



### In This Issue

- 1 Letter from the (New) Editor
- 1 A Primer on “Global Liquidity”
- 5 Trade Integration and Business Cycle Synchronization
- 6 Q&A: Seven Questions on the Global Housing Markets
- 10 IMF Working Papers
- 13 Staff Discussion Notes
- 13 Fifteenth Jacques Polak Annual Research Conference
- 14 Recommended Readings from IMF Publications
- 17 In Memoriam
- 18 *IMF Economic Review*
- 18 Announcement: New staff publication

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## Letter from the (New) Editor



Fourteen years ago, in June 2000, the first issue of the *IMF Research Bulletin* was published! It has been a great and successful ride. Indeed, I am pleased to let you know that to date the bulletin has more than 19,100 subscribers. The credit for this goes to the team that has tirelessly put together issue after issue and has managed to keep you captivated.

The objective of the *IMF Research Bulletin* is to present to a wider audience a sampling of the latest research conducted at the International Monetary Fund. The bulletin attempts to distill the main insights from IMF research in a friendly and accessible format, while keeping a keen eye on current economic policy issues. As I take over as the new editor of the bulletin, I believe, it is an opportune time to invite you, the readers, to discuss how to make the bulletin more visible and more interactive by getting your feedback. In particular, I would be interested in hearing about suggestions on the topics covered, and general ways to enhance your reading experience. If you have ideas that you would like to share, please feel free to e-mail the team at [resbulletin@imf.org](mailto:resbulletin@imf.org).

—Rabah Arezki

## Research Summaries

### A Primer on “Global Liquidity”

Eugenio Cerutti, Stijn Claessens, and Lev Ratnovski



“Global liquidity” is often used to describe the impact of low U.S. and euro area interest rates on the rest of the world. The concept is critical for understanding the global

financial cycle and international spillovers. This column defines global liquidity as the ease of financing in cross-border markets and points to its potential drivers. To limit their exposures to global liquidity fluctuations nations can embrace better macro policy frameworks, consider capital flow management tools, and more stringently regulate and supervise banks.

The financial cycle is becoming increasingly global, as highlighted in recent work (Rey 2013, Bruno and Shin 2014, Obstfeld 2014) and reflected in policy discussions (e.g., the increased talk of financial “spillovers”). The phenomenon is

(continued on page 2)

## A Primer on “Global Liquidity”

(continued from page 1)

evident from the correlation of credit growth across countries, which has increased markedly since the mid-1990s (Figure 1).

This reflects, in part, deeper real economic integration through international trade (red line in Figure 2), and, in part, increased integration of countries into the global financial system, as illustrated by the expansion of cross-border banking claims before the financial crisis (blue line in Figure 2).

An important feature of financial integration is that a large amount of funds flow from “financial center” economies such as the G4 economies (United States, euro area, United Kingdom, and Japan) to the rest of the world. For example, in June 2013, cross-border bank claims by the G4 on the rest of the world exceeded claims by the rest of the world on G4 banks by 20 percent. And this number understates the role of the G4 as financial centers, because international banks in the G4 also act as intermediaries for much of cross-border credit between countries in the rest of the world.<sup>1</sup>

Since the G4 financial systems act as intermediaries for much of global credit, funding conditions—or ease of obtaining credit—within the G4 affect funding conditions globally. This is precisely what the concept of global liquidity aims to capture. One can understand global liquidity as those credit supply factors in financial center economies that affect the provision of cross-border credit.

Under this definition, global liquidity is a specific case of funding liquidity (ease of financing, see Brunnermeier and Pedersen 2009). It is different from asset market liquidity, that is, the ability to trade rapidly with small price impacts.

### Why Is Global Liquidity Important?

The fact that financial conditions and policies in G4 economies affect financial conditions globally has implications for the rest of the world. The key one is that the ability of recipient (non-G4) economies to attract funds is determined

1. The focus on these four economies as “financial center” economies can, in principle, be refined. For example, China may also be considered as a “financial center” economy, which funds the rest of the world. But the analysis of China’s role in global liquidity is restricted by data availability.

Figure 1. Financial cycle more correlated

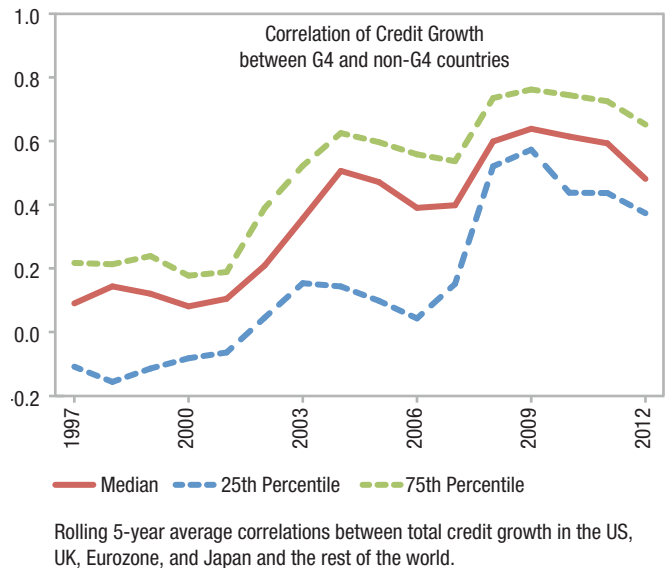
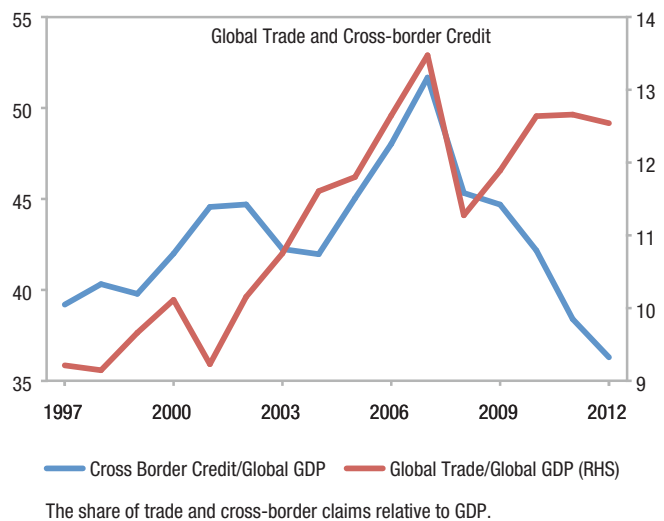


Figure 2. Deeper financial integration



not only by their domestic economic conditions and policies, but also by economic and financial conditions and policies within the G4. As such, knowing what specific conditions are relevant for the supply of funds becomes an important surveillance question for policymakers globally. And such knowledge can matter for formulating effective policy responses.

In a recent paper (Cerutti, Claessens, and Ratnovski 2014), we asked three questions critical to understanding the dynamics of global liquidity.

- What drives global liquidity, i.e., what determines credit supply conditions in international financial markets?
- Where does the global financial cycle originate? Is it primarily U.S.-driven, or do other financial center economies play a role?
- How can a borrowing country manage its exposure to global liquidity fluctuations?

We answer these questions by looking at a specific type of cross-border flows—banking flows. Other flows include bond flows, equity portfolio flows, foreign direct investment (FDI), etc. IMF (2014) studies the various types of cross-border flows and suggests that the results across different types of flows are similar.

### What Drives Global Liquidity?

The literature highlights a number of domestic G4 factors that may affect credit supply in cross-border funding markets. We confirm, using U.S. data, that all of these factors are important in driving cross-border credit:

- *Uncertainty and risk aversion*, typically captured by VIX (Rey 2013). We find that a 65 percent increase in VIX (corresponding to moving from its 25th to the 75th percentile in the distribution) reduces cross-border lending to banks by 6 percent, and to the real sector by 3.5 percent.
- *Domestic credit conditions in the G4*, captured as bank leverage (high for more accommodative conditions, see Bruno and Shin 2014), domestic credit growth (Borio and Lowe 2004), or TED spread. We find that an improvement in credit conditions such as a 50 percent change in U.S. dealer bank leverage (moving from its 25th to 75th percentile) increases cross-border lending to banks and the real sector by 5.5 percent and 4.5 percent, respectively.
- *Monetary policy*: short-term interest rates, the term premium, and changes in money mass. Here, we find that an increase in the term premium from its 25th to 75th percentile decreases cross-border lending to banks and real sector by 1.7 percent and 0.2 percent, respectively.

In addition, *global liquidity* is driven by the relative price of foreign borrowing. These price effects, however, are modest. An increase in the differential in interest rates between the recipient country and the United States from its 25th to 75th percentile increases cross-border lending by only 0.2 percent to 0.3 percent.

Comparing these economic effects leads to an important observation. Global liquidity is determined by government actions and private sector conditions. Of course, this distinction is imprecise because government actions and private sector conditions affect one another. Still, if one takes as a first order approximation that uncertainty and

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***“Global liquidity is determined by government actions and private sector conditions.”***

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bank conditions reflect the private sector, while monetary policy and the interest rate differential reflect government actions, it appears that *a predominant part of global liquidity is determined by the private sector rather than by direct government actions.*

This challenges the view that monetary policy in advanced economies is largely responsible for the global financial cycle. Rather, evolving financial sector conditions, and often self-fulfilling market perceptions (e.g., as in the behavior of the VIX), play an overwhelming role.

### Which Countries Drive Global Liquidity?

Many commentators presume that the global financial cycle is U.S.-driven. We can check whether this is the case by looking at the relative power of conditions in the United States versus other financial centers in explaining global liquidity.

Measures of uncertainty and risk-aversion are global in nature (VIX measures are highly correlated across countries), but bank conditions and monetary policy indicators have sufficient heterogeneity across G4 countries.

To determine regional effects (e.g., U.K. and euro area conditions may disproportionately affect cross-border credit to eastern Europe), we limit our comparison to how U.S. versus U.K. and euro area conditions affect cross-border lending to Asia.

We find that:

- *For bank conditions, U.K. and euro area bank leverage and TED spreads* have more statistically and economically significant effects on cross-border lending to Asia than U.S. dealer bank leverage and U.S. TED spreads.

*(continued on page 4)*

## A Primer on “Global Liquidity”

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- For monetary policy, U.S. factors play an overwhelming role. U.K. and euro area term premium, interest rates, and money growth are mostly not significant.

This highlights that while the United States drives the global financial cycle through its monetary policy, other financial centers—the United Kingdom and the euro area—affect the global financial cycle through the conditions of their banks, consistent with their major global financial intermediation role (Shin 2012).

## Can Countries Manage Their Exposure to Global Liquidity?

Borrowing countries may want to limit their exposure to global liquidity fluctuations to better control domestic financial conditions. We find that the following country policies can at least reduce by half the borrowing countries’ exposures to variations in global liquidity:

*A better macro framework*, such as a flexible exchange rate. An increase in global liquidity drivers from its 25th to the 75th percentile increases cross-border flows to banks by 16 percent for countries with a fixed exchange rate, but only by 6 percent for countries with a flexible exchange rate. The difference is smaller for cross-border flows to the real sector: 7 percent vs. 5 percent, respectively.

*Stricter capital controls* reduce cross-border inflows to banks (from about 14.5 percent to 6 percent, respectively) but not as much to the real sector (from about 8 percent to 5 percent).

*More stringent bank regulation and supervision* also decreases the impact of global liquidity on cross-border flows to banks (from about 10 percent to 4 percent respectively).

## Concluding Thoughts

This column summarized key stylized facts about global liquidity, building on existing literature and new results. The fact that global liquidity is in large part driven by G4 conditions has both positive and negative implications for the rest of the world. Since access to foreign capital is good

for economic development, accommodative conditions in the G4 that boost cross-border flows can increase economic development and growth elsewhere. Arguably, this has been one of the beneficial effects of current accommodative monetary policies in G4. But there is also scope for risks when the accommodative conditions in the G4 contribute to credit booms elsewhere, or when a tightening in the G4 triggers sudden stops in capital flows or even outflows from the rest of the world that test limits of macroeconomic policy management. Balancing these effects, particularly in the context of a shifting, unconventional monetary policy cycle in advanced economies, will be challenging.

Overall, our understanding of forces driving the global financial cycle is still in its infancy. More data on sectors’ cross-border assets and liabilities need to be collected and made public in order to better gauge global inter-linkages and the potential for spillovers, and to enhance global financial stability.

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## Trade Integration and Business Cycle Synchronization: A Reappraisal with Focus on Asia

Kevin Cheng, Romain Duval, and Dulani Seneviratne



*Over the past two decades, trade integration has increased rapidly within the world economy and tight supply chain networks have been formed, particularly within Asia. Have these developments strengthened the propagation of shocks, and more broadly the synchronization of business cycles between economies? Based on a unique dataset, we provide a new answer to this old question: increased trade integration in value-added terms does increase the synchronization of growth cycles between economies, while gross trade linkages do not seem to matter. This effect appears to be stronger in crisis times. A related finding is that growing dependence of economies, especially within Asia, on Chinese final demand in value-added terms is amplifying the international spillovers of growth shocks in China.*

The relationship between trade integration and business cycle synchronization is theoretically ambiguous and is therefore mainly an empirical question. Earlier research (notably Frankel and Rose, 1997, 1998) found a positive impact, but more recent studies have questioned the validity of earlier results, which had not accounted for fixed country-pair factors and common global shocks, and thereby may not necessarily have identified a causal relationship. Controlling for these omitted factors, recent papers (such as Kalemlı-Ozcan and others 2013 and Abiad and others 2013) find the relationship between gross trade integration and business cycle synchronization to be insignificant.

In our work (Duval and others 2014), we reassess this relationship by computing trade intensity in value-added rather than gross terms, building on the recent joint OECD-WTO initiative on trade in value added. Our logic is that gross trade data misrepresent trade linkages across countries amid increasingly important supply-chain networks across the globe. Value-added trade nets out bilateral trade in

intermediate goods—unlike gross trade data, which count products multiple times when they cross borders repeatedly for processing purposes—and thus captures more accurately the value added embodied in bilateral trade. Furthermore, value-added trade includes indirect trade linkages via third countries—such as value added exported indirectly by country A to country B via intermediate inputs exported by A to C that are then used to produce a good exported by C to B. Using value-added trade data instead proves crucial to identifying a robust impact of trade on business cycle synchronization.

### Stylized Facts About Business Cycle Synchronization and Trade Integration

Consistent with findings from other similar studies, we find that business cycle synchronization sharply increases in crisis times. The largest spikes occurred around the global financial crisis outside Asia, and around the Asian crisis of the late 1990s within Asia. However, even during normal times, business cycle synchronization—while much smaller—also shows an upward trend around the globe since the 1990s, especially in Asia (Figure 1, left).

Turning to trade integration, the most frequently featured trade variable in the literature is bilateral trade intensity, for which we follow the standard definition (the ratio of the sum of exports between a country-pair to the sum of their GDPs), except that we define it in a value-added sense. Measured this way, trade openness appears to have increased until the mid-2000s, and more so within Asia than elsewhere (Figure 1, right).

Vertical trade has also increased more in Asia than elsewhere, with China playing a pivotal role. The share of foreign value-added embedded in total exports has generally increased in Asian economies, particularly in East Asia reflecting the “China supply-chain” network. By contrast, value-added to/from Japan has generally declined. Furthermore, the nature of integration with partners differs between China and Japan, with China specializing comparatively more in downstream activities (such as assembling, even though China is now increasingly moving up the value chain) and Japan specializing in upstream activities (providing various intermediate goods as inputs). Finally, although the United States and the European Union remain by far the largest final consumers of Asia’s supply chain products,

*(continued on page 15)*



## Seven Questions on the Global Housing Markets

Hites Ahir, Heedon Kang, and Prakash Loungani



*The housing sector satisfies an essential need. Housing is an important component of investment and in many countries housing makes up the largest component of wealth. At the same time, housing booms and busts have often been detrimental to financial stability and the real economy. This article describes the state of global housing markets—including the role that foreign investors are playing—and policy responses to manage housing booms.*

### Question 1. What is the state of global housing markets today?

After sharp declines during the Great Recession, the IMF's Global House Price Index has been inching up over the past two years (Figure 1). During the past year, house prices increased in about half the advanced economies included in this index and about two-thirds of the emerging economies.

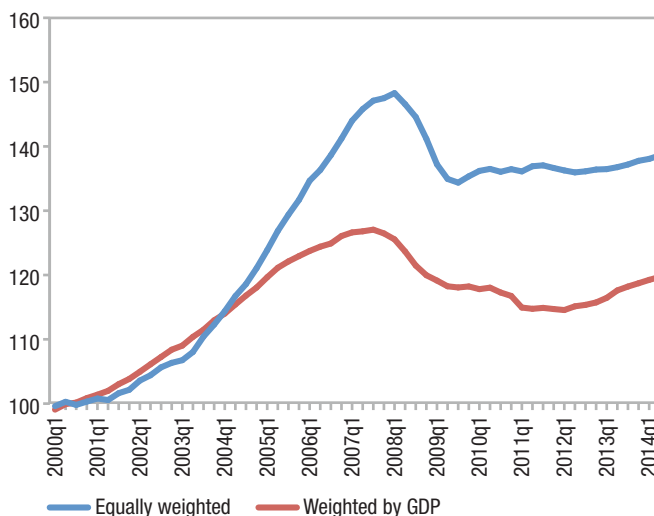
In a number of countries—Canada, many countries in the Asia-Pacific region, and many Scandinavian countries—the price of houses have increased steadily after a brief correction during the Great Recession. For many OECD countries, house price-to-income and house price-to-rent ratios remain above historical averages—this is true for example in Australia, Belgium, Canada, Norway, and Sweden. While this provides a broad indication of possible housing market valuations, one should be wary about assessing overvaluation from this evidence alone. Judgments about housing valuation require supplementary information (e.g., credit growth, household indebtedness, lender characteristics, and the method of financing) as well as knowledge about within-country developments (e.g., in some cases the house price increases may be concentrated in particular cities or regions) and institutions.

For instance, Belgium stands out for its high ratios of house prices to rents and incomes. But, on the basis of a more detailed analysis of the supplementary factors, an IMF staff report concluded that “risks of a sharp correction of real estate prices appear contained.” Among other countries, IMF assessments point to modest overvaluations in Canada, Israel, Norway, and Sweden. In many cases, the housing price booms are restricted to particular cities (as in Australia and Germany, for example) or reflect supply constraints (as in New Zealand).

### Question 2. How important are foreign investors in global housing markets?

Countries vary in the degree to which they permit foreign investment in their housing markets. According to a survey by the *Association of Foreign Investors in Real Estate*, the countries with the “most stable and secure” environments for real estate investments for foreign investors are the following: United States, Canada, Germany, Australia, United

Figure 1: Global House Price Index: Inching Up Again?



Source: Global Property Guide, Haver Analytics, Organisation for Economic Co-Operation and Development, and author's calculations.

Kingdom, Sweden, Denmark, Switzerland, France, Japan, and Austria.

For the United States, the dollar level of international sales is estimated at about 7 percent of the total existing homes sales market of \$1.2 trillion. International buyers from five countries—Canada, China, Mexico, India, and the United Kingdom—accounted for half of these transactions. In Australia, foreign residential investment has remained at most around 5–10 percent of the value of dwelling turnover and is concentrated in new, high-priced dwellings in inner-city areas of Sydney and Melbourne. For the United States, there is also survey data on the type of financing (cash vs. mortgage financing) preferred by foreign investors (Figure 2). Buyers from Canada and China rely largely on cash financing, whereas buyers from India use mortgage financing.

**Question 3. Is there evidence that foreign investors are boosting house prices?**

Industry sources and media discussion often ascribe the strength in housing markets in some countries to the emergence of a global investor class that pushes up prices in particular cities, particularly in high-end segments; over time, this is said to impart a boost to prices in other cities as well.

However, a casual look at the performance of luxury residential markets in a number of global cities does not sub-

stantiate this view. Patterns of house price developments in these markets during the past five years are quite varied: an upward trend (Beijing, Shanghai); an upward trend after a correction during the Great Recession (London, Hong Kong SAR, Dubai); flat (Singapore, Tokyo); a downward trend (a steady one in Moscow since 2008; more recent in Paris and Geneva; Sydney since 2008 with a recent uptick). The range of correlation among house price growth in these markets is quite wide, from values of -0.7 and -0.8 at one end to over 0.9 at the other. The highest positive correlations are among the cities in China, whereas the largest negative correlations are with Singapore and Geneva.

For the United States, the National Association of Realtors (NAR) tracks the cities that have been of major interest to foreign investors over the past year as revealed through searches on realtor.com. House price growth over the past year in these cities has been higher than in the other cities that are part of the Case-Shiller house price index (14 percent increase compared with 8 percent). In Australia, there is some indication of a price impact from foreign investors, particularly where there are rigidities in housing supply. But the price impact has not been felt in the parts of the market where Australia’s first home buyers are typically concentrated.

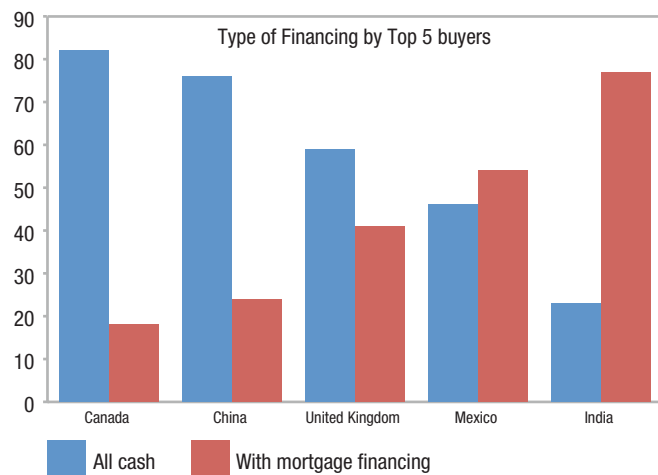
In short, there is little evidence thus far of foreign investors having more than a local impact on house prices.

**Question 4. What impact do housing markets have on economic and financial stability?**

As noted by Zhu (2014) food, clothing, and shelter are traditionally thought of as basic needs; therefore, the housing sector satisfies an essential need. Housing is an important component of investment and in many countries housing makes up the largest component of wealth. The majority of households tend to hold wealth in the form of their homes rather than in financial assets. In France, for example, less than a quarter of households own stocks, but nearly 60 percent are homeowners. Housing also plays other key roles; for instance, mortgage markets are important in the transmission of monetary policy. Adequate housing can also facilitate labor mobility within an economy and help economies adjust to adverse shocks. Hence, a well-functioning housing sector is critical to the overall health of the economy.

*(continued on page 8)*

**Figure 2. US: Cash or Charge?  
Top Foreign Buyers by Country and Type of Financing**



Source: National Association of Realtors

Seven Questions (continued from page 7)

At the same time, housing booms and busts have quite often been detrimental to both financial stability and the real economy. Many major episodes of banking distress have been associated with boom-bust cycles in property prices. Of the nearly fifty systemic banking crises in recent decades, more than two thirds were preceded by boom-bust patterns in housing prices. Housing price booms can be particularly toxic when there is a coincidence between the housing boom and the rapid increase in leverage and

**“At the same time, housing booms and busts have quite often been detrimental to both financial stability and the real economy.”**

exposure of households and financial intermediaries. During the global financial crisis, nearly all the countries with “twin booms” in real estate and credit markets—21 out of 23 countries—ended up suffering from either a financial crisis or a severe drop in GDP growth relative to the country’s pre-crisis performance. In contrast, of the seven countries that experienced a real estate boom but not a credit boom, only two went through a systemic crisis and these countries, on average, had relatively mild recessions. Even when housing busts do not have a large financial stability impact, they can affect the real economy. Recessions in OECD countries are more likely given a house-price bust. Such recessions also tend to be much deeper and generate more unemployment than normal recessions.

In sum, there is abundant evidence that housing cycles can be a threat to financial and macroeconomic stability. The cost of resolving housing crises can be very high—in the case of Ireland, for instance, government bailouts of banks from the housing collapse amounted to 40 percent of the country’s GDP. Hence it is crucial to keep an eye on current housing market developments to keep them from going through another boom-bust cycle.

**Question 5. What policies can be used to manage housing booms?**

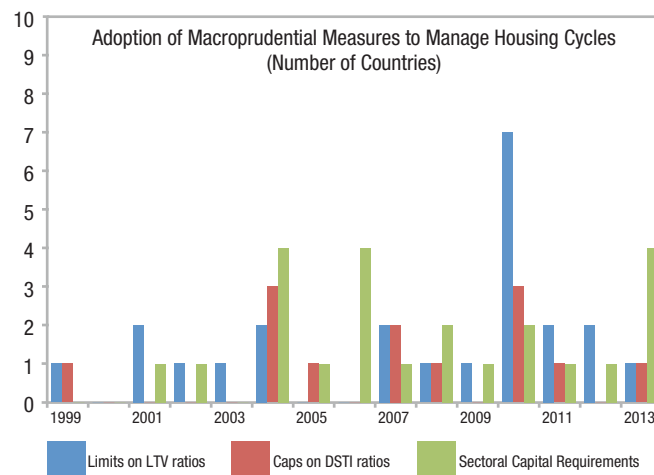
Regulation of the housing sector involves a complex set of policies. The noted economist Avinash Dixit suggested

we use the acronyms MiP, MaP, MoP to remind ourselves of the set of policies. MiP stands for microprudential policies, which aim to ensure the resilience of individual financial institutions. Such policies are necessary for a sound financial system but may not be sufficient. Sometimes, actions suitable at the level of individual institutions can destabilize the system as a whole. Hence we need not just MiP but also MaP, that is, macroprudential policies aimed at increasing the resilience of the system as a whole. Along with micro and macroprudential policies, we need MoP—monetary policy. Using policy interest rates is usually considered a blunt tool for containing house price booms. But as noted earlier, housing booms have often coincided with a generalized private credit boom. This suggests that monetary policy could be an important tool in many cases in support of macroprudential policies. However, at the moment, policy interest rates in many countries have to remain low to support economic recovery.

**Question 6. What are the main macroprudential tools to manage housing booms?**

The main macroprudential tools that have been used to contain housing booms are limits on loan-to-value (LTV) ratios and debt-service-to-income (DSTI) ratios and sectoral capital requirements (Figure 3). Limits on LTV ratios cap the size of a mortgage loan relative to the value of a property, in essence imposing a minimum down payment. Limits on

Figure 3. Finding the Right Tool



Source: Key Aspects of Macroprudential Policy—Background Paper, IMF Monetary and Capital Markets Department, June 2013



DSTI ratios restrict the size of a mortgage loan to a fixed multiple of household income. The hope is to thereby contain unaffordable increases in household debt.

Such limits have long been in use in some economies. For example, Hong Kong SAR has operated an LTV cap since the early 1990s and introduced a DSTI cap in 1994. In Korea, LTV limits were introduced in 2002 and DSTI limits in 2005. During and after the global financial crisis, more than twenty advanced and emerging economies all over the globe have followed the example of Hong Kong SAR and Korea.

Another macroprudential tool is to impose stricter capital requirements on loans to a specific sector such as real estate. This forces banks to hold more capital against these loans, discouraging heavy exposure to the sector. In many advanced economies such as Ireland and Norway, capital adequacy risk weights were increased on mortgage loans with high LTV ratios. Sectoral capital requirements have also been used in a number of emerging markets such as Estonia, Peru, and Thailand.

### Question 7. What do we know about the effectiveness of these macroprudential policies?

Up to now, the evidence suggests that limits on LTV and DSTI ratios are somewhat effective in cooling off both house prices and credit growth in the short run. They are able to break the financial accelerator mechanism that otherwise leads to a positive two-way feedback between credit booms and housing booms. But more fine tuning of these measures is needed. Macroprudential measures need to take into account the ability of market participants to circumvent some of the limits on leverage. In some countries, such as in Canada, LTV limits usefully distinguish between owner-occupied versus investor mortgages.

With regard to sectoral capital requirements, evidence suggests that while this tool increases resilience from additional buffers, its ability to curb credit growth is mixed. Some IMF research suggests that higher capital requirements on particular groups of mortgage loans have some success in curbing house-price growth in countries like Bulgaria, Croatia, Estonia, and Ukraine. There are a number of reasons why higher capital requirements may be less effective in containing credit growth. First, when banks hold capital well above the regulatory minimum, lenders may not need to make any change in response to increases in risk

weights. This often happens during housing booms when policymakers hope the tool will be most effective. Second, when lenders compete intensely for market share, they may internalize the costs of higher capital requirements rather than impose higher lending rates.

Macroprudential tools may also not be effective to target housing booms that are driven by the shortage of housing or by increased housing demand from foreign cash inflows that bypass domestic credit intermediation—as noted earlier, some foreign buyers use cash rather than mortgages to finance their purchases. In such cases, other tools are needed. For instance, stamp duty has been imposed to cool down rising house prices in Hong Kong SAR and Singapore. Evidence shows that this fiscal tool did reduce demand from foreigners who were outside of the LTV and DSTI regulatory perimeters. In other instances, high house prices could reflect supply bottlenecks, and hence the effectiveness of demand-focused instruments may be limited. In such cases, the mismatches should be fundamentally addressed by measures to increase the supply of housing.

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Dmitry Plotnikov

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Laurence M. Ball

### Working Paper 14/93

#### A Simple Method to Compute Fiscal Multipliers

Nicoletta Batini; Luc Eyraud; Anke Weber

### Working Paper 14/94

#### Does Openness Matter for Financial Development in Africa?

Antonio David; Montfort Mlachila; Ashwin Moheput

### Working Paper 14/95

#### Managing Credit Bubbles

Alberto Martin; Jaume Ventura

### Working Paper 14/96

#### Inflation and Public Debt Reversals in the G7 Countries

Bernardin Akitoby; Takuji Komatsuzaki; Ariel J. Binder

### Working Paper 14/97

#### After the Fall: Lessons for Policy Cooperation from the Global Crisis

Tamim Bayoumi

### Working Paper 14/98

#### Small and Medium Size Enterprises, Credit Supply Shocks, and Economic Recovery in Europe

Nir Klein

### Working Paper 14/99

#### Ms. Muffet, the Spider(gram) and the Web of Macrofinancial Linkages

Ricardo Cervantes; Phakawa Jeasakul; Joseph Maloney; Li Lian Ong

**Working Paper 14/100****Economic Impact of Selected Conflicts in the Middle East: What Can We Learn from the Past?**

Randa Sab

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Markus Bruckner; Era Dabla-Norris; Mark Gradstein

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Maximilien Kaffo Melou; Mariusz A. Sumlinski; Chris Geiregat

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Heiko Hesse; Ferhan Salman; Christian Schmieder

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Sophia Chen; Estelle Dauchy

**Working Paper 14/105****Determinants of Interest Rate Spreads in Solomon Islands**

Nooman Rebei

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Jeanne Gobat; Mamoru Yanase; Joseph Maloney

**Working Paper 14/107****Structural Balance Targeting and Output Gap Uncertainty**

Eugen Tereanu; Anita Tuladhar; Alejandro Simone

**Working Paper 14/108****Monetary Policy in Hybrid Regimes: The Case of Kazakhstan**

Natan P. Epstein; Rafael Portillo

**Working Paper 14/109****Impact of Fed Tapering Announcements on Emerging Markets**

Prachi Mishra; Kenji Moriyama; Papa M'B. P. N'Diaye; Lam Nguyen

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Vincent Belinga; Dora Benedek; Ruud A. de Mooij; John Norregaard

**Working Paper 14/111****Financial Plumbing and Monetary Policy**

Manmohan Singh

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F. Gulcin Ozkan; D. Filiz Unsal

**Working Paper 14/113****The EU Services Directive: Gains from Further Liberalization**

Emilio Fernández Corugedo; Esther Pérez Ruiz

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Raphael A. Espinoza; Esther Pérez Ruiz

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Magda E. Kandil; Genevieve Lindow; Mario Mansilla; Joel Chiedu Okwuokei; Jochen M. Schmittmann; Qiaoe Chen; Xin Li; Marika Santoro; Solomon Stavits

**Working Paper 14/116****Bank Risk Within and Across Equilibria**

Itai Agur

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Giang Ho; Paolo Mauro

**Working Paper 14/118****Deposit Insurance Database**

Asli Demirgüç-Kunt; Edward Kane; Luc Laeven

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Vanessa Le Lesle; Franziska Ohnsorge; Minsuk Kim; Srikant Seshadri

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Daniel Kanda; Mario Mansilla

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Elva Bova; Nathalie Carcenac; Martine Guerguil

*(continued on page 12)*

**IMF Working Papers** *(continued from page 11)*

**Working Paper 14/123**

**Oversight Issues in Mobile Payments**

Tanai Khiaonarong

**Working Paper 14/124**

**What Is Behind Latin America's Declining Income Inequality?**

Evridiki Tsounta; Anayochukwu Osueke

**Working Paper 14/125**

**Debt, Growth, and Natural Disasters: A Caribbean Trilogy**

Sebastian Acevedo Mejia

**Working Paper 14/126**

**Future of Asia's Finance: How Can it Meet Challenges of Demographic Change and Infrastructure Needs?**

Ding Ding; Raphael W. Lam; Shanaka J. Peiris

**Working Paper 14/127**

**First-Time International Bond Issuance—New Opportunities and Emerging Risks**

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### No. 14/4

#### Bank Size and Systemic Risk

Luc Laeven, Lev Ratnovski, and Hui Tong

### No. 14/5

#### Direct Distribution of Resource Revenues: Worth Considering?

Sanjeev Gupta, Alex Segura-Ubiergo, and Enrique Flores

### No. 14/6

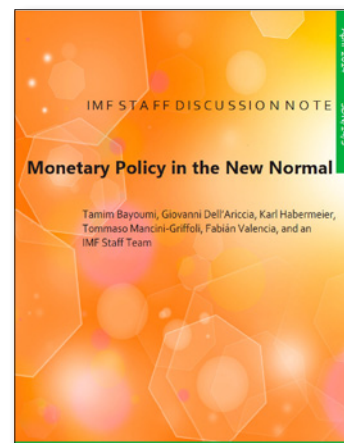
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### No. 14/7

#### Adjustment in Euro Area Deficit Countries: Progress, Challenges, and Policies

Thierry Tresselt, Shengzu Wang, Joong Shik Kang, and Jay Shambaugh, directed by Jörg Decressin and Petya Koeva Brooks



## Fifteenth Jacques Polak Annual Research Conference “Cross-Border Spillovers”

November 13-14, 2014

The International Monetary Fund will hold the Fifteenth Jacques Polak Annual Research Conference at its headquarters in Washington, DC on November 13–14, 2014. The conference promises to be an exciting opportunity to discuss topical policy issues related to cross-border spillovers.

The ARC Program Committee has lined up an excellent set of papers for the conference from Alan J. Auerbach (University of California, Berkeley) and Yuriy Gorodnichenko (University of California, Berkeley); Yan Bai (University of Rochester) and Cristina Arellano (Federal Reserve Bank of Minneapolis); Julien Bengui (Université de Montréal) and Javier Bianchi (University of Wisconsin-Madison); Christoph Boehm (University of Michigan), Aaron Flaaen (University of Michigan) and Nitya Pandalai Nayar (University of Michigan); Marcos Chamon (IMF) and Márcio Garcia (PUC-Rio); Charles Engel (University of Wisconsin-Madison); Marcel Fratzscher (DIW Berlin, Humboldt-University Berlin), Marco Lo Duca (European Central Bank), and Roland Straub (European Central Bank); Simon Gilchrist (Boston University), Vivian Yue (Emory University and Federal Reserve Bank of Atlanta), and Egon Zakrajsek (Federal Reserve Board); Jonathan Heathcote (Federal Reserve Bank of Minneapolis) and Fabrizio Perri (Federal Reserve Bank of Minneapolis); Anton Korinek (Johns Hopkins University); Joseba Martinez (New York University) and Thomas Philippon (New York University); and Eric van Wincoop (University of Virginia). H el ene Rey (London Business School) will deliver the Mundell-Fleming Lecture.

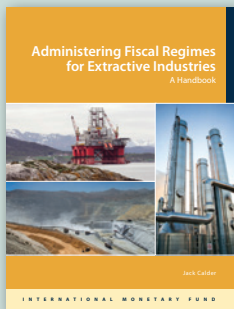
For further information on the program and details on how to register for the conference, please visit the IMF website ([www.imf.org](http://www.imf.org)) or email [ARC@imf.org](mailto:ARC@imf.org).

## RECOMMENDED READINGS FROM IMF PUBLICATIONS

**Getting Energy Prices Right***edited by Ian W. H. Parry, Dirk Heine, Eliza Lis, and Shanjun Li*

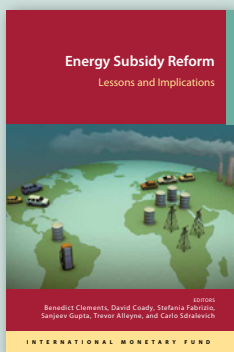
Energy taxes can produce substantial environmental and revenue benefits. This book shows how the major environmental damages from energy can be quantified for different countries and used to design an efficient set of energy taxes. The results, which are illustrated for more than 150 countries, suggest there is pervasive mispricing of energy across developed and developing countries alike. At a global level, implementing efficient energy prices would reduce carbon emissions by an estimated 23 percent and fossil-fuel air pollution deaths by 63 percent.

\$28. English. © 2014. 194 pp. Paperback. ISBN 978-1-48438-857-0. Stock # GEPRPEA

**Administering Fiscal Regimes for Extractive Industries: A Handbook***by Jack Calder*

Effective administration of government tax revenues is essential if countries are to enjoy the full benefit of their natural resources. This handbook explains administrative challenges arising from natural resource revenues. It discusses how natural resource fiscal regimes can be designed to meet appropriate policy objectives without creating unnecessary administrative complexity. It also provides a useful framework for both governments and their advisers to assess and strengthen resource revenue administration.

\$25. English. © 2014. 120 pp. Paperback. ISBN 9781475575170.

**Energy Subsidy Reform: Lessons and Implications***edited by Benedict Clements, David Coady, Stefania Fabrizio, Sanjeev Gupta, Trevor Alleyne, and Carlo Sdravovich*

Energy subsidies have wide-ranging economic consequences. Although they are aimed at protecting consumers, subsidies aggravate fiscal imbalances, crowd out priority public spending, and depress private investment. This book provides the most comprehensive estimates of energy subsidies currently available for 176 countries. It also presents an analysis of “how to do” energy subsidy reform, drawing on insights from 22 country case studies undertaken by the IMF staff and analyses carried out by other institutions.

\$28. English. © 2013. 194 pp. Paperback. ISBN 978-1-47555-811-1.

## Trade Integration *(continued from page 5)*

the importance of final demand coming from China has increased rapidly over the past two decades.

In addition to trade intensity and vertical integration, we examine other aspects of trade integration that are relevant for business cycle synchronization, such as intra-industry trade and similarity in trade specialization. Overall, the degree of intra-industry trade has barely increased across Asia, but, on average, it is slightly higher than in the rest of the world. It is especially high among ASEAN-5 economies (Indonesia, Malaysia, Philippines, Singapore, Thailand), as well as the degree of similarity of their trade specializations—although the latter has declined since the 1990s, possibly reflecting increased specialization along the regional supply chain. This would mean that if most shocks are industry specific, cycles should co-move more within ASEAN-5.

## Reassessing the Relationship Between Business Cycle Synchronization and Trade Integration

To formally gauge the impact of trade and non-trade variables—such as financial integration—on business cycle synchronization, we employ a (country-pair time-series) panel econometric framework controlling systematically for

country-pair heterogeneity and common global shocks. Our analysis uses annual value-added trade data for 63 countries, including 34 advanced economies (7 of which are in Asia) and 29 emerging economies (8 of which are in Asia). We address endogeneity issues by applying instrumental variable techniques. The main results are the following (Figure 2, left):

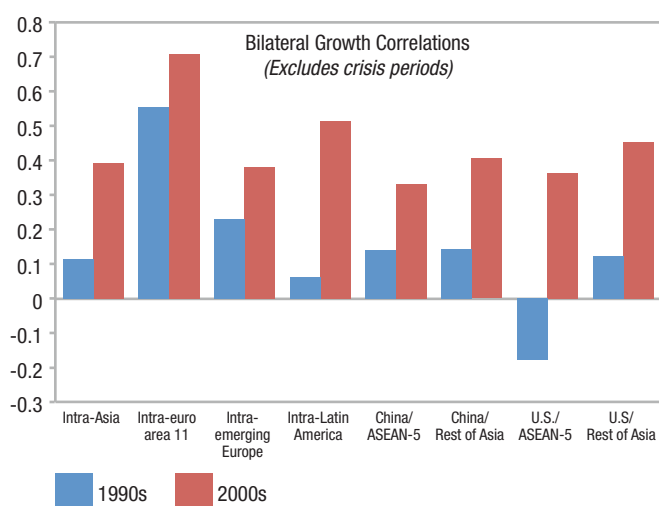
Bilateral trade intensity—in valued-added rather than in gross terms—is an important factor in explaining the synchronization of cycles. The effect is bigger in crisis times, suggesting that trade integration offers an important channel for propagating shocks across borders.

A higher degree of intra-industry trade and greater similarity in trade specializations has also led to greater co-movement. This suggests that industry-specific shocks are important and that economic cycles are likely to be more correlated among economies that have a similar economic structure.

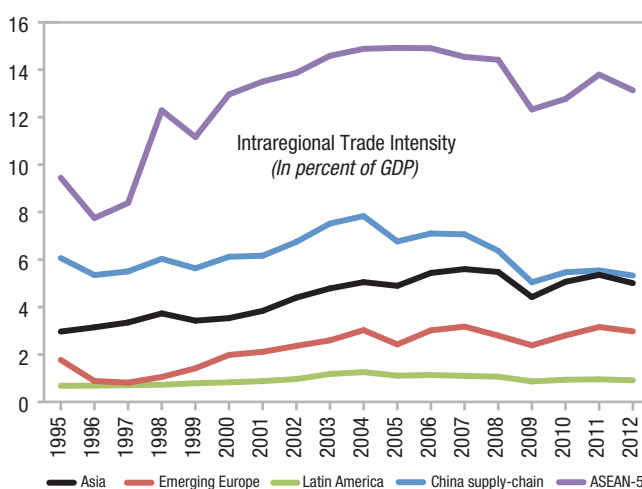
The degree of vertical integration does not seem to have a distinct effect on synchronization over and above its impact through trade intensity. This could be because this additional effect is only relevant for specific supply shocks (such as natural disasters) and country pairs (such as the 2011 tsunami in Japan or the 2013 floods in Thailand) or because in many cases inputs are substitutable allowing supply chain disruptions to be mitigated.

*(continued on page 16)*

Figure 1. Stylized Facts about BCS and Trade Integration



Sources: IMF, World Economic Outlook; and IMF staff calculations.



Sources: Organization for Economic Co-operation and Development and World Trade Organization, Trade in Value-Added database; and IMF staff estimates.

Trade Integration (continued from page 15)

Turning to non-trade variables, our empirical analysis also finds that greater banking and portfolio integration between two economies reduces their output co-movement most of the time, although banking integration does appear to increase the synchronization of cycles across countries during crisis times. This finding is supportive of the view that financial linkages may facilitate international reallocation of capital across economies in “normal” times, but may foster contagion in crisis times.

The Role of Spillovers from China

A further source of output co-movement among economies, especially in Asia, is the growing importance of China as a source of final demand for their goods and services. In its role as the “assembly hub” of Asia, China’s economy should not *directly* affect its trade partners much, since it primarily propagates shocks coming from advanced economies through the regional supply chain. But with China now being a growing source of final demand as well, it should have a bigger direct impact than in the past. Indeed, econo-

mies whose trade dependence on China’s final demand has increased over the past decade have generally experienced a greater increase in their cyclical co-movement with China during the period (Figure 2, right).

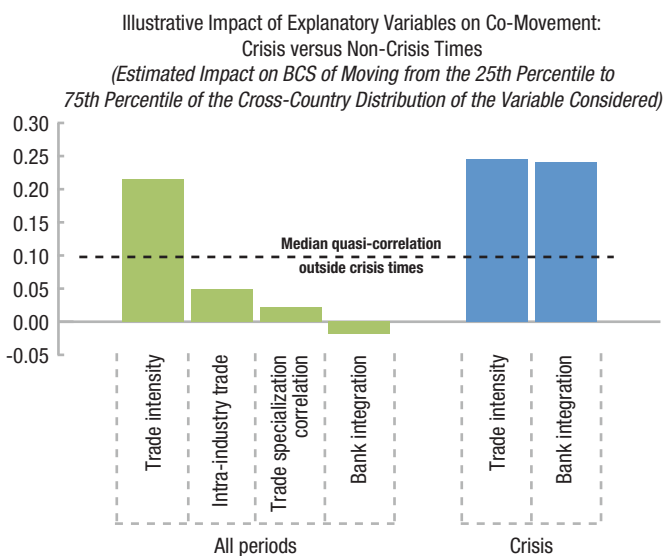
Further (panel) empirical analysis confirms that economies, which depend more on China for their export of final goods and services, are more affected by growth shocks originating from China. Specifically, we find that a one percentage point decline in China’s growth may lower GDP growth in the median Asian economy by about 0.3 percentage point after a year, compared with 0.15 in the median non-Asian economy. This difference reflects the larger dependence of Asian economies on China, compared to non-Asian countries.

Implications for Asia in the Future

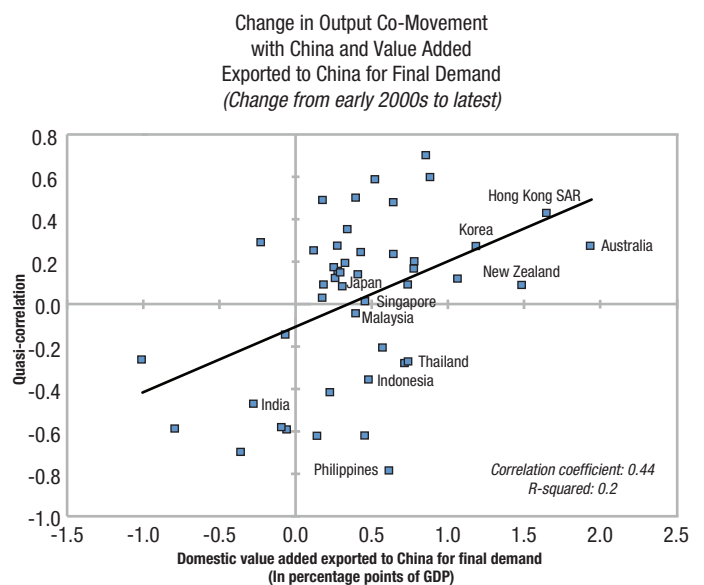
As trade integration continues to strengthen in the future in Asia and elsewhere, our analysis implies that business cycle synchronization should continue to rise. In addition, as China’s economy grows bigger and rebalances, growth shocks emanating from China are likely to further strength-

(continued on page 17)

Figure 2. Relationship between BCS and Trade Integration



Source: IMF staff estimates.



Sources: IMF, World Economic Outlook database; Organization for Economic Co-operation and Development and World Trade Organization, Trade in Value-Added database; and IMF staff estimates.



## In Memoriam

### William C. Hood (Bill)

Bill Hood, who served as Economic Counsellor and Director of Research at the IMF from 1979 to 1986, passed away peacefully on May 15, 2014 in Vienna, Virginia, at the age of 92. Through his 28 years of retirement, he led a quietly happy life, much as he had throughout a distinguished and multi-faceted career for more than three decades.

Bill was born in Yarmouth, Nova Scotia, in September 1921. He graduated from Mount Allison University and the University of Toronto (where he earned a Ph.D. in economics). He then attended the University of Chicago as a post-doctorate fellow. From 1946 to 1964, Bill was a professor of economics at the University of Toronto. While there, he made a lasting contribution by co-authoring an oft-cited paper on econometric theory with Tjalling Koopmans (the famous Dutch economist, then at the University of Chicago, who later won the 1975 Nobel Prize in economics) and by co-editing the book *Studies in Econometric Method* (1953), also with Koopmans.

Bill switched to public service in Canada in 1964, beginning with a stint at the Bank of Canada and culminating

with his appointment as Deputy Minister of Finance in 1979. Later that year, following a change in government, Bill replaced the retiring Jacques J. Polak and became the Fund's third Director of Research. On retirement, he spent the rest of his life in the Washington area, where he and his late wife Mary (to whom he was married for 50 years) could remain close to their two children and four grandchildren.

Bill's highly successful career was masked by his modest and unassuming demeanor. When he was appointed Deputy Minister, an unnamed former official was quoted as saying, "He may be technically the best economist in the country, but if someone hadn't told me how brilliant the guy was, I would never have known it." At the IMF, he had the reputational misfortune of following two larger-than-life legends, Eddie Bernstein and Jacques Polak, and then being followed by economists who by now are even more well-known, starting with Jacob Frenkel and Mike Mussa. Nonetheless, his time at the Fund was marked by a substantial increase in the role and reputation of the Research Department, especially through the conversion of the *World Economic Outlook* from a secret annual internal report into the Fund's flagship publication. Most importantly, one could not have hoped to work for a nicer man.

—James Boughton and Hugh Young

### Trade Integration (continued from page 16)

en shock propagation and synchronization, particularly in Asia. By contrast, China's role as a conduit for external shocks may diminish as its role as the region's "assembly hub" continues to decline.

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## IMF Economic Review

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## Announcement: New staff publication

The *Journal of International Money and Finance* recently published a special issue entitled "Understanding International Commodity Price Fluctuations" co-edited by Rabah Arezki (IMF), Prakash Loungani (IMF), Rick van der Ploeg (Oxford University), and Anthony J. Venables (Oxford University). The papers were presented at a conference in Washington, D.C., September 20-21, 2013, organized jointly by the Research Department of the International Monetary Fund and the Oxford Centre for the Analysis of Resource Rich Economies at the University of Oxford. The special issue addresses three key questions (i) Are commodity prices increasingly being driven by financial speculation?; (ii) Do newer techniques to forecast commodity prices beat a random walk? (iii) What are the economic and environmental impacts of new sources of energy supply?