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Research Summaries

Ten Years of NAFTA: Economic Integration in North America

Roberto Cardarelli

Ten years ago, Canada, Mexico, and the United States launched the world's largest free trade area under the North American Free Trade Agreement (NAFTA). This agreement represented a milestone in global trade policy, not just because of the size of the free trade area it created but also because of the comprehensiveness of the agreement. NAFTA covered merchandise trade as well as issues related to investment, labor markets, and environmental policies. In addition, it was the first comprehensive free trade agreement between advanced countries and a developing economy.

During the last decade, several papers have appeared that assess the impact of NAFTA on the economies of its members. This article briefly surveys recent IMF research on the effects of NAFTA on trade and financial flows in the region; on whether increased economic integration has resulted in a higher business cycle interdependence among NAFTA partners; and, finally, on whether free trade agreements have favorably affected growth performance of both Canadian and Mexican economies, and their catching up with the U.S. economy, over the past decade. *(continued on page 2)*

International Reserves

Jaewoo Lee

The ongoing integration of the international capital market has been accompanied by a new breed of capital account–driven financial crises and a subsequent rise in international reserve holdings by several emerging market economies. This article summarizes recent IMF research that sheds light on the role of international reserves in an era of increasing capital mobility.

International reserves are at the core of the IMF work: the change in international reserves over time reflects the net flow in the balance of payments, and a minimum level of net international reserves is an important element of IMF conditionality. Measurement of international reserves needs to be kept current and relevant, especially in light of the globalization of financial markets and the development of new financial instruments. The IMF's most recent guidelines on how to measure reserves are summarized by Kester (2000). Two core criteria for classifying external assets as reserves are to be "readily available to" and "controlled by" the monetary authorities. *(continued on page 5)*

Ten Years of NAFTA: Economic Integration in North America *(continued from page 1)*

A large body of research shows that the North American free trade agreements have been followed by a dramatic increase in trade and financial flows among partner countries. Kose, Meredith, and Towe (forthcoming) and Cardarelli and Kose (forthcoming) show that the free trade agreements played a significant role in increasing Canadian and Mexican exports to the United States over the 1990s, and changed the composition of sectoral trade flows across these countries. In particular, both Canadian and Mexican exports have shifted toward manufactured goods, and vertical specialization—the amount of imported goods embodied in exports—and intrafirm trade among the NAFTA partners have increased substantially.

However, isolating the effects of NAFTA on its members is a particularly difficult task: NAFTA came after a series of other trade agreements signed over the 1980s, including the 1988 Canada-U.S. Free Trade Agreement. Moreover, other significant shocks that occurred over the past decade may have affected trade and financial flows in the region. Using a gravity model to analyze the impact of NAFTA on Mexico's trade performance, Krueger (1999) finds that most of the increase in Mexican trade after NAFTA was driven by factors other than the agreement, including Mexico's unilateral reduction of tariffs following its entry into GATT in 1986 and the collapse of the Mexican peso in 1994. Using a shift-in-share analysis, Krueger (1999, 2000) also finds that, over the 1990s, Mexican exports gained shares in both the United States and the rest of the world, suggesting that NAFTA was a trade-creating, and not a trade-diverting, agreement. As for Canada and the United States, Bayoumi and Klein (1997) find that, despite the trade agreement and the geographical closeness, the United States-Canada border remains a significant barrier, and that Canadian provinces' trade balances respond much less to events in the rest of the world than they do to events within Canada.

A growing body of research assesses the extent to which business cycles in North America have become more synchronized. Studies that examine changes in the degree of correlation of business cycles across advanced countries have failed to reach a definitive conclusion, possibly because they use different data and methodologies. While Kose, Prasad, and Terrones (forthcoming) report that correlations of output and consumption fluctuations in Canada and the United States were higher in the "globalization" period (1986–2002) than in the Bretton Woods period of fixed exchange rates (1960–72), Helbling and Bayoumi (2003) do not find a statistically significant change in the correlations of the growth rates of GDP of Canada and the United States during 1973–2000.

Studies that analyze the relative importance of regional and country-specific shocks in explaining business cycle comovement have reached more uniform results. Kose, Otrok, and Whiteman (2003) suggest that the North American regional factor played an important role in driving macroeconomic fluctuations in Mexico, Canada, and the United States. Bordo and Helbling (2003) and Helbling and Bayoumi (2003) also find evidence that increased regional trade integration in North America led to an increase in synchronization of business cycles, and that common shocks are the dominant influence of the business cycle in the region.

Studying the impact of NAFTA on Mexican business cycles, Kose, Meredith, and Towe (forthcoming) show that output variability has declined in Mexico after the inception of NAFTA, and that business cycles within the NAFTA region have become more synchronized during the past decade. They also conclude that structural changes in the Mexican economy have decreased the role of country-specific shocks in driving the Mexican business cycle and led to a concomitant increase in the role of region-wide shocks. By studying a dynamic stochastic general equilibrium model, which is calibrated to reflect some basic features of the NAFTA economies, they also show that reductions in trade frictions that boost trade flows can cause a concomitant increase in business cycle interdependence. Similarly, Cuevas, Messmacher, and Werner (2002) find that business cycles in Mexico became more synchronized with the cycles in Canada and the United States after NAFTA.

Focusing on the changes in Canada's business cycle under the free trade agreement, Cardarelli and Kose (forthcoming) conclude that the increase in vertical specialization and intra-industry trade between Canada and the United States has helped strengthen business cycle linkages between the two countries. However, inter-industry trade and differences in industrial structure remain considerable, implying that sector-specific shocks could still lead to divergence of cycles. For example, the fact that Canada experienced a shallower downturn and a somewhat stronger recovery from the 2000 recession than the United States can be partly ascribed to Canada's smaller information technology sector. Focusing on the labor market, Prasad and Thomas (1997) also note that similar shocks in Canada and the United States could result in dissimilar labor market outcomes, both in the short run and in the long run, because of some differences in labor market adjustment mechanisms between the two countries.

The important role played by country-specific factors in explaining Canadian business cycles points to significant benefits associated with exchange rate flexibility. Arora and Jeanne (2001) argue that exchange rate flexibility has not slowed the pace of Canada-U.S. economic integration, and has been useful in isolating the Canadian economy from asymmetric external shocks.

Several papers address the impact of increased trade integration on the long-run growth prospects of Mexico and Canada. Kose, Meredith, and Towe (forthcoming) suggest that NAFTA may have favorably affected Mexico's growth performance over the past decade. In particular, the paper shows a dramatic increase in the average growth rate of investment after NAFTA. Arora and Vamvakidis (2004) conclude that half of the increase in Mexico's growth in the latter half of the 1990s was attributable to the growth performance of its NAFTA partners. However, they argue that it is difficult to assess the role played by NAFTA in accounting for output growth in Mexico, because Mexico and the United States had strong trade linkages even before the agreement.

As far as Canada is concerned, Cardarelli and Kose (forthcoming) find that increased exposure to trade has positively contributed to Canadian firms' total factor productivity over the last two decades, and that the relationship has strengthened under the NAFTA period. However, the labor productivity gap between Canada and the United States has remained wide over the 1990s, partly because of differences in the industrial structure of the two countries. In particular, industry growth accounting shows that after 1995 Canada's labor productivity performance has been as strong as that in the United States in many (non–information and communication technology (ICT) producing) manufacturing sectors, but Canada has lagged in some industries that have been intensively using ICT capital, especially in the service sector. Cerisola and Chan-Lau (2000) also show that Canadian firms have benefited from U.S. firms' R&D activity by accessing their best technologies.

The analysis of the NAFTA experience illustrates that, while important barriers remain, large gains could be derived from further steps to deepen economic linkages among its members. For example, differences in regulatory frameworks impede trade and investment flows; security concerns, which have become critically important during the past two years, slow cross-border flows of goods; and rules-of-origin requirements also restrict trade flows. As an example of the potential efficiency gains from deeper economic integration, recent research quoted in Cardarelli and Kose (forthcoming) suggests that the removal of rules-of-origin requirements and the harmonization of external tariffs—which has been under discussion among the NAFTA partners—could increase NAFTA countries' GDP by as much as 2–3 percent.

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June 2004

IMF Study on China

China's Growth and Integration into the World Economy: Prospects and Challenges

Edited by Eswar Prasad, with contributions from Steven Barnett, Nicolas Blancher, Ray Brooks, Annalisa Fedelino, Tarhan Feyzioğlu, Thomas Rumbaugh, Raju Jan Singh, and Tao Wang

China's transformation into a dynamic, private-sector-led economy and its integration into the world economy have been among the most dramatic global economic developments of recent decades. This paper outlines key developments in China's macroeconomy and economic structure. It also surveys the main policy challenges that will need to be addressed for China to maintain sustained high growth and continued global integration.

Section I summarizes the main issues. Section II focuses on the rapid expansion of China's external trade and the implications for its trading partners. Section III and IV analyze the determinants of price and exchange rate dynamics, respectively. Section V reviews recent fiscal developments and discusses potential medium-term vulnerabilities arising from the government's contingent and quasi-fiscal liabilities. Section VI examines the rising inter-regional disparities in income and other economic outcomes, and outlines reforms to center-local fiscal relations that could help mitigate some of these problems. Section VII discusses recent banking reforms and highlights the challenges in strengthening the financial sector. Section VIII surveys labor market developments, the prospects for employment growth, and measures to improve labor market outcomes.

This study was issued as Occasional Paper No. 232.

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International Reserves

(continued from page 1)

The new guidelines also seek to ensure that statistics on international reserves—deemed critical for preventing financial crisis—are transparent in the face of a plethora of financial derivatives and off-balance-sheet activities.

Measured properly, what long-term trend have international reserves been exhibiting? The answer, according to Flood and Marion (2002), is a steady increase. In percent of world GDP, international reserves increased threefold between the early 1960s and the late 1990s. While greater financial volatility over the last decade may have contributed to this upward trend, econometric estimates by Flood and Marion show that buffer-stock models explain only a small portion of reserves volatility during the Bretton Woods as well as the floating exchange rate period.

Taking a more eclectic approach, Edison (2003) uncovers several variables that are closely correlated with international reserves in a cross section of countries. Over the 1980s and 1990s, international reserve holdings of individual countries were positively associated with economic size (both income and population) and current account vulnerability (measured by the ratio of imports to GDP), and negatively associated with exchange rate volatility. Going beyond reduced-form correlations, Hviding, Nowak, and Ricci (forthcoming) find that a higher level of reserves contributes to lowering exchange rate volatility—through a signaling channel—even after controlling for differences in exchange rate regimes.

Indeed, a key reason for holding international reserves has been to stabilize the exchange rate through intervention in the foreign exchange market. Canales-Kriljenko and others (2003a, 2003b) examine current practices of official intervention and distill several lessons that may help conduct daily intervention operations under flexible exchange rate regimes. Turning to an econometric study of the real exchange rate changes in both advanced and emerging market economies, Dutta and Leon (2002) confirm that intervention remains an often-used policy tool of central banks.

Notwithstanding the prevalence of sterilized intervention—use of reserves exclusively for exchange rate management, without affecting the overall conduct of monetary policy—little theoretical support has existed for its efficacy. Kumhof and Van Nieuwerburgh (2002) contribute to narrowing this gap, by proving the effectiveness of sterilized intervention in a model where fiscal non-neutrality results in imperfect substitutability between domestic and foreign bonds. In a different vein, Black, Christofides, and Mourmouras (2001) develop a model of currency substitution in which the authorities accumulate reserves to meet precautionary demand for foreign currency, which is triggered by concerns about convertibility of domestic currency.

The financial market–driven crises of the 1990s have reemphasized the importance of an additional rationale for holding international reserves. For emerging markets confronted by volatile financial flows, maintaining a high level of reserves may be viewed as an act of self-protection, and appropriate operational guidelines have been considered in several IMF studies. Mulder (2000) endorses the short-term external debt as the first pass at the appropriate benchmark for reserves to be held by emerging markets, and Bussière and Mulder (2001) recommend factoring in the current account deficit and corporate debt as well. Wijnholds and Kapteyn (2001) suggest further enhancements to the recommended level of reserves that allow for the possibility of domestically driven capital outflow.

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Lending analytical support to these policy guidelines, Detragiache and Spilimbergo (2001) find that reserves reduce the likelihood of crisis, after accounting for the endogeneity involved in the level of short-term debts. While affirming the importance of liquidity measures—including reserves—in predicting crisis, they call for further analysis of the causal link between short-term debt and the probability of crisis. Disyatat (2001) shows that higher reserves enable a government to defend a currency under attack at smaller costs—thereby reducing the likelihood of crisis—because the government's financing cost otherwise usually increases with the market pressure against the currency.

Looking forward, stockpiling reserves need not be the most efficient preventive measure. Using a simple model of the insurance value of reserves, Lee (forthcoming) quantifies the extent to which emerging market economies appear to hold reserves in excess of the near-optimal level held by advanced economies—an excess that is attributed to the absence of cost-effective insurance arrangements. In an analysis of the IMF as a means of coinsurance, Chami, Sharma, and Shim (forthcoming) propose contractual arrangements that address the dual objective of safeguarding IMF resources and enhancing the welfare of the borrower. The authors show that the precommitted loan contracts create the right incentives for borrowers, but that precommitment creates a new problem of time inconsistency.

In addition to research on the level of reserves, the composition and management of reserves have also been extensively examined. Comparing the 1990s with the previous decades, Eichengreen and Mathieson (2000) find a remarkable stability in the relationship between the currency composition of international reserves and its key determinants, that is, trade flows, financial flows, and currency pegs. Williams, Polius, and Hazel (2001) analyze the experience of pooling reserves, including factors that enhanced the benefit of pooling, among countries in the Eastern Carribean Currency Union and the CFA Franc Zone. Clark and Polak (2004) reconsider the role of the SDR, which was first created as the solution to the likely shortage of international liquidity. The need for the SDR has weakened substantially as the joint supply of reserve currencies—dollar, euro, yen, and pound—has become fully elastic. However, the authors concur with the argument that SDR allocation can be a costless way to meet the demand for international reserves.

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Workshop on Dynamic Stochastic General Equilibrium (DSGE) Modeling

Douglas Laxton

The workshop was held in Washington during the week of April 26–30. The workshop consisted of a one-day miniconference on the use of DSGE models for policy analysis followed by four days of practical training, where participants were exposed to Bayesian estimation methods, techniques for doing formal welfare analysis, and a summary of the types of models that have been developed in the Research Department to support policy analysis at the IMF. The 104 conference participants represented 37 institutions from 22 countries. Fifteen participants were from academic institutions, 53 were from central banks (36 from industrial countries and 17 from emerging market economies), and the remainder were from the IMF and the World Bank.

Examples of DSGE models were presented at the first day of the workshop. Lawrence Christiano developed a DSGE model to study the Great Depression in the United States and concluded that a more accommodative monetary policy would have greatly reduced the severity of the Great Depression. Frank Smets provided an example of how Bayesian methods could be used to estimate DSGE models. Enrique Mendoza developed a DSGE model to understand the phenomena of "sudden stops" in capital flows to emerging market economies. He concluded that financial development that could alleviate collateral and working capital constraints could substantially improve macroeconomic performance. Michael Woodford presented a lecture on monetary policy under flexible exchange rate regimes and emphasized the importance of time consistency in designing monetary policy rules. Paolo Pesenti summarized a sample of the work on the Global Economy Model that was being done at the IMF. The presentations were followed by a round-table discussion where the panelists—Jarle Bergo, Ralph Bryant, Jordi Gali, Richard Harrison, Dale Henderson, Tiff Macklem, David Reifschneider, Tom Sargent, and Klaus Schmidt-Hebbel—commented on the papers and suggested extensions for the future. Generally, the panelists were encouraged by recent developments and the strong links that were being established between academic and policymaking institutions. However, they noted that more work would be needed to incorporate a more interesting role for fiscal policy into these models and to develop the necessary extensions for applying such models to emerging market economies.

Frank Schorfheide, Chris Sims, and Alejandro Justiniano provided an overview of Bayesian methods, including example programs that they developed to illustrate how these methods can be used in DYNARE, a software program developed by Michel Juillard and his team at CEPREMAP. Paolo Pesenti introduced participants to the theoretical structure of the Global Economy Model. Riccardo Colacito, Sagiri Kitao, and Yongseok Shin presented some examples that they developed to illustrate Bayesian estimation in DYNARE. Michael Kumhof presented his paper, "Fiscal Crisis Resolution: Taxation Versus Inflation."

Tommy Sveen presented preliminary work on developing a version of the Global Economy Model to support monetary policy analysis at the Norges Bank. Nicoletta Batini and Dennis Botman gave two examples of incorporating fiscal policy into DSGE models and provided simulations of the crowding-out and spillover effects of government deficits. Ayhan Kose, Jaewoo Lee, and Alessandro Rebucci summarized their work in progress on the implications of international trade in goods and assets. Philippe Karam presented examples, developed with Stephane Adjemian and Alejandro Justiniano, of how to do Bayesian estimation on small models designed to support policy analysis. Selim Elekdag, Jinill Kim, and Ivan Tchakarov highlighted the importance of moving beyond linear approximations of models and showed how higher-order perturbation analysis could be used to conduct more informative formal welfare analysis of alternative policy rules.

All of the available papers, presentations, and example programs can be obtained by e-mailing Laura Leon at *lleon@imf.org*. A special thanks to Laura Leon and Victoria Ashiru for running the conference so smoothly.