ECONOMIC POLICY PAPERS

What Will Happen When Foreigners Stop Lending to the United States?

Editor's note: This is an adapted version of a longer Economic Policy Paper by the same title online at minneapolisfed.org.

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The global saving glut

From 1992 to 2012, households and the government in the United States borrowed heavily from the rest of the world. As U.S. borrowing—measured as the current account deficit—grew, the U.S. net international investment position deteriorated by $4 trillion (2012 USD), and, by 2012, the United States owed the rest of the world $4.4 trillion. In this paper, we use a model developed by the authors (Kehoe, Ruhl and Steinberg 2013) that captures this increase in borrowing to study two ways the United States might reverse its current account deficit and begin to pay down its accumulated debt. Our hypothesis for the driving force behind the United States' borrowing is the *global saving glut* theory proposed by Ben Bernanke. In a March 2005 address, he asked:

> "Why is the United States, with the world's largest economy, borrowing heavily on international capital markets—rather than

* The authors thank David Backus, Kei-Mu Yi and Frank Warnock for helpful discussions. Participants at seminars and conferences made useful comments and suggestions. The authors are grateful to Jack Rossbach for extraordinary research assistance. The data presented in the figures are available at http://www.econ.umn.edu/~tkehoe/.

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ABSTRACT

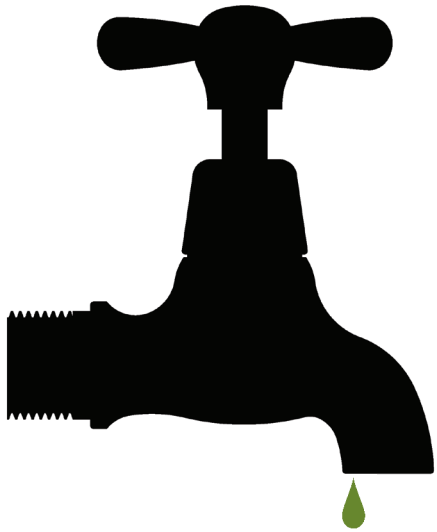
Since the early 1990s, the United States has borrowed heavily from its trading partners. This paper presents an analysis of the impact of an end to this borrowing, an end that could occur suddenly or gradually.

Modeling U.S. borrowing as the result of what Bernanke (2005) calls a *global saving glut*—where foreigners sell goods and services to the United States but prefer purchasing U.S. assets to purchasing U.S. goods and services—we capture four key features of the United States and its position in the world economy over 1992–2012: (1) in the model, as in the data, the U.S. trade deficit first increases, then decreases; (2) the U.S. real exchange rate first appreciates, then depreciates; (3) the U.S. trade deficit is driven by a deficit in goods trade, with a steady U.S. surplus in service trade; and (4) the fraction of U.S labor dedicated to producing goods—agriculture, mining and manufacturing—falls throughout the period.

Using this model, we analyze two possible ends to the saving glut: an orderly, gradual rebalancing and a disorderly, sudden stop in foreign lending as occurred in Mexico in 1995–96. We find that a sudden stop would be very disruptive for the U.S. economy in the short term, particularly for the construction industry.

In the long term, however, a sudden stop would have a surprisingly *small* impact. As the U.S. trade deficit becomes a surplus, gradually or suddenly, employment in goods production will not return to its level in the early 1990s because much of this surplus will be trade in services and because much of the decline in employment in goods production has been, and will be, due to faster productivity growth in goods than in services.

AT THE END



HOW BAD WILL IT BE?

> lending, as would seem more natural? … [O]ver the past decade a combination of diverse forces has created a significant increase in the global supply of saving—a global saving glut—which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today" (Bernanke 2005).

The essence of the global saving glut theory is that increased saving in the rest of the world, recently primarily in China, but before that in Japan and Korea, resulted in foreigners purchasing U.S. assets rather than U.S. exports. As foreigners sold goods and services to the United States to finance these asset purchases, the price of their goods and services fell relative to U.S. prices.

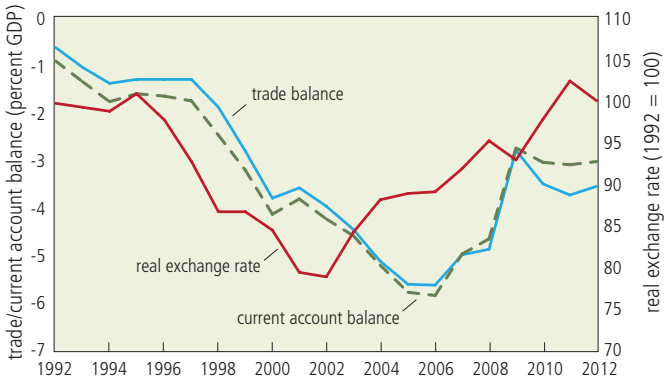
The balance of payments identity says that payments by U.S. residents to rest of the world (ROW) must equal payments by the rest of the world to U.S. residents. This identity holds at all times simply because accounting conventions calculate it so that it will: An excess of payments made by the rest of the world over payments made by U.S. residents, for example, is counted as purchases of assets in the rest of the world by U.S. residents, that is, U.S. residents borrowing from foreigners.

We can rearrange the terms of this identity arithmetically to say that the U.S. trade balance plus net factor payments and transfers from the rest of the world are equal to net U.S. asset accumulation in the rest of the world. The first half of this (trade balance plus net factor payments and transfers from the rest of the world) is commonly referred to as the current account balance. The current account balance is therefore equal to net U.S. accumulation of foreign assets.

Because net factor payments and transfers from the rest of the world are small, the U.S. current account balance is approximately equal to the U.S. trade balance. This near equivalence is seen in Figure 1, where the two trend lines run closely together. Consequently, the balance of payments identity says that the trade deficit is approximately equal to foreign accumulation of U.S. assets. The figure therefore shows that as foreigners bought U.S. assets, the U.S. trade balance and current account balance both declined from somewhat negative positions in 1992 to substantially negative positions of about -6 percent GDP by 2005-06.

Figure 1

U.S. trade balance, current account balance and real exchange rate



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.

Figure 1 also presents data on prices in the United States relative to those in the rest of the world, the real exchange rate between the U.S. dollar and a weighted geometric average of the currencies of its 20 most important trading partners. As the real exchange rate falls, fewer U.S. consumption baskets trade for one consumption basket of its major trading partners, and the dollar appreciates.[1]

Between 1992 and 2002, the real exchange rate between the currencies of the United States and its major trading partners fell significantly, resulting in a nearly 28 percent increase in prices of U.S. goods and services relative to product prices of trading partners (or, equivalently, prices in the rest of the world fell by 22 percent).

After 2002, however, relative price trends ran in the opposite direction. The real exchange rate rose and the dollar depreciated by 22 percent. The U.S. trade balance—and the current account balance—also rose; the reversal in the balance of trade and current account balance began about four years later.

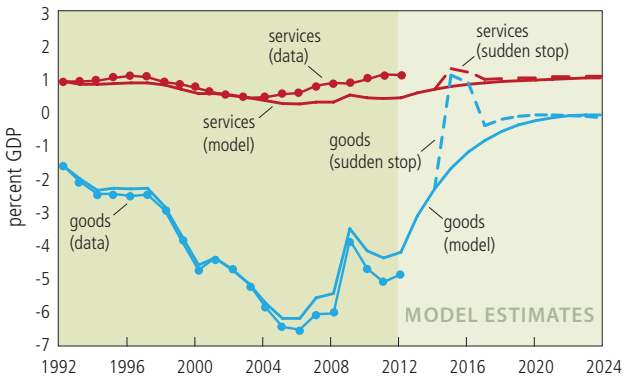
The Kehoe-Ruhl-Steinberg model

For our analysis of the impact of an end to foreign lending, we use a standard dynamic general equilibrium model of two "countries": the United States and the rest of the world. Details of our framework, calibration and parameter selection are described fully in Economic Policy Paper 13-4 and Staff Report 489 online at minneapolisfed.org. For this discussion, it is important to note a few key features of the model.

- We split production into three industries—goods, services and construction. These are not typical categories used in international macroeconomics; standard methods consider services to be nontradable among nations. Data clearly indicate, however, that services are in fact traded (see Table 1 in Economic Policy Paper 13-4). Indeed, the United States had a large surplus in services trade in 1992, while it had a large deficit in goods trade. The 1992-2012 data in Figure 2 (dotted lines) show that this pattern persists over time. Our model (solid lines) closely matches this pattern between 1992 and 2012.

Figure 2

U.S. trade balance in goods trade and services trade: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Data in dotted lines. Services in red; goods in blue.)

- We select two other parameters—one for goods and one for services—that govern substitutability between imports and domestic output for final uses. We choose these parameters to be consistent with the higher volatility in the goods trade balance seen in Figure 2; that is, we assume that foreign goods are more substitutable for U.S. goods than foreign services are for U.S. services. Nonetheless, foreign goods are still less-than-perfect substitutes for U.S. goods in our model: That imperfect substitutability allows us to model the saving glut as driving down the relative price of foreign goods and forcing the U.S. real exchange rate to appreciate.

- As in the United States, households in the rest of the world work, consume and save to maximize utility. They also have similar preferences: They enjoy leisure and regard imports of U.S. goods and services as substitutes for domestic ones, with the same elasticity of substitution as in the United States.

Generating the saving glut

In our model, the saving glut is generated by the "intertemporal decision-making" of households in the rest of the world. By this, we mean that the overall quantity of investment in U.S. bonds is determined by choices foreign households make each year about how much they favor work relative to leisure and prefer consumption now relative to consumption later (which requires saving current income).

To match the data on trade balances from 1992 to 2012, we set these intertemporal weights such that the rest of the world discounts less (that is, places more value on) the future than U.S. households. That induces foreign households to postpone current consumption so as to be able to consume more later. They do so by saving current income through purchase of U.S. bonds.

After 2006, the peak of foreign lending to the United States, this trend reverses: The rest of the world's discount factor gradually converges to that of U.S. households—the saving glut diminishes—and the world economy converges to a balanced growth path.

We model the sudden stop in 2015–16 in the same

manner as Kehoe and Ruhl (2009), who model the Mexican sudden stop of 1995–96 as a surprise. During the sudden stop, the rest of the world buys no more bonds, but households and the government in the United States make interest payments on existing bonds at the 2014 interest rate. The U.S. interest rate during the sudden stop is determined within the United States since there is no foreign lending.

We model the sudden stop as a surprise because U.S. interest rates currently indicate that financial markets do not assign a significantly positive probability to a U.S. debt crisis—as was the case for Mexico in 1995 and is currently for ongoing eurozone debt crises (Arellano, Conesa and Kehoe 2012).

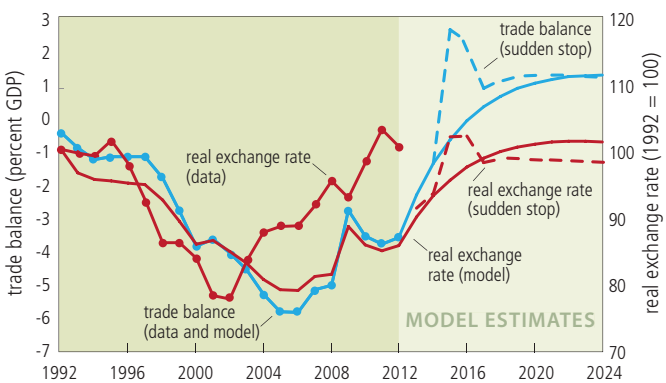
Dynamics of the trade balance

Our model of the saving glut is designed to capture the impact of government policies in the rest of the world that may be been responsible for the saving glut, such as Chinese policies that discouraged consumption and promoted saving, or policies that kept the Chinese real exchange rate from appreciating against the U.S. dollar. It can also be seen as capturing factors that make U.S. saving more attractive for foreigners than saving in their own countries.[2]

Our view is that the saving glut is a temporary, albeit lengthy, phenomenon and that discounting of the future by the rest of the world will eventually revert to a value consistent with balanced growth. Bernanke (2005) takes a similar perspective.[3]

Figure 3

U.S. trade balance and real exchange rate: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Sudden stop estimates in dashed lines. Data in dotted lines. Real exchange rate in red; trade balance in blue.)

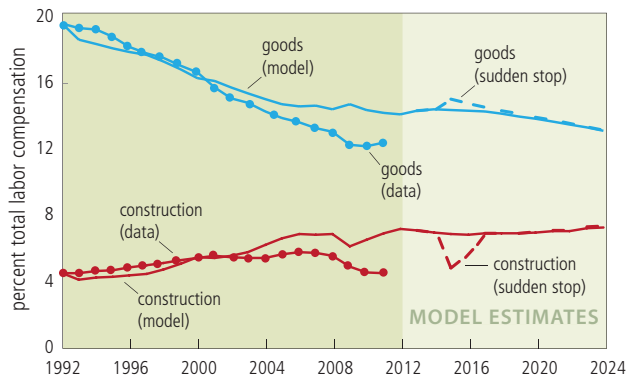
In other words, the current account imbalances associated with the saving glut will end eventually. The only question is whether the rebalancing process will be gradual or sudden.

Figure 3 reports the results of two experiments, one with gradual rebalancing and the other with a sudden stop in new foreign loans to the United States in 2015–16. As explained, the model has been calibrated so that it exactly matches the U.S. trade balance in 1992–2012. The model matches the actual behavior of the U.S. real exchange rate during 1992–2002, though in the model the depreciation of the U.S. real exchange rate starts after 2006, while in the data it starts four years sooner.

The model also captures much of the sectoral reallocation of labor during the saving glut, at least until the 2008–09 recession (Figure 4). It captures 78 percent of the actual decline in labor compensation going to workers in the goods industry and slightly overestimates the rise in compensation received by construction workers.[4] The model does a relatively poor job of capturing the collapse of the construction boom during 2008–12.

Figure 4

Allocation of U.S. labor across sectors: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Sudden stop estimates in dashed lines. Data in dotted lines. Construction in red; goods in blue.)

The intuition for the model's performance is straightforward: During the saving glut, foreigners buy more U.S. bonds and fewer U.S. goods and services. To finance their bond purchases, the rest of the world sells its goods to the United States, lowering the relative price of these goods. This shows up in appreciation of

the U.S. real exchange rate. These foreign goods imports allow U.S. labor to shift from goods production to the production of services and construction.

In an experiment without a saving glut, labor compensation in goods production falls less than in a model with a saving glut, but still quite substantially. But the experiment also reveals that most of this drop is due to faster growth in productivity in manufacturing rather than to imports of foreign goods.

Notice in Figure 3 that, if a sudden stop were to occur, it would have a very disruptive impact on the U.S. economy, causing the exchange rate to depreciate rapidly and the trade balance to move rapidly into a substantial surplus. Figure 2 shows that much of the improvement in the U.S. trade balance would come from goods trade because U.S. services are not very substitutable for services in the rest of the world. In Figure 4, we see that the U.S. construction industry would crash and its labor would be reallocated to goods and services production. In our baseline model, this reallocation is modeled as costless. In alternative models *with* adjustment costs, the sudden stop is far more costly, echoing concerns expressed by Bernanke (2005):

> "To repay foreign creditors, as it must someday, the United States will need large and healthy export industries. The relative shrinkage in those industries in the presence of current account deficits—a shrinkage that may well have to be reversed in the future—imposes real costs of adjustment on firms and workers in those industries."

What do we learn from the model?

As we can see in Figures 2, 3 and 4, our model captures four key features of the United States and its position in the world economy over 1992–2012. In the model, as in the data:

- the U.S. trade deficit first increases, then decreases;
- the U.S. real exchange rate first appreciates, then depreciates;
- the U.S. trade deficit is driven by a deficit in goods trade, with a steady U.S. surplus in service trade;
- the fraction of U.S. labor dedicated to producing goods falls throughout the period, with most of the drop due to higher productivity in goods than in services.

The model's success in replicating these key facts over the last two decades gives us some confidence in its predictions for the future. As seen in Figure 3, the model predicts that after 2012, the U.S. real exchange rate will depreciate as U.S. households and government begin to repay the rest of the world. Much of the U.S. trade surplus will be in services trade and, if productivity in goods continues to grow faster than that in services (as it did over 1992–2012), employment in goods, particularly in manufacturing, is unlikely to ever return to its level in 1992 (Figure 4).

These changes will occur whether the stop in foreign lending is sudden or gradual. A sudden stop, however, would be very disruptive to the U.S. economy. Construction, unlike goods and services, is completely nontradable, so it would absorb much of the real exchange rate depreciation. During a sudden stop, the U.S. real interest rate would jump from 2.9 percent in 2014 to 5.5 percent in 2015. A sudden stop would cause a sharp contraction in construction output and employment, even more severe than during the collapse of the recent U.S. housing boom (see the sudden downturn in the construction trend line in Figure 4).

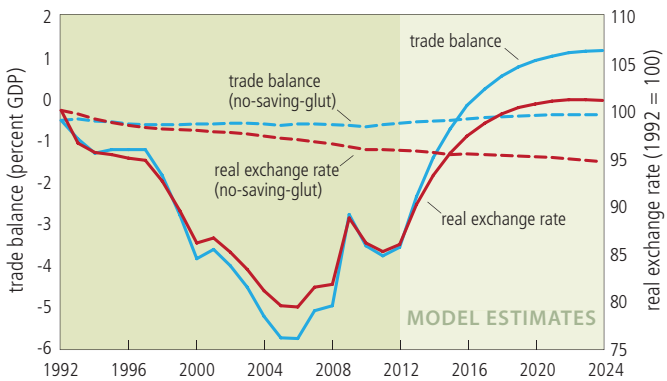
A sudden stop would also change the welfare analysis of the global imbalances over the period 1992–2012. Twenty years of inexpensive foreign goods—as well as the credit with which to purchase these goods—has made U.S. households better off. We calculate the increase in real income of U.S. households generated by the saving glut as equivalent to giving these households an extra $689 billion in income in 1992, 10.9 percent of 1992 U.S. GDP.

If the saving glut were to end in a disorderly sudden stop, where productivity falls as it did in Mexico in 1994–95, these welfare gains would be lost. U.S. households would suffer a real income loss of $330 billion (1992 USD), 5.2 percent of 1992 U.S. GDP, compared with a scenario in which the saving glut had never occurred. That is, the total cost of a disorderly sudden stop would be 16.1 percent of 1992 U.S. GDP, or over $1 trillion ($689 billion plus $330 billion). These calculations come from a model in

which the costs of the sudden stop come from its surprise nature and from the drop in productivity. If the model includes adjustment frictions, the estimate of real income loss is larger.

Figure 5

U.S. trade balance and real exchange rate



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Saving-glut data and estimates in solid lines. No-saving-glut data and estimates in dashed line. Real exchange rate in red; trade balance in blue.)

Directions for future research

Our results leave puzzles that suggest directions for future research. Most notably, our model generates only a small decline in interest rates between 1992 and 2012, in stark contrast to the data. Second, it is puzzling that using a U.S. saving drought (rather than a global saving glut) as the source of global imbalances over the past 20 years generates very inaccurate results for U.S. investment. And third, our model generates incorrect results on the timing of U.S. exchange rate depreciation; as mentioned previously, this depreciation actually began in 2002, but the model shows a 2006 beginning for this trend. These three puzzles and avenues for resolving them are discussed at length in the online version of this paper.

What should policy makers do?

That the long-term impact of the saving glut on the U.S. economy does not depend on whether it ends suddenly or gradually does not mean that the glut has not had a long-term impact. On the contrary, the impact has been substantial, generating as much as an 11 percent increase in real GDP, as mentioned above. Figure 5 shows further evidence of how large the long-term impact has been. And indeed, to repay its debt to foreign lenders, the United States will have to run a substantial trade surplus in future years. The purchasing power of the U.S. dollar—as measured by the reciprocal of the real exchange rate—will be lower. Output and employment in goods will be higher.

While U.S. households have benefited from two decades of low-priced foreign goods, these welfare gains could be fully erased, and even reversed, by a disorderly sudden stop in foreign lending. Policymakers should be vigilant to ensure that a sudden stop does not take the U.S. financial sector by surprise, as it was by the collapse of the U.S. housing market during the 2008–09 recession.

The need for prudential regulation in the U.S. financial system to prevent a sudden stop in foreign lending from becoming disorderly might seem to imply the need for capital controls, a policy currently under consideration in the eurozone (Fahri and Werning 2012, and Benigno et al. 2013). We believe such a step would likely be unwise for the United States. The United States is in a unique position as the provider of the world's reserve currency, and capital controls on purchases or sales of U.S. assets—especially of U.S. government bonds—would push foreign governments toward other reserve currencies. Since the United States enjoys substantial economic benefit from providing the world's reserve currency, we think it unlikely, and probably undesirable, for U.S. policymakers to consider capital controls to guard against a disorderly sudden stop. ■

Endnotes

[1] The real exchange rate between the U.S. dollar and the Chinese renminbi, whose principal unit is the yuan, for example, is

U.S.-China real exchange rate = U.S.-China nominal exchange rate x (Chinese CPI ÷ U.S. CPI),

where we measure the price level in each country using its consumer price index (CPI). To understand this real exchange rate, consider the units in which it is measured:

(dollars÷yuan) x ((yuan÷Chinese consumption basket) ÷ (dollars÷U.S. consumption basket)) = U.S. consumption basket ÷ Chinese consumption basket.

As the real exchange rate falls, fewer U.S. consumption baskets trade for one Chinese consumption basket, and the dollar appreciates.

[2] Notice, however, that, besides modeling U.S. government spending and borrowing during 1992–2012, we do not model U.S. government policies such as monetary policies or policies to promote mortgage borrowing that may have been responsible for the massive U.S. borrowing during this period. See Obstfeld and Rogoff (2009) and Bernanke et al. (2011) for discussions of these policies and their interaction with the saving glut. We later argue, however, that it is unlikely that global imbalances over the period 1992–2012 were driven by lack of saving in the United States. That would imply that U.S. investment was low when in reality investment was quite significant throughout this period.

[3] "[T]he underlying sources of the U.S. current account deficit appear to be medium-term or even long-term in nature, suggesting that the situation will eventually begin to improve, although a return to approximate balance may take some time. Fundamentally, I see no reason why the whole process should not proceed smoothly. However, the risk of a disorderly adjustment in financial markets always exists" (Bernanke 2005).

[4] In the data, workers in the goods industry received 19.7 percent of total U.S. labor compensation in 1992. By 2007, this number had fallen to 13.3 percent. In the model, the labor compensation that goes to workers in the goods industry goes from 19.7 percent in 1992 to 14.7 percent in 2007.

In construction, workers received 4.4 percent of total labor compensation in 1992 data, rising to 5.6 percent in 2007, the peak of the construction boom. In the model, reallocation toward construction is actually larger, going from 4.4 percent of total labor compensation in 1992 to 6.8 percent in 2007.

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