Seemingly small international trade linkages can lead to substantial spillovers across countries, going a long way in explaining the well-documented global comovement in GDP growth and inflation across countries. The spillovers come largely from indirect effects, with shocks in a foreign country not only propagating to the domestic economy directly but also cumulating through the trade network via other foreign countries. We develop and estimate a model incorporating these network effects, and we find that inflationary shocks in Europe have substantial effects on U.S. inflation and that U.S. monetary policy has a sizeable impact on foreign economies.

The recent global inflationary episode has highlighted how events in foreign countries can significantly affect the domestic economy. For example, supply chain disruptions in China and gas price spikes from the war in Ukraine have driven up inflation in the U.S. These effects have impacted inflation even though foreign goods are less than 20 percent of total U.S. purchases. How can foreign shocks have such sizeable impacts even though the U.S. trades relatively little?

In our recent working paper, "Multilateral Comovement in a New Keynesian World: A Little Trade Goes a Long Way," we show how trade patterns in the data can help explain global comovement in GDP growth and inflation across countries. Importantly, we highlight that disturbances abroad propagate to the domestic economy not only directly, but also indirectly through the trade network: Events in Europe affect the U.S. both directly and via their impact on China, Canada and other trading partners. The cumulation of these indirect effects is key to reconciling small foreign-trade shares with large cross-country spillovers.

To quantify these effects, we develop and estimate a business-cycle model with multilateral trade across multiple large economies. Our main quantitative findings are:
- Spillovers from country-specific shocks alone explain almost 90 percent of the pairwise correlation in output growth between countries and over half the cross-country correlation in inflation across countries.
- U.S. inflation can inherit 20 percent of unexpected inflation in Europe.
- Unexpected increases in U.S. interest rates lead to declines in foreign GDP equal to about half the corresponding decline in domestic GDP.

**A Model of Business Cycles With Multilateral Trade**

To study the role of trade in explaining cross-country correlations, we introduce multilateral trade in goods and financial assets into a New Keynesian framework, a workhorse class of models used to analyze business-cycle fluctuations in output and inflation. Instead of relying only on local inputs, firms can use goods from foreign countries. For example, a car made in the U.S. uses both local steel and imported microchips as inputs. As a result, foreign conditions matter for the domestic economy through forward linkages (demand for a country’s output depending on foreign demand) and backward linkages (input costs depending on prices in foreign countries).

Because trade is multilateral, what happens in a foreign country spills over to the domestic economy not only directly, but also indirectly through so-called "third-country" effects as the shock propagates through the trade network. For example, supply chain issues in China do not affect the U.S. just directly, but also indirectly through their effects on Europe's production and demand for U.S. exports. The resulting impact on Europe then further propagates across the trade network, such as by affecting the U.S. via its effects on Canada. These multiple layers of effects can cumulatively generate large spillovers despite the relatively small amount of trade.

**The Global Phillips Curve**

Economists and policymakers often summarize the link between output and inflation through the Phillips curve, which describes how inflation depends on slack in the economy as well as inflation expectations and other disturbances. In a world with trade, we need to consider more determinants of inflation, particularly from foreign countries.

Our model shows us precisely how these variables matter for inflation through a relation we call the *global Phillips curve*. Domestic inflation now depends on output, consumption and exchange rates in the rest of the world. The degree to which variables from a given country matter for domestic inflation is proportional to the share of imports from that country. Furthermore, for any given country (foreign or domestic), each of the variables depends implicitly on economic conditions across all countries.
How Trade Matters for Cross-Country Comovement

To quantify the impact of trade, we use state-of-the-art methods to estimate the model using data for the U.S., the E.U., China, Japan and Canada from the second quarter of 2004 through the fourth quarter of 2019, allowing for the possibility of global shocks. (For instance, policy may be coordinated across countries.) Therefore, comovement across countries can arise from either spillovers of country-specific shocks or common disturbances across countries. To quantify the importance of trade, we ask how correlated the global economy would have been in the absence of trade compared to a world without global shocks.

Even though the countries in our sample largely purchase local output, trade explains a large fraction of global comovement. Specifically, spillovers from country-specific shocks alone explain almost 90 percent of the observed average pairwise correlation in output growth between countries. These shocks also explain more than half the cross-country comovement in inflation across countries and between output and inflation in different countries. In other words, even without global shocks, the trade network alone is sufficient to generate substantial comovement in output growth and inflation.

How can we reconcile the small import shares with the large spillovers? The indirect effects from the trade network are key. As discussed above, events in a foreign country have both direct and indirect effects on the domestic economy. We show that attenuating the indirect effects can reduce the output correlations by at least one-fifth and lead to negative inflation cross-country correlations.

Implications for Recent Data

The aftermath of the COVID-19 pandemic has highlighted how interconnected the global economy is. Supply chain disruptions in different countries and energy price hikes due to the Russia-Ukraine War have been partly blamed for high inflation in the U.S. There have also been concerns that rising interest rates within the U.S. could trigger a global economic contraction. Our model provides a quantitative framework to evaluate the size of these spillovers.

Regarding supply chain disruptions and energy price hikes, we show that the U.S. inherits 20 percent of the initial increase in European inflation in response to a European inflationary shock. To put this in the present context, suppose that three-fourths of the 4.4 percent increase in European inflation from the fourth quarter of 2021 to the first quarter of 2022 came from the supply shock associated with the Ukraine war and its effect on energy prices (which we take to be our inflationary shock). Our estimates suggest that such a shock would account for around half of the increase in U.S. inflation over the same period. Importantly, when we consider alternative model parameters that attenuate the
indirect effects, there is almost no response in U.S. inflation to the European inflationary shock. This suggests that most of the response of U.S. inflation arises from indirect effects through the trade network rather than the direct impact from Europe.

Regarding rising U.S. interest rates, we estimate that an unexpected 25-basis-point increase in U.S. interest rates can lead to a drop of between 0.14 percent and 0.22 percent in GDP, which is up to 70 percent of the decrease in U.S. GDP, according to our model. Given the increase in U.S. interest rates of almost 4 percentage points thus far in 2022, these numbers are substantial. A caveat is that our model makes specific assumptions about how foreign central banks react, and the exercise assumes that the interest rate hike deviates from the past Fed behavior.

Concluding Remarks

The world is connected by trade. Even for a large economy like the U.S. with a relatively small foreign component of GDP, events abroad can have substantial impacts on the domestic economy. Much of these spillovers arise indirectly through other countries in the trade network. It is therefore misleading to only use the import share from a given country to infer how much that country could impact the U.S.

These indirect effects from the trade network have become especially apparent as the U.S. feels the effects of economic events transpiring in various foreign countries, emphasizing a need for policymakers to be attentive not only to local conditions, but also developments internationally.

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