primary aim is to sell a finished product in the host-country market where foreign firms initially served via exporting, high trade protection (e.g., tariffs and nontariff barriers) should encourage firms to substitute affiliate production for exports and result in greater FDI. On the other hand, with the globalization of production processes, export-platform FDI intended for sales in the third market other than the host country has become increasingly common in developing countries. However, high trade barriers in developing countries discourage FDI flows in search of access to intermediate inputs. In an industry-level study in China, Amiti and Jarvorcki (2008) point out that vertical FDI of this type is more dominant at the provincial level and that access to customers and suppliers of intermediate inputs are the key determinants of FDI inflows.

Helpman (2006) provides a synthesis of recent developments in the new theory of FDI and trade in the globalization process. In this literature, the models of heterogeneous firms explain why and how they respond differently to globalization process, i.e., whether to export or to serve foreign markets via FDI. By introducing contractual frictions between buyers and sellers of intermediate inputs, the trade theory with within-industry heterogeneity can further account for the internalization decision of the firm, i.e., the choice of whether to source inputs via arm's length trade (outsourcing) or via intrafirm trade (FDI). This enables us to explain the observed complex pattern of the integration of production processes across national borders beyond the traditional distinction between horizontal and vertical FDI. The prediction of the new theory of FDI with incomplete contracts is that institutional quality—such as the rule of law and corruption—matters to the firm's decision to invest abroad as opposed to outsourcing (Antras, 2003; Antras and Helpman, 2004).

Institutional quality in the host country is an important determinant of FDI inflows. Wei (2000) shows that a variety of corruption indices are highly correlated with FDI. A recent study by Alfaro, Kalemli-Ozcan, and Volosovych (forthcoming) also argues that poor institutional quality is the main reason why capital does not flow from rich to poor countries. The authors construct a composite index of institutional quality from *International Country Risk Guide* variables and show that policies aimed at strengthening the protection of property rights and reducing corruption should help increase FDI as well as other types of capital flows.

Campos and Kinoshita (2008) find that structural reforms are another key determinant in explaining FDI flows into transition economies and Latin America countries. After controlling for institutional quality and other policy variables, they find that progress in financial sector liberalization is associated with greater FDI inflows into these countries. Their finding is consistent with the importance of vertical linkages and a well-developed financial market as a precondition for greater efficiency of local suppliers and customers, though multinational firms themselves are not financially constrained.

Should countries seeking inward FDI promote it via tax and policy incentives? If so, what form should such incentives take? In reality, many countries engage in some form of FDI policy. Preferred tools range from offering tax breaks to imposing requirements on foreign investors such as export targets and training of domestic workers. The evidence on the effects of taxes on FDI to date is unsettled. Using data on U.S. multinationals, Wheeler and Mody (1992) find that differences in corporate tax rates were not

relevant for location decisions by foreign investors in the manufacturing sector, although they are more important for the export-oriented industry. De Mooij and Ederveen (2003) provide a comprehensive literature survey of the effect of corporate tax rates on FDI. As they point out, the implications of tax rates vary with the nature of FDI, measurement of FDI activity, and tax treatment in the host and home countries. As multinationals potentially face taxes in the host and home countries, it is also important to take into account policies to address double taxation that could significantly alter the effects of taxes on FDI location decisions.

The establishment of export processing zones (EPZs) has become a common way for developing countries to attract FDI. In the EPZs, tariffs and quotas are eliminated and bureaucratic requirements are lowered in hopes of bringing in new business and foreign investment. In particular, EPZs provide for imports of intermediate goods used in the production of exports on a duty-free basis. Consequently, most EPZs concentrate on the production of textiles, clothing, and electronics for the mass market. EPZs generally contribute to an increase in manufactured exports. However, the net benefits of FDI on the domestic economy are not always positive because the FDI depends on the backward and forward linkages between EPZs and the domestic economy.

In the aftermath of the capital account crises, capital controls on volatile short-term flows is another policy being used to promote more stable long-term flows. Elo (2007) cautions, however, against jumping to the conclusion that this policy achieves what it is intended to do. She finds that, although capital controls to restrict short-term volatile financial flows may seem to help shift the composition of financial flows more toward more stable and long-term FDI flows at a glance, capital controls also reduce the quality of FDI in terms of volatility and volume by increasing country risk.

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IMF Staff Papers

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(forthcoming)

“Modeling Aggregate Use of IMF Resources—Analytical Approaches and Medium-Term Projections”

Atish Ghosh, Manuela Goretti, Bikas Joshi, Alun Thomas, and Juan Zalduendo

“Informality and Regulations: What Drives the Growth of Firms?”

Era Dabla-Norris and Gabriela Inchauste

“Exchange Rate Transmission into Industry-Level Export Prices: A Tale of Two Policy Regimes in India”

Sushanta Mallick and Helena Marques

“Measuring and Analyzing Sovereign Risk with Contingent Claims”

Michael Gapen, Dale Gray, Cheng Hoon Lim, and Yingbin Xiao

“Probabilistic Sustainability of Public Debt: A Vector Autoregression Approach for Brazil, Mexico, and Turkey”

Evan Tanner and Issouf Samake

“Does Transparency Pay?”

Rachel Glennerster and Yongseok Shin

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Visiting Scholars, February–June 2008

- Allan Drazen;** University of Maryland; 12/1/07–4/30/08
- Igor Ermolaev;** Bank of Russia; 1/14/08–3/21/08
- Charles Freedman;** 2/1/08–4/11/08
- Simon Gilchrist;** Boston University; 12/10/07–3/31/08
- Sunghyun Henry Kim;** Tufts University; 4/7/08–4/30/08
- Dmitry Korshunov;** Bank of Russia; 1/14/08–3/21/08
- Warwick McKibbin;** The Australian National University, Canberra, Australia; 8/1/07–4/30/08
- Enrique Mendoza;** University of Maryland; 12/17/07–4/30/08
- Christopher Otrok;** University of Virginia; 12/17/07–2/29/08
- Paolo Pesenti;** Federal Reserve New York; 11/1/07–4/30/08
- Dennis Quinn;** Georgetown University; 10/15/07–4/20/08
- Guido Tabellini;** IGIER - Università Bocconi, Italy; 3/10/08–3/13/08
- Kenneth West;** University of Wisconsin; 2/4/08–2/5/08

Recent External Publications by IMF Staff

Journal Articles

Benito, Andrew

“Financial Pressure and Balance Sheet Adjustment by Firms”
Oxford Bulletin of Economics and Statistics

Benito, Andrew

“Financial Pressure and Firm Behavior: Evidence from Spanish Panel Data”
Bulletin of Economic Research

Cordoba, Juan Carlos; Verdier, Genevieve

“Inequality and Growth: Some Welfare Calculations”
Journal of Economic Dynamics and Control

Crowe, Christopher; Meade, Ellen

“The Evolution of Central Bank Governance around the World”
Journal of Economic Perspectives

Doe, Lubin

“Reforming External Tariffs in Central and Western African Countries”
International Journal of Public Budget

Dunaway, Steven

“Pension Reform: Cutting the Gordian Knot”
China Economic Quarterly

Eicher, Theo; Papageorgiou, Chris; Roehn, Oliver

“Unraveling the Fortunes of the Fortunate: An Iterative Bayesian Model Averaging (IBMA) Approach”
Journal of Macroeconomics

Haas, François

“Financial Integration in Europe: Current State of Play”
Integrating Europe’s Financial Markets

Hauner, David

“Guest Editor’s Introduction”
Emerging Markets Finance and Trade

Hesse, Heiko

“Monetary Policy, Structural Break and the Monetary Transmission Mechanism in Thailand”
Journal of Asian Economics

Kandil, Magda; Bahmani, Mohsen

“Testing the PPP in the Non-linear STAR Framework: Evidence from MENA Countries”
Scientific Journal of Administrative Development

Kandil, Magda; Chomsisengphet, Souphala

“Towards Understanding the Asian Crisis and Its Aftermath”
Journal of the Asia Pacific Economy

Kandil, Magda; Mirzaie, Ida

“Consumption and Macroeconomic Policies: Evidence of Asymmetry in a Sample of MENA Countries”
International Journal of Development Issues

Kunzel, Peter; Medeiros, Carlos; Souto, Marcos; Papaioannou, Michael; Zanforlin, Luisa

“Corporate Inflation-Indexed Bonds in Emerging Market Countries: Recent Trends and Prospects”
Journal of Financial Transformation

Lane, Timothy; Caselli, Francesco; Ardagna, Silvia

“Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries”
The B.E. Journal of Macroeconomics

Miyagiwa, Kaz; Papageorgiou, Chris

“Endogenous Aggregate Elasticity of Substitution”
Journal of Economic Dynamics and Control

Poirson, Hélène

“Financial Market Implications of India’s Pension Reform”
International Finance Review

Poirson, Hélène

“Pension Reforms and the Implications on Financial Markets”
Sensex

Ricci, Luca; MacDonald, Ronald

“Real Exchange Rates, Imperfect Substitutability, and Imperfect Competition”
Journal Of Macroeconomics

Sharma, Sunil; Loukoianova, Elena; Neftci, Salih

“Pricing and Hedging of Contingent Credit Lines”
Journal of Derivatives

Sy, Amadou N.R.

“Fuller Capital Account Convertibility in India: Challenging Times”
The Analyst; Indian Banking 2006–07

Tanner, Evan; Iwata, Shigeru

“Pick Your Poison: The Exchange Rate Regime and Capital Account Volatility in Emerging Markets”
Czech Journal of Economics and Finance

Tokarick, Stephen

“How Large Is the Bias Against Exports From Import Tariffs?”
World Trade Review

Verdier, Genevieve

Journal of International Economics

Yang, Yongzheng; Gupta, Sanjeev

“Regional Trade Agreements in Africa: Past Performance and Way Forward”
Africa Development Review

Other External Publications (Books, Conference Volumes, etc.)

Arnone, Marco; Darbar, Salim; Gambini, Alessandro

“Governance in Banking Supervision: Theory and Practices”
Designing Financial Supervision Institutions—Independence, Accountability and Governance, ed. by Donato Masciandaro and Marc Quintyn (Cheltenham, UK: Edward Elgar)

A full and updated listing of external publications of IMF staff (from 1997 onward), including forthcoming publications, can be found in a searchable database at the Research at the IMF website at <http://www.imf.org/research>.

Country Study

Mexico

Roberto García-Saltos



Mexico has come a long way in developing policies conducive to macroeconomic and financial stability, creating a sound environment to invigorate growth prospects. The results of the policy framework implemented since the 1994–95 crisis include fiscal consolidation, low and stable inflation amid a floating exchange rate, and a sound financial system. In that context, greater integration with the global economy has been consistent with greater stability and reliable access to foreign finance. At the same time, Mexico’s increased linkage with the U.S. economy has led to more synchronization with the U.S. business cycle. Recently, IMF staff analyzed these transformations and their implications, as well as the need for further financial development and structural reforms to accelerate growth and further reduce poverty.

There can be little doubt that Mexico learned well and implemented the lessons of the 1994–95 financial crisis. Consistent policy implementation has brought a new era of stability and resilience to external shocks. Three components of economic policies, along with the role played by the North American Free Trade Agreement (NAFTA), explain how Mexico achieved this transition to stability.

First, sustained fiscal consolidation has translated into lower gross public debt (on the broadest “augmented” measure), which fell to 42 percent in 2007, down from 50 percent in 2000 (and much higher levels previously). Jenker (2004), Soueid (2005), and Moissinac (2005) analyze how this fiscal performance was complemented with proactive public debt management strategies, reducing fiscal vulnerabilities. Mexico’s shift in the structure of public debt away from foreign-currency-denominated instruments created a financial infrastructure that improved the liquidity and depth of the domestic bond market.

Second, the consistent implementation of an inflation targeting framework, within a symmetrically floating exchange rate regime, steadily reduced inflation and inflation expectations to low levels. From near 10 percent at the beginning of this decade, Mexico’s inflation over the last five years has consistently approached the 3 percent target. Faal (2005), Batini, Barkbu, and Garcia-Saltos (2006), and recent studies at Mexico’s central bank (Capistran and Ramos-Francia, 2007) document the significant reduction in inflation persistence and volatility.

Third, financial sector reforms that followed the 1994–95 financial crisis have greatly enhanced the stability of the financial sector and created a new basis for financial intermediaries to provide credit to the private sector (IMF, 2006). Moissinac (2005) documents the reforms on bank supervision and on capital and securities markets infrastructure, which has contributed to the rebound of commercial bank lending in recent years. Moreover, Espinosa and Zanforlin (2007) explain that the recent rapid credit growth in housing finance appears to be grounded in a more solid basis than in the past. While the mortgage-backed securities market in Mexico is still relatively small—with fewer systemic implications, and on a sounder footing, than in some developed countries—this study points to lessons from the recent financial turbulence in other countries, which could help Mexico avoid pitfalls and maintain its financial stability.

The adoption of NAFTA and its interactions with domestic policies has also contributed to Mexico’s new economic landscape, and has had important impact on the economic structure, exports, economic volatility and synchronization as they relate to the U.S. economy. On the economic structure, Kose, Meredith, and Towe (2004) document the significant increase in the contributions of exports and investment to GDP growth that followed the implementation of NAFTA. From a commodities-oriented export structure, Mexico has moved toward exporting manufacturing products, with the U.S. market taking up more than 80 percent of the country’s exports. These studies show that NAFTA could also account for an important share in the reduction in Mexico’s output and investment volatility, which since 1996 decreased by about one-third. At the same time, the business cycles of Mexico and the United States have become significantly more synchronized, with large increases in the cross-country correlations of the major macroeconomic aggregates (Sosa, 2007; Österholm and Zettelmeyer, 2007; and Swiston and Bayoumi, 2008). Blavy and Juvenal (2007) found that NAFTA has contributed to significantly reduced transaction costs between Mexico and the United States, and thus to increased price-level synchronization, albeit still to a lesser extent than between the United States and Canada. For the post-NAFTA period, Sosa (2007) found that shocks

to U.S. demand for Mexico's exports represent about 40 percent of Mexico's output fluctuations, in fact constituting the largest source of foreign disturbances. The size of the apparent effect of U.S. real variables on Mexican GDP is rather large and goes beyond its immediate and direct influence on Mexico's exports. Indeed, changes in U.S. economic activity are also important in driving—directly or indirectly—output fluctuations in the services sector, which accounts for more than 65 percent of Mexican GDP. Given the presumably small direct exposure—through trade channels—of the service sector to the U.S. economy, these results suggest that there are also other spillovers or multiplier effects transmitting shocks from the export sector to the rest of the Mexican economy. A possible additional channel is through the effect of workers' remittances on boosting private consumption (Mehrez, 2006; Roache and Gradzka, 2007; and Mishra, 2007).

Going forward, Mexico's fundamental challenge remains to put in place policies to achieve a sustained and substantial acceleration in GDP growth and a further reduction in poverty and inequality. While faster integration with the global economy could account for lower output volatility, Mexico has not joined the league of fast-growing emerging markets, and there have been no signs of income convergence across regions (Serra and others, 2006) or with the United States. The priorities for the reform agenda are well defined, and include policies to increase the extent of competition so as to allow key markets to function more efficiently, strengthen the business environment to encourage investment-led growth and increase the accountability of public spending, especially at the level of subnational governments (Buliř and Swiston, 2006; Moissinac, 2006; Ahmad and others, 2007). One significant element that warrants future attention is the pervasiveness of informal economic activity in Mexico, the explanations for which go beyond labor market issues, and which is likely to be both a cause and consequence of other problems that may slow growth, including low labor productivity, high levels of tax evasion, and low levels of access to financial services (Mehrez, 2005).

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Trade Linkages and Business Cycles

(continued from page 1)

argued that trade openness plays a role (Rodrik, 1997; and International Labor Organization, 2004). As there has been exponential growth in world trade in recent decades, understanding the relationship between trade and volatility has become increasingly important.

Several studies using cross-country data have highlighted a positive relationship between trade openness and macroeconomic volatility. For instance, one study finds that more open countries experience significantly higher GDP volatility (Kose, Prasad, and Terrones, 2003a). However, a companion paper also finds that globalization weakens the negative impact of volatility on growth, providing suggestive evidence that increased volatility may be less damaging in a globalized economy (Kose, Prasad, and Terrones, 2005).

Though cross-country results are informative to some extent, very little is known about the channels through which trade affects volatility. Some of our recent work examines this question using an industry-level panel dataset of manufacturing production and trade (di Giovanni and Levchenko, forthcoming). The main results are threefold. First, sectors more open to international trade are more volatile. Second, trade is accompanied by increased specialization. These two forces imply increased aggregate volatility. Third, sectors that are more open to trade are less correlated with the rest of the economy, an effect that acts to reduce overall volatility. The point estimates indicate that each of the three effects has an appreciable impact on aggregate volatility. Taken together, they imply that the relationship between trade openness and overall volatility is positive and economically significant. The impact also varies a great deal with country characteristics. We estimate that the same increase in openness is associated with an increase in aggregate volatility that is five times larger in developing countries compared with developed ones. Finally, we find that the marginal impact of openness on volatility roughly doubled over the last 30 years, implying that trade has become more closely related to volatility over time.

One channel through which trade can affect a country's volatility is through the pattern of specialization: countries that come to specialize in particularly risky sectors after trade opening may experience increased macroeconomic volatility. This kind of mechanism is also related to the finding that terms-of-trade volatility is important in explaining cross-country variation in output volatility (Mendoza, 1995). Indeed, differences in terms-of-trade volatility across countries must be driven largely by patterns of export specialization.

However, there currently is no systematic empirical evidence on how countries differ in the riskiness of their export composition. To fill this gap, we develop a measure

of the riskiness of countries' patterns of export specialization, and illustrate its features across countries and over time (di Giovanni and Levchenko, 2007a). The exercise reveals large cross-country differences in the risk content of exports. This measure is strongly correlated with terms-of-trade and output volatility, but does not exhibit a close relationship with the level of income, overall trade openness, or other country characteristics. We then propose an explanation for what determines the risk content of exports, based on the theoretical literature exemplified by the early contribution by Turnovsky (1974). Countries with a comparative advantage in safe sectors or a strong enough comparative advantage in risky sectors will specialize, whereas countries whose comparative advantage in risky sectors is not too strong will diversify their export structure to ensure against export income risk. We use both nonparametric and semi-parametric techniques to demonstrate that these theoretical predictions are strongly supported by the data.

By almost any measure, the world economy exhibits ever-stronger international linkages. Both trade and capital flows have grown dramatically as a share of world GDP over the past few decades. In addition, trade in goods has become more vertical, as intermediates in production account for an increasing share of world trade (Hummels, Ishii, and Yi, 2001). Recent years have also seen newer forms of cross-border economic integration, such as offshoring and outsourcing of different parts of the production chain (Amiti and Wei, 2005).

Has increased trade and financial integration also led to further synchronization of business cycles across countries? There appears to be some evidence that business cycles have become more synchronized over the past two decades, though this finding is only significant for industrialized countries. By contrast, there appears to be no evidence that consumption correlations increased with trade and financial integration, suggesting that the countries are not reaping the benefits of risk-sharing (Kose, Prasad, and Terrones, 2003b). Other work evaluates the relative importance of global, regional, and country-specific shocks in driving business cycles. It finds that a common factor worldwide can explain about one-third of developed countries' business cycle variation and about 15 percent in a large sample of countries, while regional effects play a minor role (Kose, Otrok, and Whiteman, 2003).

While these studies consider properties of the world business cycle per se, another influential strand of the literature explicitly examines the links between trade and business-cycle synchronization across countries. The seminal paper by Frankel and Rose (1998) established what has become a well-known empirical regularity: country pairs that trade more with each other experience higher business-cycle correlation. While the finding has been confirmed by a series of subsequent studies, the mechanisms underlying this effect

are still not well understood.² In light of the rapidly changing nature of global trade, understanding these mechanisms is becoming increasingly important for macroeconomic policy. For instance, Tesar (forthcoming) analyzes business-cycle synchronization of the European Union accession countries in a model of cross-border production sharing.

In some recent work, we examine the mechanisms through which bilateral trade linkages affect business-cycle comovement using an industry-level panel dataset of manufacturing production and trade (di Giovanni and Levchenko, 2007b). We establish that higher bilateral trade in an individual sector increases both the comovement within the sector between trading countries, as well as the comovement between that sector and the rest of the economy of the trading partner. The estimated magnitudes imply that transmission across sectors is responsible for nearly 90 percent of the total impact of higher bilateral trade on the business-cycle correlation.

We also demonstrate that vertical linkages in production within and across sectors are an important force behind the overall impact of trade on business cycle synchronization. The elasticity of within-sector comovement with respect to bilateral trade is significantly higher in industries that use output of the same sector as an intermediate in production. Furthermore, the elasticity of the cross-sector comovement is higher in sectors that are more heavily used as intermediates by other sectors. The importance of vertical linkages found in this paper provides a fruitful area of theoretical research given the failure of standard international business-cycle models to replicate the features of the data.³

As trade integration continues apace, there will be macroeconomic consequences. Our research has highlighted the importance of delving beneath aggregate-level analysis in order to ascertain a more complete picture of the channels through which trade can affect macroeconomic volatility and business-cycle synchronization. Thus far we have focused on patterns at the sector level, which has helped show the importance of different risk characteristics and linkages in disaggregated data. The next step in the agenda is to begin exploring models and data that put firm-level analysis center stage.

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²Recent cross-country studies include Clark, and van Wincoop (2001); Baxter and Kouparitsas (2005); and Calderon, Chong, and Stein (2007).

³This point was reinforced in Kose and Yi (2005).

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