



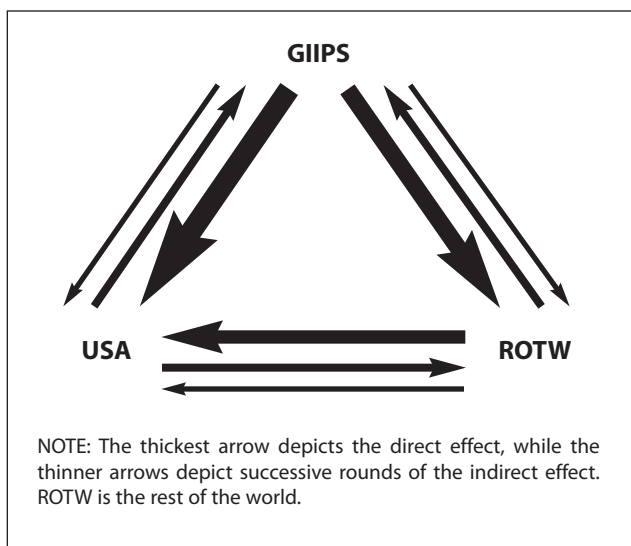
## Can Trade Links Transmit a European Crisis?

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Trade enhances a country's ability to benefit from specialization, but it may also increase the vulnerability of that country's economy to the economic fluctuations of its trading partners. Many observers worry about a transmission of the economic turmoil from Europe to the United States. A European recession may result in lower expenditures, including imports. (European imports are, of course, the exports of its trading partners, including the United States.) In fact, a recent *Economic Synopses* essay does find that the current woes of Europe have moderate implications for the United States.<sup>1</sup>

However, worldwide trade interlinkages may amplify this potential contagion: In particular, Europe's contraction will lower the income of all its trading partners, who will then spend less—and thus import less—and further decrease all their trading partners' incomes. Considering the currently most troubled countries Greece, Ireland, Italy, Portugal, and Spain (henceforth, GIIPS), the chart provides a simple graphical representation of these effects where thicker arrows indicate precedence and a stronger impact.

Here, we quantify the combined direct and indirect effects of the European crisis on the U.S. economy. To do



this, we start from this identity: GDP = Consumption (C) + Investment (I) + Government expenditure (G) + Exports (X) – Imports (M). Let  $D$  denote absorption (i.e., total domestic demand for the country's goods) minus imports,  $C + I + G - M$ . Now, suppose that some country's expenditures decrease, which includes expenditures for imported goods. This decrease in imports will be approximately proportional to the share of imports in that country's total expenditures. This is the *direct* effect.

The total *indirect* effect can be described as the accumulation of ripple effects through a sequence of  $K$  rounds of decreases in output and consequent decreases in expenditures (where  $K$  is a large number). Starting from the direct effect, we approximate the subsequent (second, third, fourth, and so on) rounds in the same way and sum them up to estimate the total effect that a European recession would have on the U.S. economy through trade.

Let  $d_{\%}D_k^i$  be the change in country  $i$ 's expenditures; the  $k$ th step impact of the indirect effect on country  $i$  equals

$$(1) \quad d_{\%}Y_{k+1}^i = \frac{D^i}{Y^i} d_{\%}D_k^i + \frac{X^i}{Y^i} \sum_{j \neq i} \frac{M^{j,i}}{Y^j} d_{\%}D_k^j,$$

$$(2) \quad d_{\%}D_{k+1}^i = \frac{D^i}{Y^i} d_{\%}Y_{k+1}^i.$$

Equation (1) states that the drop in the output of country  $i$  is the drop in its own expenditure,

$$\frac{D^i}{Y^i} d_{\%}D_k^i,$$

plus the drop in total exports to all its trading partners (denoted by  $M^{j,i}, j \neq i$ ),

$$\sum_{j \neq i} \frac{M^{j,i}}{Y^j} d_{\%}D_k^j,$$

weighted by the share of exports in output

$$\frac{X^i}{Y^i}.$$

Equation (2) then translates the drop in output into the next step's drop in expenditure. Adding up these elements yields our estimate

$$d_{\%} Y^i \approx \sum_{k=1}^K d_{\%} Y_k^i$$

of the effect of a drop in some countries' expenditures on country  $i$ 's output, taking into account all trade interlinkages.

Using this method, and data from the United Nations' Commodity Trade Statistics Database (<http://comtrade.un.org/>), we find that each percentage-point decline in expenditures of the GIIPS countries may lower U.S. GDP by 0.11 percent, which appears rather small.<sup>2</sup> However, the effect of the same decline at the EU-wide level would be more than four times stronger, lowering U.S. GDP by 0.48 percent. This suggests that, while a GIIPS crisis would not have too strong an effect on the U.S. economy, an EU-wide crisis may be a problem of serious concern. ■

## Notes

<sup>1</sup> Silvio Contessi and Li Li. "Get by with a Little Help from My...Other Exports." Federal Reserve Bank of St. Louis *Economic Synopses*, No. 12, May 9, 2012; [http://research.stlouisfed.org/publications/es/12/ES\\_2012-05-09.pdf](http://research.stlouisfed.org/publications/es/12/ES_2012-05-09.pdf).

<sup>2</sup> We thank Michael Sposi, a visiting scholar at the Federal Reserve Bank of St. Louis, for sharing his trade data and the codes to process it. Please note that our data cover only manufacturing goods, while the United States is a large exporter of services. GDP data are from the World Bank's World Development Indicators (series NY.GDP.MKTP.KD) converted from 2000 U.S. dollars to 2005 U.S. dollars using the GDP deflator (series GDPDEF) downloaded from the St. Louis Fed FRED database (<http://research.stlouisfed.org/fred2/series/GDPDEF>).