revenue volatility (given heavy reliance on investment income and revenue from land sale). Despite Hong Kong SAR's healthy fiscal position, its sovereign CDS spreads have spiked during the recent crisis episodes and tracked those of the UK rather closely, most likely reflecting high degree of interconnectedness to UK banks.

The propagation of shocks through the trade and financial channels will be captured in the general equilibrium simulations presented below. These simulation models are calibrated based upon the historical patterns of financial and trade spillovers between the country blocks in the model. While disruptions to the dollar funding base are not explicitly featured in the frameworks used for the simulations, the effects such disruptions could have on Hong Kong credit markets and financial conditions are captured by widening the spreads in Hong Kong SAR in response to the tighter financial conditions in the euro area. This financial linkage across regions is present in the data, as displayed above, and we calibrate the credit spread response from past correlations.

III. FRAMEWORKS

Two frameworks are used to gauge the potential spillovers to Hong Kong SAR of a downturn in Europe and Mainland China: the GIMF and the GVAR.

A. Overview of the GIMF

Details of the model's equations are available in Kumhof and Laxton (2009), but we provide a brief summary of the main features.

The model includes unions, manufacturers, capital, investment and consumption goods producers, distributors, households, the government, and banks. Each economy is populated with two types of households: overlapping-generations households and liquidity-constrained households. The main difference between these two types of households is that the latter do not have access to financial markets, and hence are unable to consume more than their after-tax income each period. Both types of households consume retailed outputs and supply labor to unions. Households with access to financial markets hold domestic currency denominated bonds issued by their government or banks, and foreign currency denominated bonds.

Labor Market

There is a wide variety of labor supplied by unions. Unions buy labor services from households and sell them to manufacturers at a premium. Imperfect substitutability between the varieties of labor provides the unions with market power over manufacturing firms. Unions face nominal rigidities in their price setting behavior.

Goods Market and Trade

The production of final consumption and investment goods starts with manufacturers producing tradables and nontradable goods using physical capital rented from entrepreneurs, labor from unions, and energy from global market. The manufacturing goods are then sold to domestic distributors and import agents who operate in foreign economies—this is the first layer of multilateral trade (intermediary goods). Distributors combine domestic and foreign-

produced tradable goods with public infrastructure to produce an output that will be used in the production of domestic consumption and investment goods, and will be exported abroad—this is the second layer of multilateral trade (final goods). Investment goods producers sell their final composite to entrepreneurs and the government; consumption goods producers sell their final composite to the government; and retailers sell their output to households.

Manufacturers and distributors face nominal rigidity in price setting, while retailers and importers are subject to real rigidities since it is costly to rapidly adjust their sales volume. Manufacturers are also subject to real rigidities in capital accumulation.[3] The model's wide range of rigidities in labor and product markets implies that prices are higher than they would be under a more competitive environment (prices are set as a markup over marginal costs in these markets).

Entrepreneurs and Banks

Entrepreneurs purchase a capital stock from capital producers, who are subject to investment adjustment costs, and they then rent this capital to manufacturers. Entrepreneurs finance their capital holdings using a combination of external and internal financing—that is with loans from banks and their own cash flow. They are subject to a capital income tax, face idiosyncratic shocks that affect the value of their capital at each period, and decide of the level of capital utilization. Entrepreneurs that encounter adverse shocks can have the value of their capital fall beyond a certain level, finding themselves unable to service the loans that they contracted to buy the capital. Those entrepreneurs are considered bankrupt. In such a case, banks recover only a proportion of the value of their assets, with a recovery rate that is stochastic.

Capital producers produce the capital stock that entrepreneurs rent to manufacturers in the non tradable and tradable sectors. Capital producers pay dividends to households in the form of lump sum transfers from their profits. To produce the capital stock these capital producers buy previously installed capital from entrepreneurs and increment it by the flow increase in the capital stock provided by investment goods producers. The previously installed capital stock that they use each period depends on the capacity utilization rate that entrepreneurs have chosen to employ.

Financial Sector

Banks lend funds to entrepreneurs by borrowing from households (through deposits) and charging entrepreneurs a premium—the external finance premium or spread—depending on their riskiness and the perceived state of the economy. A lower external finance premium reduces the cost of capital and, thus, increases the demand for loans from banks. The total amount of capital that is purchased by entrepreneurs increases leading to higher profits and more dividends paid to households. This, in turn, raises private consumption. At the same time, the higher capital utilization rate, the lower cost of financing, and the increased net

[3] For more details, see N'Diaye, Zhang and Zhang (2010).

worth of the entrepreneurs feeds through into higher aggregate investment. The higher path for output, net worth, and asset prices further lowers the external finance premium creating a feedback process to increased credit growth, higher asset prices and faster output. This is at the core of the financial accelerator mechanism in this modeling framework.

Monetary Policy

Monetary policy is characterized in two ways: either there is a clear commitment to stabilizing output growth and inflation under a flexible exchange rate regime (employing a Taylor rule approach to setting short-term interest rates; or the monetary authority maintains a managed float exchange rate regime whereby smoothing exchange rate fluctuations becomes an additional objective of monetary policy. At the extreme under a fixed rate regime, such a monetary policy can be directed at stabilizing the exchange rate (as in the case of Hong Kong SAR). Monetary policy has real effects in this model because of the layers of nominal rigidities that are assumed. These nominal rigidities are compounded by real rigidities in labor hiring, capital investment, imports of investment and consumption goods, distribution, and retail sales.

Fiscal Policy

Fiscal policy matters both in the short term and in the longer term in the GIMF because the model has four key assumptions that imply non-Ricardian features: (i) households have finite economic lifetime which makes them incorporate in their spending decisions only the effects of fiscal policies that are likely to occur during their lifetime; (ii) some of the households are liquidity constrained and are forced to consume all their after-tax income every period; (iii) households' labor productivity declines with age, which implies a higher discount rate for future labor income tax than otherwise; and (iv) labor and consumption taxes are distortionary because they affect labor effort and spending behavior. Fiscal policy aims at stabilizing the debt-to-GDP ratio over the long term by controlling spending or levying taxes. Public spending on investment is productive, providing longer-term output benefits. Governments levy lump-sum taxes, a consumption tax, a labor income tax, and a capital income tax.

Calibration

The model has been calibrated building on the work done in conjunction with HKMA staff.[4] In terms of the monetary framework, it is assumed that emerging Asian countries block peg their currencies to the U.S. dollar, while all other regions follow a floating exchange rate regime. For economies where the exchange rate is allowed to float, monetary policy aims at stabilizing output and inflation.

[4] See N'Diaye, Zhang, and Zhang (2010) for more details.

B. GVAR

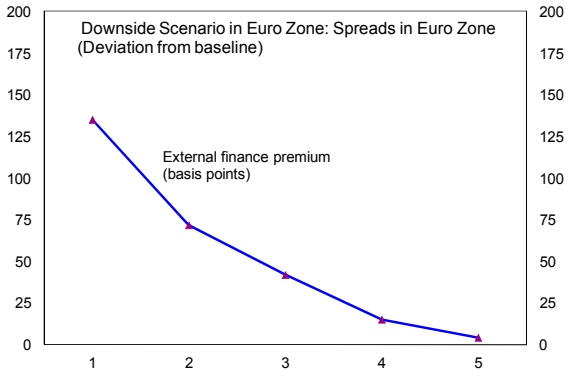
The GVAR provides a dynamic multi-country framework suitable for the analysis of interdependence and international transmission of shocks. The GVAR model comprises 30 countries—21 advanced and 9 emerging—and is based on Chen et al. (2010). The model has real and financial variables: industrial production (a proxy for GDP), real effective exchange rate, real money market rate, real share prices, and a measure of potential financial stress (the asset-weighted average expected default frequency of banks and nonfinancial corporates). The latter captures the role of credit in the transmission of financial and real sector shocks. Monthly data are used (Jan 1996–Dec 2008). Given China's rapidly changing economic structure, an estimated model like the one used here cannot speak to the long-term impact of shocks or changing policies. Balance sheet quality is captured through estimated default probabilities (EDFs); the EDFs have predictive power on the strength of credit growth one year ahead (the unconditional correlation between credit growth and one-year lagged EDF is around -0.5), even though credit is highly influenced by official actions in China.

IV. SCENARIOS

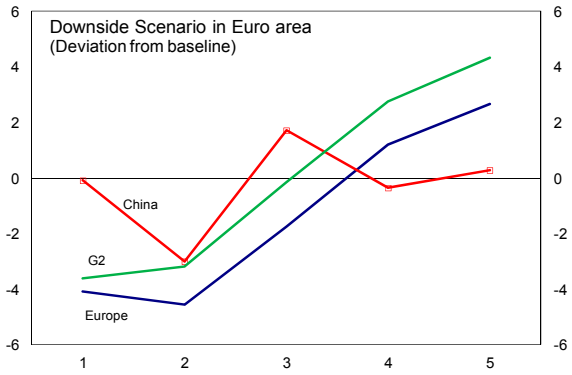
Two scenarios are envisaged: (i) a downturn in euro area activity owing to a further deterioration in the European sovereign debt crisis and (ii) a hard landing in Mainland China.

A. Illustrative Scenario of Euro Area Financial Distress

This illustrative scenario assumes that euro area economies are unable to restore confidence and banks are forced to realize losses from holdings of public debt and general macroeconomic fallout. These losses would erode capital and to restore it, banks would be forced to contract credit by about $250 billion reflected in average credit spreads increasing by about 150 basis points relative to baseline (with some countries at the periphery facing larger increases in spreads than others in the core of the euro area).[5] This tightening in financial conditions and further deterioration in the business environment in the Euro Area would persist for two years and then fade away gradually over the following three years as balance sheets adjust and deleveraging works through the financial system. Widening spreads in Europe will affect the rest of world given the global financial inter-linkages. Credit spreads increase in the U.S. by about 50 basis points (about a third of the rise in European spreads) because of the relatively limited net exposure of U.S. banks to European banks.



[5] The assumed decline in credit and associated rise in credit spread is about half the amount assumed in the WEO 2012 update downside scenario.



With interest rates near zero in many advanced economies, it is assumed that policy interest rates have little room to react in the euro area and in the United States. In addition, the deterioration in fiscal positions following the 2008–09 response to the global financial crisis means that there is also no room for additional discretionary fiscal policy response. In China, on the other hand, there is ample room to loosen fiscal policy. The scenario assumes that the Chinese authorities implement a fiscal stimulus of around 3½ percent of GDP for the first two years and gradually unwind that stimulus during the following three years. Despite this fiscal response China's growth still falls by 3 percentage points below the baseline in the second year following the shock.

In the euro area, tighter financial conditions and deteriorating business environment would initially lead firms to lower investment spending and shed labor. Private consumption would drop as labor market conditions worsen. Euro area's import demand from the rest of the world would therefore decline. The rest of the world demand for the euro area's exports also falls as global trade slumps and the Euro appreciates in real effective terms. Financial conditions tighten in the U.S. as banks curtail lending in order to protect their balance sheets.

Weaker growth in the euro area and deteriorating prospects for future profits reduces the net worth of firms—reflected in falling stock prices—which in turn depresses their collateral value and further lowers domestic demand in an adverse feedback loop.

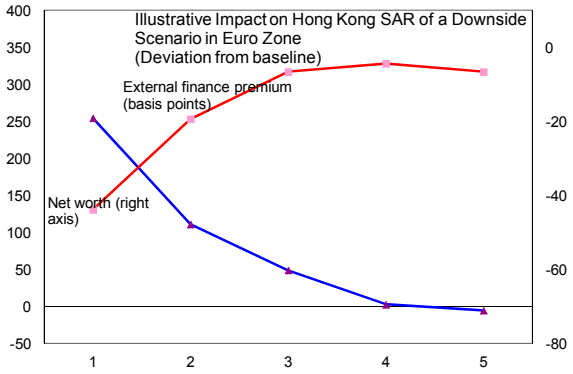
The impact on Hong Kong SAR's trading partners' growth would be substantial. Output would fall by around 4 percent below baseline during the first two years in the euro area alone. G2 output would decline by 3 percent from baseline during the same period. Meanwhile, China's output would be insulated the first year as government spending helps cushion the impact of the downturn in the euro area. In the second year, however, output contracts by around 3 percent below baseline as we assume no new stimulus is put in place while growth in euro area and the rest of the world remains depressed. Part of the contraction in output growth in China would stem from lower demand for China's exports and part from weaker domestic demand, particularly investment. Investment in China weakens because the outlook for manufacturing firms activity and future profits worsen, their net worth deteriorate, the risk premium rises, and financial conditions tighten. Weaker growth prospects feed through to lower employment and hence consumption.

Spillover to Hong Kong SAR

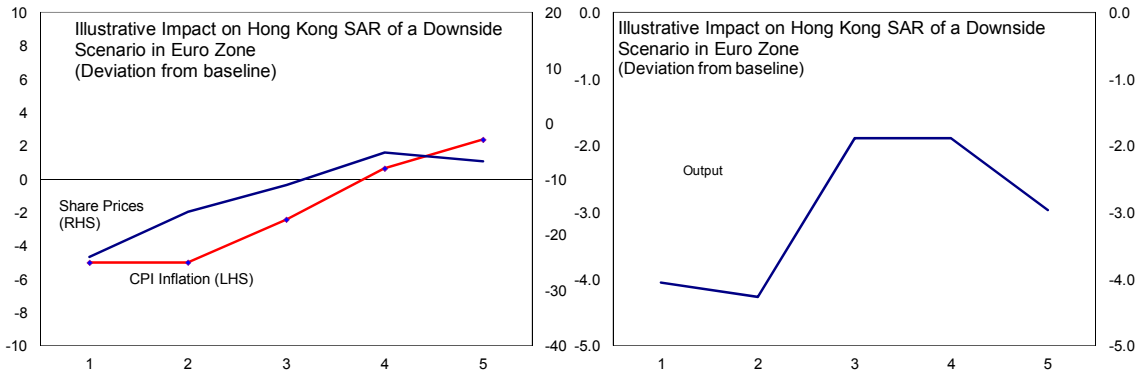
Financial distress in the euro area would spill over to Hong Kong SAR both through the trade channel and the financial channel. While the transmission through the trade channel is fully captured in the model, the financial transmission channel is less so. In the GIMF, external shocks to trade affect domestic financial conditions through the impact trade has on growth, profit opportunities, employment, and hence corporates and households net worth. But this

channel is an indirect one. Direct impacts of exchange rates and interest rates fluctuations on wealth—valuation effects—are also captured. However the model does not capture general confidence effects associated with financial disruptions and correlation across asset market that typically rise during times of distress. To capture this, we assume the shocks are correlated across regions with the correlation coefficient determined by the size of the financial linkages (exposure to euro area) between regions. The model does not however capture the impact tighter interbank markets conditions could have on credit conditions faced by corporates.

Lower demand for Hong Kong SAR's exports to the euro area and other trading partners would cause Hong Kong SAR's investment, profits, labor market and private consumption to fall. Imports would collapse (by about 10 percent below baseline) as a consequence. This initial shock would then be amplified through a financial accelerator mechanism. The expectation of a fall in future profit and growth would reduce the corporate sector's net worth by about 40 percent below baseline in the first year, depressing stock prices by 20 percent and with it the value of the corporate sector's collateral. This reduced availability of collateral, in turn, further decreases credit leading to lower domestic demand, particularly for investment. Falling stock prices also weigh down on private consumption through the standard wealth effect. Falling demand then leads consumer price inflation to decline by as much as 5 percentage points below baseline, effectively pushing the economy into deflation.



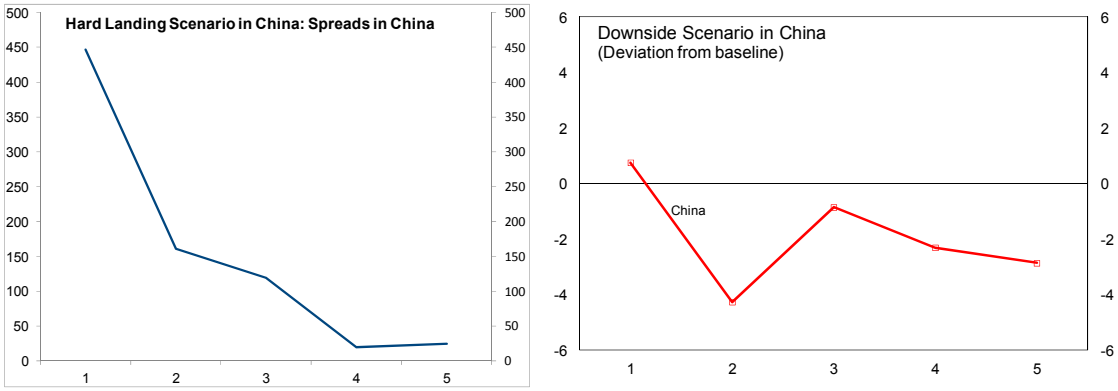
Without policy response, Hong Kong SAR's output loss would be significant at 4-4½ percent below baseline during the first two years, pushing Hong Kong SAR back into recession for the second time in three years. Even five years later Hong Kong SAR would not get back to pre-crisis output levels. The process of adjustment back toward steady state during the first five years takes place rather speedily for private consumption and investment, but weaknesses in trading partners' activity delays the complete return to trend growth. Adjustment would be quicker if the Hong Kong government were able to put in place a substantial fiscal policy response, similar to the one implemented in the aftermath of the 08/09 global financial crisis, to boost domestic demand and compensate for sluggish external growth. The size of the response would depend on whether the rest of the world implements a fiscal package or not given Hong Kong SAR's high openness. It is likely many emerging economies would have enough fiscal space to put in place a package in response to the slowdown while advanced economies outside of the euro area will likely not have room.



B. Illustrative Scenario of Mainland Hard Landing

GIMF Model

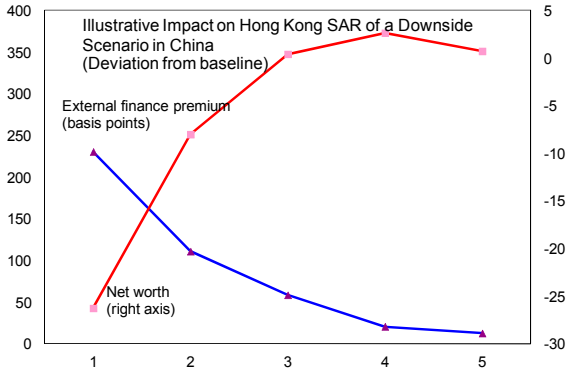
In this scenario, a collapse of the property market causes a sizable portion of credit to local government financial platforms, the real estate sector, and small and medium enterprises to become impaired. As a result of such losses, financial conditions tighten in China with credit spreads surging by 450 basis points. This initial shock lasts for two years and fades away gradually over time. It is also assumed that the Chinese government's ability to respond through credit pump priming is limited during the first two years, owing to worsening bank balance sheets. The end-result of these credit losses would be to cause the Mainland economy to contract by roughly 4¼ percent by the second year.

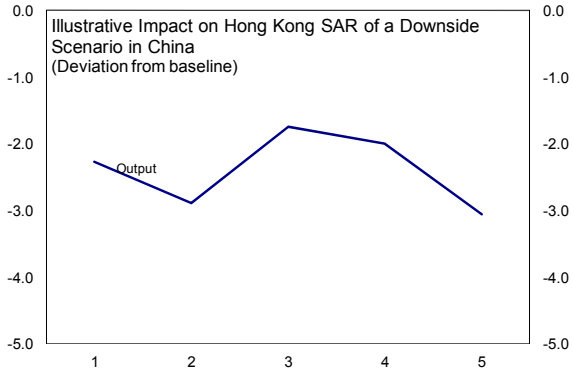


Such a weakening of activity in the Mainland would have significant effects on activity in Hong Kong SAR both through the trade and the financial channels. Through trade, the mechanism at play would be similar to the one described in the scenario where an external shock emanate from Europe with the exception that services trade (not captured in the GIMF) would also be hit. Spillovers from financial channels would be compounded by the fact that Hong Kong SAR's financial institutions have a large presence on the Mainland and provide services to Mainland corporations, the quality of which is likely to deteriorate markedly under this hard landing scenario.

Worsening growth prospects in Hong Kong SAR would depress employment, consumption, investment, and credit demand from households and corporations in both Hong Kong SAR

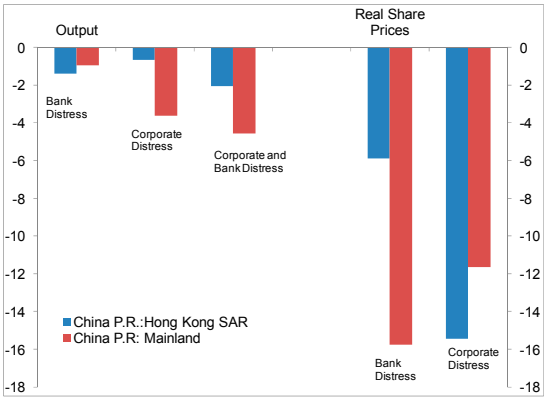
and the Mainland entities. Hong Kong Corporations' net worth and equity markets would decline, which would further depress private consumption and investment spending. Overall, Hong Kong SAR would be on a sustained downturn with output falling by about 3 percentage points below baseline in the first two years.





GVAR

The GVAR sheds further light on the potential impact financial distress in China's corporate sector could have on Hong Kong SAR's economy in the short term.[6] Indeed, a deterioration in the quality of Chinese nonfinancial and financial corporations could have substantial effects on Hong Kong SAR, with the ultimate impact on Hong Kong output possibly 1¼ times larger than the effect such shocks could have on China's output (in the case of financial corporation distress). Share prices would also be affected in both economies. These results highlight the strong trade and financial linkages between the two economies.



V. Conclusions

The analysis above has shown that a renewed global slowdown or hard landing in Mainland China pose significant risks to Hong Kong SAR's economy. As a highly open, international financial center, Hong Kong SAR would be hit hard, possibly falling into recession and deflation, as such shocks spill through both trade and financial channels. Nevertheless, Hong Kong SAR' strong fundamentals including its sizable fiscal reserves, proactive financial regulatory environment, and prudently managed banks leave it well placed to handle even very large shocks.

[6] The large size of the services sector reduces somewhat the appropriateness of industrial production as a proxy for output in Hong Kong SAR. Nevertheless, the correlation between GDP growth and industrial production growth remains high at about 0.82 (during 2006-2011).

REFERENCES

BIS (2011), *BIS Quarterly Review*, *Statistical Annex.,* Basel: Bank for International Settlements. December.

Chen, Q., D. Gray, P. N'Diaye, H. Oura, and N. Tamirisa (2010), "International Transmission of Bank and Corporate Sector Distress," IMF Working Paper No. 10/124A (Washington: International Monetary Fund).

Fitch Ratings (2011), "China's Growing Importance for Hong Kong Banks," Special Report, October 24.

IMF (2010), Presentation of background work for the Article IV Consultation with the Government of Hong Kong SAR, prepared by Ola Melander and Srikant Seshadri.

Kumhof, M. and D. Laxton (2007), "A Party without a Hangover? On the Effects of U.S. Government Deficits," IMF Working Paper No. 07/202 (Washington: International Monetary Fund).

Kuralbayeva, K, and P. N'Diaye (2006), "Determinants of Private Consumption in a Selected Number of Asian Countries," Mimeo.

N'Diaye, P., P. Zhang, and W. Zhang (2010), "Structural reform, Intra-Regional Trade, and Medium-Term Growth Prospects of East Asia and the Pacific: Perspectives from a New Multi-Region Model," *Journal of Asian Economics*, Vol. 21, (2010), pp. 20-36.

Peltonen, T., R. M. Sousa and I. Vansteenkiste (2009), "Wealth Effects in Emerging Market Economies," ECB Working Paper No. 1000, (Frankfurt-am-Main: European Central Bank).

Segoviano, M. (2006a). "The consistent information multivariate density optimizing methodology." Discussion Paper No. 557, Financial Markets Group, London School of Economics.

Segoviano, M. (2006b). "The Conditional Probability of Default Methodology," Financial Markets Group, London School of Economics, Discussion Paper 558.

Segoviano, M., and C. Goodhart (2009). "Banking stability measures." IMF Working Paper No. 09/04 (Washington: International Monetary Fund).

APPENDIX. STRUCTURE OF GVAR

The structure of the GVAR model can be summarized as the follows.[7] Consider *N*+1 economies, indexed by *i* = 0, 1, 2, ..., *N*, and a vector $\mathbf{x}_{it}$ of k_i domestic variables for each economy. Stacking the vectors of country-specific variables,

$$\mathbf{x}_t = \left(\mathbf{x}_{0t}', \quad \mathbf{x}_{1t}', \quad ..., \quad \mathbf{x}_{Nt}' \right), \tag{1}$$

a VAR in $\mathbf{x}_t$ would contain too many parameters to be estimated if the time dimension T of the data is not much larger than the number of economy N. Instead of regressing $\mathbf{x}_{i,t}$ on

$$\mathbf{x}_{-i,t} = \left(\mathbf{x}_{0t}', \quad \mathbf{x}_{1t}', \quad ,..., \quad \mathbf{x}_{i-1,t}', \quad \mathbf{x}_{i+1,t}', \quad ,..., \quad \mathbf{x}_{N,t}' \right), \tag{2}$$

without restriction, the GVAR links $\mathbf{x}_{i,t}$ to a $k_i^* \times 1$ vector $\mathbf{x}^*_{i,t}$, where

$$x^*_{\ell it} = \sum_{j=0}^{N} \omega_{\ell ij} x_{\ell jt}, \quad \ell = 1, 2, ..., k_i^*. \tag{3}$$

The weight ω_{lij} captures the spillover effect of variable *l* of foreign economy *j* on variable *l* of domestic economy *i*. Since ω_{lij} measures the relative importance of economy *j* to economy *i*, the spillover effect of variable *l* is in proportion to the weight chosen to measure the relative importance. Therefore, each economy's component of GVAR is given as a VARX*(p_i, q_i):

$$\mathbf{x}_{it} = \mathbf{a}_{io} + \mathbf{a}_{i1} \cdot t + \sum_{s=1}^{p_i} \mathbf{\Phi}_{is} \mathbf{x}_{i,t-s} + \sum_{s=0}^{q_i} \mathbf{\Lambda}_{is} \mathbf{x}^*_{i,t-s} + \sum_{s=0}^{r_i} \mathbf{\Psi}_{is} \mathbf{d}_{t-s} + \mathbf{u}_{it} \tag{4}$$

with $u_{it} \overset{iid}{\sim} \left(0, \sum_i\right)$,

where $\mathbf{d}_{t-s}$ is the observed common factor of $q \times 1$ dimension and $\boldsymbol{\varepsilon}_{it}$ is *iid* across time. Country-specific vector $\mathbf{x}^*_{i,t-s}$ reflects interdependence among economies and serves as a proxy for the unobserved common effects across economies. The country-specific foreign variables and common factors are treated as weakly exogenous (if confirmed by statistical tests), i.e., they are "long-run forcing" country-specific domestic variables. The term "long-

[7] Based on Chen and al. (2010).

run forcing" means that in the equations for foreign variables, the coefficients on the error-correction terms are set to zero. The dynamics of foreign variables are not influenced by deviations from the long-run equilibrium path, in contrast to the dynamics of domestic variables.

The VARX* can be estimated economy by economy using the ordinary least squares (OLS) method or rank-reduced approach if the cross-dependence of the idiosyncratic shock is sufficiently small, that is:

$$\sum_{j=0}^{N} Cov\left(\varepsilon_{\ell it}, \varepsilon_{sjt}\right) / N \to 0, \tag{5}$$

all $i \neq j$, l and s.

From equation (3), it can be seen that

$$\mathbf{z}_{it} = \mathbf{W}_i \mathbf{x}_t \qquad i = 1, 2, \ldots, N \tag{6}$$

Where $\mathbf{z}_{it} = \left(\mathbf{x}_{it}^{'} \quad \mathbf{x}_{it}^{*'}\right)$ and $\mathbf{W}_i$ is an appropriately defined weighting scheme. Thus, stacking (4) across i, the endogenous variables can be solved for in a global system:

$$\mathbf{G}\mathbf{x}_t = \mathbf{a}_{i0} + \mathbf{a}_{i1} \cdot t + \sum_{s=1}^{p} \mathbf{\Phi}_s \mathbf{x}_{t-s} + \sum_{s=0}^{r} \mathbf{\Psi}_s \mathbf{d}_{t-s} + \mathbf{u}_t \tag{7}$$

thus

$$\mathbf{x}_t = \mathbf{G}^{-1}\mathbf{a}_{i0} + \mathbf{G}^{-1}\mathbf{a}_{i1} \cdot t + \mathbf{G}^{-1}\sum_{s=1}^{p} \mathbf{\Phi}_s \mathbf{x}_{t-s} + \mathbf{G}^{-1}\sum_{s=0}^{r} \mathbf{\Psi}_s \mathbf{d}_{t-s} + \mathbf{G}^{-1}\mathbf{u}_t \tag{8}$$

Where $p = \max\{p_i, q_i\}$, $r = \max\{r_i\}$, and

$$G = \begin{pmatrix} A_0 W_0 \\ A_1 W_1 \\ \vdots \\ A_N W_N \end{pmatrix}, \quad H_s = \begin{pmatrix} B_{s,0} W_0 \\ B_{s,1} W_1 \\ \vdots \\ B_{s,N} W_N \end{pmatrix}, \quad u_t = \begin{pmatrix} u_{0,t} \\ u_{1,t} \\ \vdots \\ u_{N,t} \end{pmatrix}. \tag{9}$$

Equation (8) is a VAR for the complete set of domestic variables for all economies.

The advantage of the GVAR model is that it makes the estimation of (8) feasible by accounting for interdependence among economies and then estimating the partial system on a economy-by-economy basis, which implies allowing for modeling a large number of economies. The impulse response is computed based on (8).
The vector for domestic variables is given by:

$$\mathbf{x}_{it} = \left(edfb_{it} \quad edfn_{it} \quad r_{it} \quad y_{it} \quad p_{it}^{s} \quad q_{it}\right)'$$

(10)

where $edfb_{it}$ denotes the logarithm of asset-weighted average expected default frequency (EDF) of banks and $edfn_{it}$ for (nonfinancial) corporates, r_{it} is the real money market rate, y_{it} is the logarithm of industrial production, p^{s}_{it} the logarithm of real share price index, and q_{it} is the logarithm of the real effective exchange rate.

The vector for foreign variables for each economy except the U.S. is given by:

$$\mathbf{x}^{*}_{it} = \left(edfb^{*}_{it} \quad edfn^{*}_{it} \quad r^{*}_{it} \quad y^{*}_{it} \quad p^{s*}_{it}\right)' \tag{11}$$

We do not construct foreign effective exchange rates to minimize the number of parameters to be estimated, since information about foreign economies' currency is captured in the (trade-weighted) real effective exchange rate q_{it}.
The foreign variable for the U.S. is constructed as:

$$\mathbf{x}^{*}_{us,t} = y^{*}_{us,t} \tag{12}$$

Given the large influence of the U.S. financial variables on global markets, the U.S. foreign financial variables are less likely to be weakly exogenous for the U.S. domestic variables. That is the main reason we do not include the U.S. foreign financial variables in the equations for the United States.

The spot oil price is included as a common factor d_{t-s} to remove the common component in the reduced form residuals. Another candidate for inclusion as a common factor could be the index of global stock price volatility VIX, to ensure that the EDF shocks are purely idiosyncratic. However, because the VIX is driven by volatility in U.S. share prices, it is not weakly exogenous to the U.S. variables. Adding it separately will not augment the information content of the model.

Equations (3) and (4) show that the spillover effect of a foreign variable on a domestic variable is proportional to the weight ω_{ij}, which measures the relative importance of economy *i* to economy *j* in the transmission. Since the transmission channels for financial variables are likely to be different from the transmission channels for the variables measuring real activity, we use financial weights to construct foreign financial variables—EDFs, real money market rate, share price index and real effective exchange rate—and trade weights for industrial production.