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Research Summaries

Waste Not, Want Not: Understanding the Efficiency of Health Expenditure

Francesco Grigoli and Javier Kapsoli



Public health spending is low in emerging and developing economies relative to advanced economies, and health outputs and outcomes need to be substantially improved. Simply increasing public expenditure in the health sector, however, may not significantly affect

health outcomes if the efficiency of this spending is low. In a recent paper, we quantify the potential gains in life expectancy from reducing the inefficiency of public health expenditure compared with improvements in other determinants of health, such as increasing public spending in health, raising education outcomes, and reducing tuberculosis and HIV diffusion. The results suggest that African economies have the lowest efficiency of public health spending. At current spending levels, they could boost life expectancy up to about five years if they followed best practices; by comparison, a 10 percent increase in public health spending per capita would raise life expectancy by only two months.

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Dismal Employment Growth in EU Countries: The Role of Corporate Balance Sheet Repair and Dual Labor Markets

Bas B. Bakker and Li Zeng



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but not in others. To close the large gaps between saving and investment, firms reduced investment and cut costs to boost profits. With much of the cost adjustment falling on firms' wage bills, employment losses were largest in countries under the most intense pressures to improve corporate profitability and with limited wage flexibility due to labor market duality.

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Waste Not, Want Not

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Previous research indicates significant inefficiencies in social spending in advanced economies as well as in emerging and developing ones (Herrera and Pang, 2005; Gupta and others, 2007; Verhoeven, Gunnarsson, and Carrillo, 2007; Afonso, Schuknecht, and Tanzi, 2010; Joumard, André, and Nicq, 2010; and Grigoli, 2012). Despite lower levels of spending for emerging and developing economies, such inefficiency leads to a considerable waste of resources (Grigoli and Ley, 2012), and reducing such waste can help to boost much-needed improvements in health indicators.

In recent years, the literature analyzing the efficiency of public expenditure has expanded considerably in advanced economies, but there are only a few contributions on emerging and developing economies. Most of the literature uses non-parametric techniques that do not control for the diverse set of factors that influence health outputs/outcomes. These factors include educational attainment; urbanization (which eases the access to health care); private levels of health spending; lifestyle behaviors (such as alcohol consumption); environmental factors (such as access to sanitation facilities and clean water); and contagious disease indicators (tuberculosis [TB] and HIV diffusion). If these factors are not incorporated in the analysis, then rankings based on the relationship between public health spending and outcomes alone can be misleading.

Emerging and developing economies are very different from advanced ones in terms of health system performance. From 2001 to 2010, public spending on health averaged 3.2 percent of GDP in emerging and developing economies, about half that of advanced economies. The differences are even more pronounced when measured in terms of spending per capita, where outlays in advanced economies are eight times the amount in emerging economies and the developing world. In terms of health outputs and outcomes, emerging and developing economies score systematically worse than advanced ones. A child is expected to live about 15 years longer in an average advanced economy than in an emerging and developing one. Even more striking are the figures for mortality rates. For example, the mortality rate for children under age 5 in emerging and developing economies is eleven times the rate in advanced economies. This heterogeneity in health sector performance is present not only across country groups, but also within the group of emerging and developing countries. This suggests that while public health expenditure is generally associated with

better health outputs and outcomes, there are significant differences across emerging and developing economies.

Both non-parametric and parametric techniques have been used in the literature to gauge the technical efficiency of public spending (see Ray, 2004, and Fried and others, 2008, for a comprehensive review of methodologies to gauge efficiency).¹ The former approach includes Free Disposable Hull and Data Envelopment Analysis, whereas the latter comprises a wide family of models generally known as stochastic frontier models, one of which is stochastic frontier analysis (SFA). These two families of methods have advantages and disadvantages. However, there are many environmental, economic, and social factors that affect

“Emerging and developing economies are very different from advanced ones in terms of health system performance.”

the performance of the health sector. Given the great heterogeneity across emerging and developing economies, it appears that SFA is a better choice for assessing the efficiency of health spending in these countries.

Our estimations show that variables other than public health expenditure have a significant impact on health-adjusted life expectancy (HALE). The estimates are generally robust for educational attainment and TB and HIV diffusion. A significant, but less robust impact is observed for private spending on health, population density (used as a proxy for access to health services), and access to sanitation facilities. The ranking of the most efficient countries is dominated by Western Hemisphere and Asian economies. The results indicate that African economies are the least efficient.

These findings are suggestive of the potential HALE increase that could be achieved if economies produced on the production frontier (that is, eliminated all inefficiency). For the least efficient quartile of countries, for example, 5.1 years of HALE could be gained by moving to the efficiency frontier. By comparison, a 10 percent increase in public health spending per capita would raise HALE by

¹ By technical efficiency we refer to the case where public goods and services are provided at the minimum cost. High levels of corruption, for example, may be a cause of low cost effectiveness. We do not assess allocative efficiency, which evaluates whether resources are allocated to the optimal mix of public programs.

Table 1. Means by Quartile of Technical Efficiency

	Actual				Potential Outcome Increase
	Obs	HALE	Public Expenditure Pc PPP	SFA Efficiency Score	HALE Increase
1st quartile	20	59.2	125.3	.972	1.7
2nd quartile	20	59.3	185.2	.956	2.7
3rd quartile	20	56.3	182.6	.942	3.5
4th quartile	20	52.2	278.4	.910	5.1

Source: Authors' calculations.

Table 2. Average Potential Gain from Reaching the Regional Average

(In HALE years)

	Public Expenditure Pc PPP	Years of Schooling	TB Diffusion	HIV Diffusion	Efficiency
Africa	1.2	0.1	6.5	0.4	1.5
Asia and Pacific	0.9	0.1	2.4	0.0	1.0
Europe	3.0	0.1	1.0	0.0	0.9
Middle East and Central Asia	4.1	0.1	1.3	0.0	1.3
Western Hemisphere	3.3	0.1	1.9	0.0	0.8

Source: Authors' calculations.

Note: Potential gains from each variable are calculated by multiplying the SFA coefficient by the increase needed to reach the regional average. Above regional average observations are excluded from the potential gain calculations.

only two months. The results are robust to changes in model specification and assumptions regarding the distribution of the inefficiency term.

Another way to assess the importance of improving the efficiency of spending is to compare its effects on HALE with improvements in other significant determinants of health outcomes. We calculate how much HALE could increase if we raised the performance of countries scoring below the regional mean on public spending, years of schooling, TB and HIV diffusion, and spending efficiency. The results indicate that bringing public health expenditure efficiency to the regional average would substantially lengthen HALE across regions.

These results also offer some insight on the most effective policies to raise HALE. The gains from increasing public spending and reducing TB diffusion are generally the largest. Years of schooling and reductions in HIV diffusion, however, would on average have only modest effects on HALE. Variable-specific effects by country are reported in our paper

(Grigoli and Kaspoli, 2013). Since these calculations are based on the SFA coefficients relative to the entire sample, these results must be interpreted with care. They nevertheless provide an idea on how reforms affecting these variables could affect health outcomes.

In conclusion, our findings suggest that there can be large gains in health outcomes by improving the efficiency of public health spending. Enhancing the efficiency of spending should thus be a core element of countries' reform strategies. The results also underscore the importance of the composition of health spending to improve its efficiency. In particular, spending aimed at efforts to control TB diffusion should be a priority.

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Dismal Employment Growth in EU Countries

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2 percent in Poland and Germany. These differences partly reflect differences in real GDP growth. Latvia, for example, with the largest decline in real GDP between 2008 and 2011, also experienced one of the largest reductions in employment. Poland, which had the largest increase in real GDP during this period, also had one of the best employment outcomes.

However, in a number of countries, the losses in employment far exceed what could be expected given the drop in output. This is particularly the case in Bulgaria, Ireland, and Spain. Spain had roughly the same decline in GDP as Italy, but employment dropped by only 2 percent in Italy, while in Spain it fell by 11 percent.

From Precrisis Borrowing Binge to Postcrisis Balance Sheet Repair

Between 2003 and 2008, the debt of the nonfinancial corporate sector increased sharply in many countries. The increases were particularly large in Bulgaria, Ireland, and Spain. The increase was the counterpart of a sharp deterioration of the nonfinancial corporate sector's saving-investment balance, which reflected both rising investment, and—in about half of the countries—a decline of corporate saving, that is, retained profits. By 2008, corporate investment exceeded saving by more than 5 percent of GDP in Latvia, Spain, Slovenia, Bul-

garia, and Portugal. The large gap made firms vulnerable to a sudden deterioration of financing conditions.

Once the global crisis hit, and capital flows dropped, the large saving shortfalls were no longer sustainable, and firms had to adjust. Between 2008 and 2011, the corporate saving-investment balances improved in almost all countries. The improvement was most dramatic in Latvia, Lithuania, and Spain. The improvement in the saving-investment balance resulted not only from cutting investment but also from boosting corporate profits and saving (viz., retained profits). Firms boosted profits by cutting costs, and much of the cost adjustment fell on firms' wage bills.

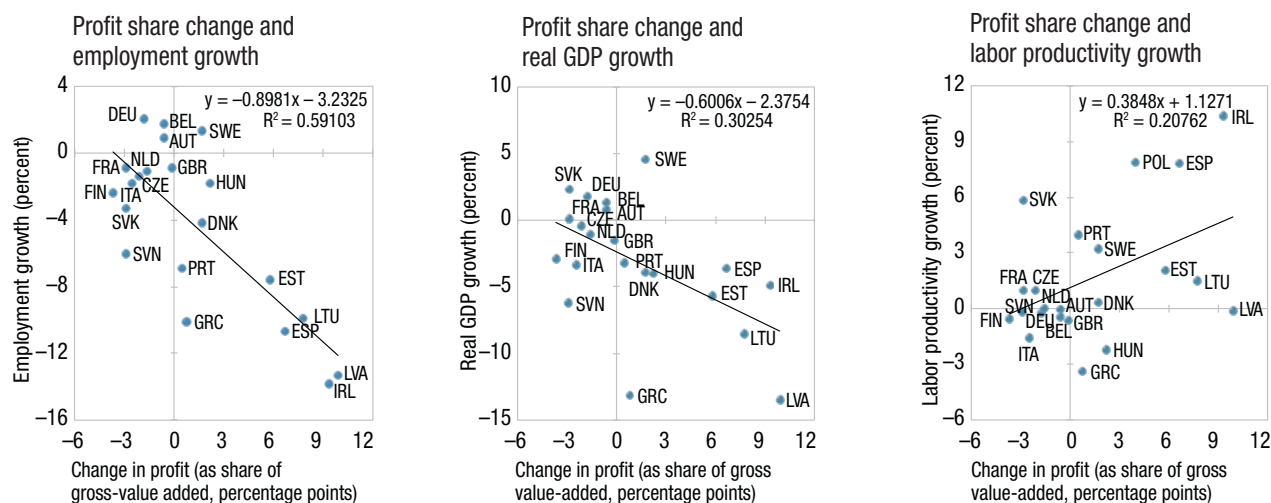
The differences in the extent to which corporate profit shares have increased between 2008 and 2011 are striking. It is noteworthy that the sharpest increases in corporate profitability occurred in countries where the debt had increased and profitability had fallen during the precrisis years, likely reflecting that pressures to boost profits were higher in these countries.

Corporate Restructuring Hurt Output and Employment

The increase in profit shares was associated with a reduction in output and an increase in labor productivity, both of which hurt employment (Figure 1):

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Figure 1. Change in Profit Share of Nonfinancial Corporate Sector, 2008–2011



Sources: IMF, *World Economic Outlook* database; Haver Analytics; and IMF staff estimates.

Dismal Employment Growth in EU Countries

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- During 2008–11 there was a *negative* relationship between the increase in the profit share and GDP growth. Profit shares increased sharply in several countries with large output declines, while they declined in a number of core euro area countries where output increased. This suggests that—for this particular period—causality did not go from GDP growth to profits, but rather that corporate restructuring (which boosted corporate profits) had a negative impact on GDP.
- Larger profit share increases were also associated with bigger increases in labor productivity. The increase in productivity likely reflects restructuring by enterprises to produce the same output with fewer workers. It may partly also reflect a composition effect, as sectors with lower labor productivity (including, in particular, the construction sector in some countries) were hit disproportionately by the crisis.

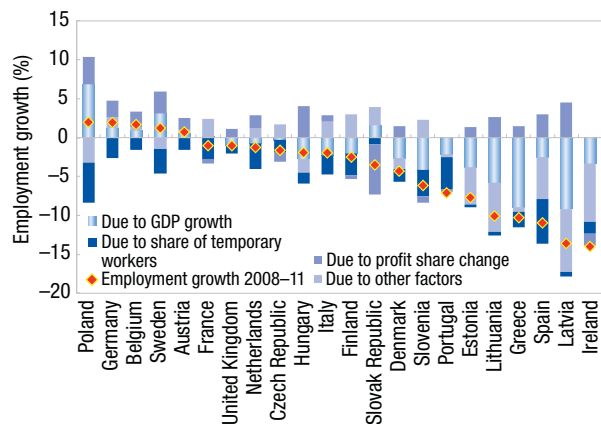
The combination of a sharp increase in labor productivity with a decline in output is very different from the positive relationship observed during normal times. Between 2003 and 2008, faster GDP growth was associated with higher labor productivity growth. Between 2008 and 2011, this relationship broke down, and labor productivity growth was fastest in some of the countries with the largest output declines.

Labor Market Duality Did Not Help

There are large differences across European countries in the duality of the labor market. In some countries a large share of employment consists of temporary jobs. In these countries there is a stark difference between insiders (who have permanent jobs and cannot easily be fired) and outsiders (who have temporary jobs).

We would expect that countries with dual labor markets will see sharper reductions of employment than other countries. For a given level of output, profit shares can be increased either through employment reductions or wage declines. In countries with dual labor markets, it is likely that much of the adjustment will go through employment reductions rather than wage cuts, as insiders have little incentive to adjust wages, while outsiders can easily be fired. Indeed, we show in our paper that in countries with a high share of temporary employment, real wage growth is much less sensitive to unemployment changes.

Figure 2. Decomposition of Employment Growth 2008–11



Sources: IMF, *World Economic Outlook* database; Haver Analytics; and IMF staff estimates.

Econometric Analysis

Econometric regression analysis confirms that the three factors discussed—real GDP growth, corporate balance sheet repair, and labor market duality—all contributed to the large cross-country differences in employment growth during 2008–11. The results are robust to introducing other precrisis imbalance measures to the model, such as current account deficits and the size of the construction sector.

A decomposition exercise illustrates the important roles of both the increase in corporate profits and labor market duality in the large drop in employment that occurred in a number of countries. Figure 2 shows that among all the countries where employment dropped by more than 7 percent, with the notable exception of Greece, the increase in profits accounted for more than 50 percent of the job losses. The figure also shows that labor market duality contributed over 4 percentage points to the employment losses in Spain, Poland, and Portugal.

Policy Implications

The analysis in this paper suggests that the large employment losses in many countries have been the result of a corporate adjustment process, which helped restore the financial health of the corporate sector. While the adjustment has deepened the recession, it has also helped set the stage for renewed growth.

It is difficult to determine *ex ante* when the corporate adjustment will have run its course. There are, however, signs that in at least some of the crisis-hit countries, the process may be nearing its end. For instance, in Ireland, the profit share stopped increasing and the wage bill ended its decline

during 2012. At the same time, its employment started growing again and the unemployment rate started to come down.

The results also suggest that there is a trade-off between wage adjustment and employment losses and that in some countries employment losses would have been smaller if wages had adjusted more. Wage adjustment is preferable to employment adjustment because the former helps distribute the burden more equitably, while the latter negatively affects human capital and the potential growth rate.

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Seven Questions on Financial Interconnectedness

Co-Pierre Georg and Camelia Minoiu

Financial interconnectedness, the ensemble of relationships among economic agents created through financial transactions, can be an important source of systemic risk. A better understanding of the consequences of financial interconnectedness through the lens of network analysis is currently a leading objective of academics and policymakers. This Q&A article provides brief answers to seven questions on financial interconnectedness in light of a growing body of research on financial networks, including contributions by the authors. The findings of this literature suggest that financial interconnectedness plays a crucial role in the transmission of shocks and that there is a lot to learn from network analysis about the resilience of financial systems.

Question 1. What is financial interconnectedness?

Financial interconnectedness refers to direct and indirect linkages among financial institutions. These linkages can take many forms. For example, contractual connectedness is the dependency of one institution on another that stems from contractual obligations (such as ownership, loans, and derivatives) between the two institutions. Banks that participate in the interbank market, for instance, become interconnected as they become exposed to one another through lending and borrowing operations. Financial institutions also create common exposures when they invest in the same asset; this is a more complex and less studied type of linkage.

Both types of linkages are closely related to economic phenomena such as financial contagion and spillovers. Financial contagion is the process by which an adverse shock at one financial institution can have negative consequences for many others. Contractual connectedness in the interbank market can lead to interbank contagion, by which the default of one bank leads to losses and the subsequent default of another bank. This may trigger a default cascade. Interconnectedness due to common exposures can lead to spillovers and correlation in bank performance. When a liquidity-constrained bank sells off its assets, other banks may incur losses due to the assets' falling market price and mark-to-market pricing.

Analyzing the interconnectedness of economic agents—the ways in which they are directly and indirectly connected—can thus help sharpen our understanding of contagion and spillovers.

Question 2. What can be learned from modeling financial interconnectedness among economic agents as a network?

One of the key lessons from the global financial crisis is that it is not sufficient to supervise banks at the micro level, that is, by monitoring their balance sheets in isolation. Rather, microprudential supervision needs to be complemented with macroprudential oversight, which takes financial interconnectedness into account. Network theory can help us understand the complex structure of modern financial systems. Using insights from the network formation literature, we can analyze how markets are formed and how they evolve over the business cycle. When we model the set of financial linkages as a complex network, we can use the rich set of tools from network theory to assess the stability of the financial system. We can also better understand which areas of the financial system are most vulnerable to shocks, which banks' defaults trigger more subsequent defaults, and how contagion spreads.

Question 3. Is there a link between the structure of a financial network and financial stability?

One of the most mature areas of financial network research looks at how an initial default is transmitted to the rest of the financial system. Will the default cascade “die out” after a few rounds, or will it eventually cause a systemic breakdown? Network theory shows that many financial networks exhibit a so-called tipping-point property: below a critical level of interconnectedness, initial defaults are contained irrespective of the network structure. Above this threshold, however, initial defaults can turn systemic, leading to the collapse of the entire financial system. This leads us to ask under which conditions the structure of financial interconnectedness matters for contagion. Georg (2013) shows that during periods of macroeconomic stress, the network structure determines the extent of contagion. Furthermore, some network structures are more resilient to random shocks than others. Roukny and others (2013) show that there is no network structure that is universally most robust.

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Seven Questions on Financial Interconnectedness

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Question 4. What does financial network analysis tell us about social efficiency?

Most studies on financial networks assess the resilience of different network structures to initial shocks but do not undertake welfare analysis. A recent strand of the literature analyzes the efficiency of the resource allocation process in markets that can be modeled as trading networks. Gofman (2012) shows that intermediation in over-the-counter markets (such as repo markets) can lead to inefficient resource allocation when the network is insufficiently dense. This work establishes a link between network structure and efficiency and raises important questions about optimal network structure. Are resilient networks also socially efficient? Can trading in a less resilient, but more efficient financial network, also be welfare-improving? Answering these questions will be critical for the study of macroprudential regulation.

Question 5. What do empirical financial networks tell us about contagion and systemic risk?

There is relatively little empirical work in this area largely because granular data are scarce. Hale, Kapan, and Minoiu (2013) map the network of interbank exposures created through syndicated lending for more than 5,500 global banks. Through these bank-level linkages they then trace the direct and indirect channels of crisis transmission. Direct channels refer to cross-exposures by which the default (non-payment or loan restructuring) by a borrower would impair the financial performance of its lender. Indirect channels refer to chains of banks in which payment default by a borrower would trigger a chain reaction. Such an event would affect not only the financial performance of the bank's immediate lenders, but also that of the lenders to those banks, the lenders to the lenders of those banks, and so on. They find that higher bank exposures to crisis countries are associated with lower bank return on assets, whereas higher exposures to non-crisis countries leave bank profitability unchanged.

Using data from the European large-value payment system TARGET2, Gabrieli and Georg (2013) show that a bank's position in the interbank network prior to a liquidity shock has a significant impact on the bank's access to liquidity after the shock. They focus on ultimate providers and users of liquidity. Providers are typically smaller banks that transfer liquidity to users along an intermedia-

tion chain within the financial network. Banks that obtain liquidity through longer intermediation chains are more vulnerable to disruptions along the chain and thus have a harder time obtaining liquidity after the shock. Their paper illustrates how money market freezes can better be understood through the lens of network analysis.

Cai, Saunders, and Steffen (2014) show that interconnectedness of banks through common asset exposures is a major source of systemic risk. It turns out that many of the top originators of syndicated loans are both highly interconnected and on the Financial Stability Board's list of Global Systemically Important Financial Institutions. Banks' degree of interconnectedness in the co-syndication network is a predictor of their contribution to systemic risk. This study shows that there are both a bright and a dark side to loan syndication: while it offers opportunities for portfolio diversification, it also leads banks to concentrate risks and become more vulnerable to systemic shocks.

Question 6. Does financial interconnectedness predict crises?

After the global financial crisis, central banks and regulators have stepped up efforts to improve their early warning systems (EWS). The previous literature, which was concerned mostly with currency and debt crises in emerging markets, had identified early signal indicators such as high credit and asset price growth, low international reserves, real exchange rate overvaluation, and excessive short-term and foreign debt. The global financial crisis has shown that financial interconnectedness—a factor previously ignored in EWS—has been a potent factor in amplifying shocks and transmitting them across borders.

Minoiu and others (2013) examine the link between country-level indicators of interconnectedness in the global banking network (visualized in Figures 1 and 2) and the likelihood of systemic banking crises. They compute two types of network-based indicators: (i) the number and intensity of countries' financial links; and (ii) the number and intensity of their neighbors' links. The results show that a country's own interconnectedness rises markedly a few years before the onset of a crisis, and levels off afterwards. In addition, a country's neighbors experience a decline in interconnectedness before the onset of a crisis in that country. Their models predict crises more accurately—both in and out of sample—when they include financial connectedness measures in addition to standard macroeconomic variables. The implication is that network-based indicators of connectedness have

rich informational content that could be exploited to improve existing EWS.

Question 7. What are the policy implications of recent research on financial connectedness?

Recent research on financial networks shows that there is much to learn about the resilience of financial systems from network theory. Some of the policy-relevant lessons from this growing literature are that:

- there is a strong link between network structure and the propagation of shocks;
- network-based measures of interconnectedness have predictive content for financial crises; and
- highly interconnected banks are also systemically important.

Future research should focus on better understanding the structure of financial networks originating not just from interbank liabilities, which are relatively well studied, but also from other linkages such as derivative contracts, common exposures, and ownership. Ongoing efforts to enhance regulatory data collection and dissemination practices, both at the national and international levels, can help narrow the gap between the theory and empirics of financial networks, and further support the development of recommendations for policy.

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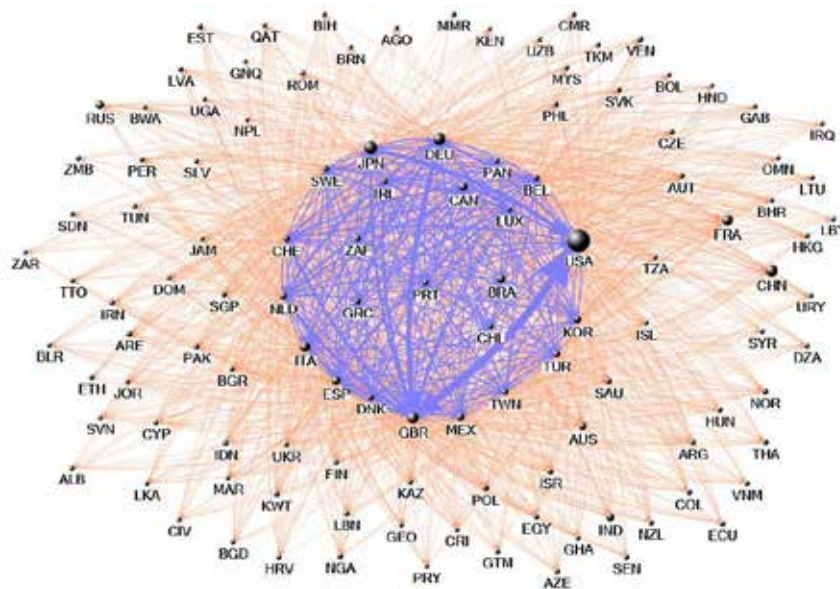
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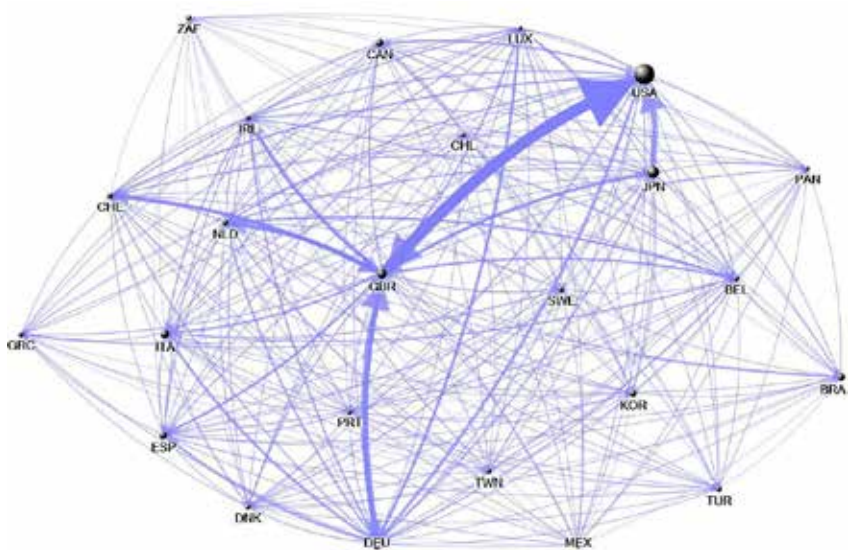
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Figure 1. Cross-Border Linkages



Notes: The figure depicts the network of cross-border bank linkages in 2007 for 116 countries (nodes). Edges are directional, representing cross-border claims of banking systems in 24 BIS reporting countries vis-à-vis residents in other BIS reporting countries (blue) and non-reporting countries (orange). Edge width increases with the size of cross-border claims. Node size increases with the size of the economy (measured by GDP).
Sources: BIS locational banking statistics and *World Economic Outlook*.

Figure 2. Cross-Border Bank Linkages Among Selected BIS Reporting Countries



Notes: The figure depicts the sub-network of cross-border bank linkages in 2007 for 24 BIS reporting countries (nodes). Edges are directional, representing cross-border claims of banking systems in these countries vis-à-vis one another. Edge width increases with the size of cross-border claims. Node size increases with the size of the economy (measured by GDP).
Sources: BIS locational banking statistics and *World Economic Outlook*.

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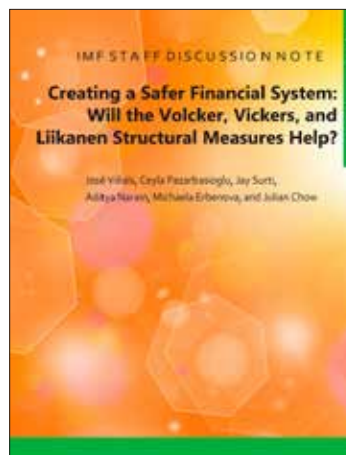
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