

# The Fundamental Structure of the International Monetary System

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## ABSTRACT

*A fundamental function of the International Monetary System is to allocate scarce safe assets across countries. The system is fundamentally asymmetric. Net global safe asset producers are at the center. They enjoy an external premium and face a slack external adjustment constraint. This fundamental characteristic is largely independent of formal exchange rate arrangements (fixed or flexible exchange rates). Global imbalances mutate at the zero lower bound (ZLB) from benign to malign. Away from the ZLB, safe asset scarcity propagates low equilibrium real interest rates via current account surpluses. At the ZLB, safe asset scarcity propagates recessions via current account surpluses. Away from the ZLB, net safe asset suppliers enjoy a premium. At the ZLB, they must absorb a larger share of the global recession.*

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In a stabilized world, a recession in one part of the world economy is balanced by expanded lending by the depressed country. This finances balance-of-payments deficits of other countries, and enables investment to be maintained. Britain operated such a mechanism in the years before 1914; it was unable to do so after 1929. [Neither the United States] nor France proved able or willing to maintain the system with loans. . . . One reason was that potential borrowers had lost their credit-worthiness. Default, currency depreciation, political coups, but especially falling prices made most countries unattractive risks for loans.

—Charles Kindleberger, *The World in Depression, 1929–1939*

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These remarks were originally published in shorter form in the *NBER Reporter* 2016, no. 1, available at <http://nber.org/reporter/2016number1/gourinchas.html>. Most of the research described in this article was done in collaboration with Ricardo Caballero (MIT) and Emmanuel Farhi (Harvard) or H el ene Rey (London Business School).

Anyone looking at recent financial headlines could be forgiven for thinking that the international monetary system is under heavy strains. The People's Bank of China faces severe private capital outflows, a result of the yuan's appreciation in tandem with the US dollar and the slowing down of the Chinese economy. The Bank of Japan is battling persistent deflation by trying to depreciate the yen. The European Central Bank has clearly telegraphed that it, too, would welcome further depreciation of the euro. In the United States, notwithstanding a modest "lift-off" in December 2015, the Federal Reserve is confronted with a global slowdown and a rising dollar. Policy discussions explicitly mention the possibility of negative policy rates in the future. Talks of "currency wars" abound. To understand the current environment, it is helpful to step back and consider the international monetary system circa 1960, during the Bretton Woods era.

### **The international monetary system then . . .**

Back in those days, the international monetary system was relatively simple. Market economies pegged their currency against the US dollar. In turn, the United States maintained the value of its dollar at \$35 per ounce of gold. With the assistance of the International Monetary Fund, countries could obtain liquidity to deal with "temporary" imbalances, but it was incumbent upon them to implement a fiscal and monetary policy mix that would be consistent with a stable dollar parity or, infrequently, to request an adjustment in their exchange rate.

The United States faced no such constraint. The requirement to maintain the \$35 an ounce parity had only minimal bite on US monetary authorities, as long as foreign central banks were willing, or could be convinced, to support the dollar. By design, then, the system was asymmetric, with the United States at its center, a situ-

ation that reflected the country's economic and political strengths in the immediate aftermath of World War II.<sup>1</sup>

Not everyone was happy about this state of affairs. Some objected to the special role of the dollar. In 1965, France famously requested the conversion of its dollar reserves into gold, while its minister of finance complained loudly about the United States' "exorbitant privilege" (Aron 1965).<sup>2</sup> The Bretton Woods regime allowed the United States to acquire valuable foreign assets, so the argument went, because the dollar reserves required to maintain the dollar parity of foreign countries amounted to automatic low-interest, dollar-denominated loans to the United States (Rueff 1961, 126–127, 262, 267–268).

Others worried about the long-term sustainability of the system. As the world economy grew rapidly in the 1950s and 1960s, so did the global demand for liquidity and the stock of dollar assets held abroad. With unchanged global gold supplies, something had to give. This is the celebrated "Triffin dilemma" (1960). In 1968, Triffin's predictions came to pass: faced with a run on gold reserves, the US authorities suspended dollar-gold convertibility. Shortly thereafter, the Bretton Woods system of fixed but adjustable parities was consigned to the dustbin of history. The era of floating rates began.

### **The international monetary system outside the ZLB: Exorbitant privilege, safe assets, and exorbitant duty**

Under the new regime, countries were free to adjust their monetary policy independently. Mundell's "trilemma" required either that market forces determine the value of their currency or that

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1. For a discussion of the original Bretton Woods negotiations and especially the exchanges between J. M. Keynes, on the UK delegation, and H. D. White, from the US Treasury, see Steil (2013).

2. For a historical perspective on the exorbitant privilege, see also Eichengreen (2012).

capital controls be imposed (Mundell, 1963). In principle, this environment should be more symmetrical: no more “exorbitant privilege” for the United States since other countries would not be forced to hold low-interest dollar reserves to maintain the value of their dollar exchange rate; no asymmetry in external adjustment between the United States and the rest of the world since exchange rates would now adjust freely; and no Triffin dilemma since dollar liquidity would be decoupled from gold supply.

Yet, recent research illustrates that the era of floating rates shares many of the same structural features as the Bretton Woods regime. Consider the question of the “exorbitant privilege,” defined as the excess return on US gross external assets relative to US gross external liabilities. H el ene Rey and I set out to measure this excess return using disaggregated data on the US net international investment position and its balance of payment. These calculations are often imprecise, given the coarseness of the historical data, but they all point in the same direction: the United States earns a significant excess return which has *increased* since the end of Bretton Woods from 0.8% per annum between 1952 and 1972 to between 2.0% and 3.8% per annum since 1973 (Gourinchas and Rey 2007a).<sup>3</sup>

A large share of these excess returns arises because of the changing composition of the US external balance sheet over time: as financial globalization proceeded, US investors concentrated their foreign holdings in risky and/or illiquid securities such as portfolio equity or direct investment, while foreign investors concentrated their US asset purchases in portfolio debt, especially Treasuries and bonds issued by government-affiliated agencies, and cross-border loans (see figure 4.1).<sup>4</sup> The “exorbitant privilege” should be properly understood as a risk premium.

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3. See also Gourinchas and Rey (2014). For a more conservative estimate on a shorter time period, see Curcuru et al. (2008).

4. Recent work on the structure of global banking flows helps nuance this picture. For instance, Shin (2012) shows that prior to the financial crisis, foreign banks borrowed dollars

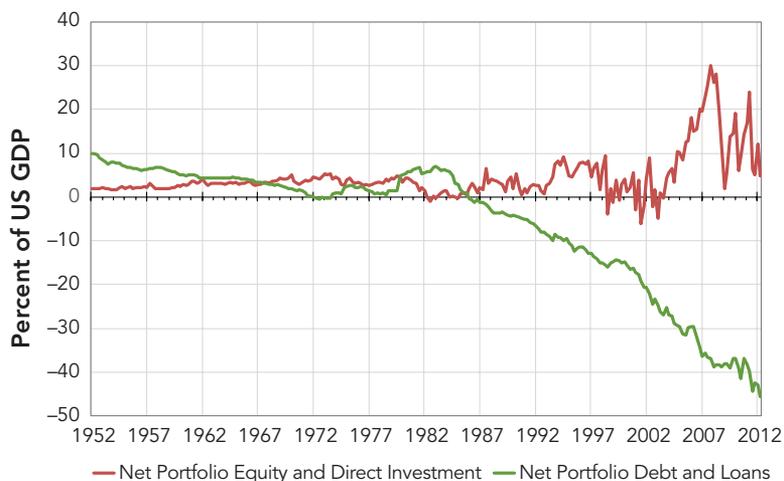


FIGURE 4.1. US External Leverage.

*Note:* The figure reports US net portfolio equity and direct investment (as a percent of US GDP) and US net portfolio debt and other assets (as a percent of US GDP). Starting in the 1970s, the United States builds a large short position in “safer” assets (portfolio debt and loans) and a large long position in riskier investments (portfolio equity and direct investment).

*Source:* P-O. Gourinchas and H. Rey, “External Adjustment, Global Imbalances and Valuation Effects,” NBER Working Paper No. 19240, July 2013, and Chapter 10 in *Handbook of International Economics*, Volume 4, 2014, pp. 585–645.

These large and growing US excess returns have first order implications for the sustainability of US trade deficits and the interpretation of current account deficits. As an illustration of the orders of magnitude involved, suppose that the United States has a balanced net international investment position with gross assets and liabilities of 100% of GDP. An excess return of 2% per annum implies that, on average, the United States can run a trade deficit of 2% of GDP while leaving its net international investment position unchanged. More generally, since a large part of realized returns takes the form of valuation gains—due to changes in asset

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from US money market funds and invested into riskier US assets such as mortgage-backed securities.

prices and exchange rates—the current account, which excludes nonproduced income such as capital gains, will provide an increasingly distorted picture of the change in a country’s external position.<sup>5</sup>

Consider next the question of external adjustment. The United States still faces a very different process than most other countries. For instance, H el ene Rey and I found that a deterioration of the US trade balance or of its net international investment position is often followed by a predictable depreciation of the US dollar against other currencies. This depreciation may subsequently improve the US trade balance, along the usual channels, but it also improves the return on US financial assets held abroad, thereby making the United States relatively richer (Gourinchas and Rey 2007b).<sup>6</sup> Most other countries don’t seem to enjoy a similar advantage.<sup>7</sup> These findings help us understand why markets have taken a somewhat benign view of the United States’ persistent current account deficits since the 1980s (see figure 4.2).

What accounts for this risk premium? In my work with Ricardo Caballero and Emmanuel Farhi, we argued that it reflects a superior capacity of the United States to supply “safe assets”—assets that deliver stable returns even in global downturns. To illustrate the argument, consider a world consisting of only two regions, the United States (U) and the rest of the world (R). The regions may vary in their capacity to produce safe assets because of differences in the soundness of their fiscal policy or in their levels of financial development. They may also differ in their demand for these assets, because of demographic differences, financial frictions, and/or differences in preferences for saving (Caballero et al. 2008).<sup>8</sup>

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5. See for instance Obstfeld (2012) and also Gourinchas and Rey (2014) for a range of countries.

6. See also Corsetti and Konstantinou (2012).

7. However, Rogoff and Tashiro (2015) find positive excess returns for Japan between 2001 and 2013.

8. See also Bernanke (2005) and Mendoza et al. (2009).

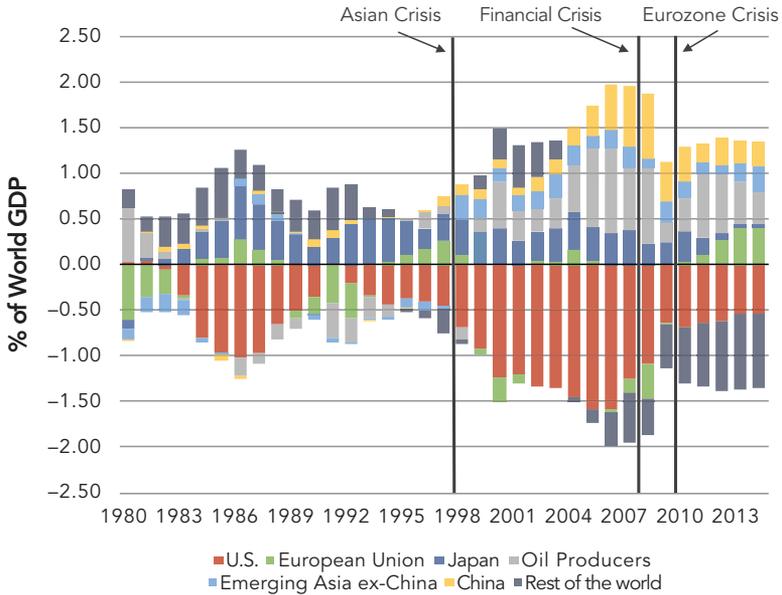


FIGURE 4.2. Global Imbalances.

*Note:* The graph shows current account balances as a fraction of world GDP. We observe the buildup of global imbalances in the early 2000s, until the financial crisis of 2008. Since then, global imbalances have receded but not disappeared. Notably, deficits subsided in the United States, and surpluses emerged in Europe. Oil Producers: Bahrain, Canada, Iran, Iraq, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Russia, Saudi Arabia, United Arab Emirates, Venezuela; Emerging Asia ex-China: India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam.

*Source:* World Economic Outlook Database, April 2015 and author's calculations.

Suppose  $U$  is a natural *net* supplier of these assets. If the two countries were forced to live in financial autarky, unable to borrow from, or lend to, one another, the price of safe assets would be higher in  $R$ , and their return lower. If the two countries integrate financially, capital will flow from  $R$  to  $U$ , as  $R$  investors are eager to purchase  $U$ 's safe assets. From the perspective of  $U$ , two things happen: it runs a current account deficit (foreign capital flows in), and interest rates decrease. By the same logic, suppose  $R$ 's risky assets offer a higher autarky return. Then  $U$  would also want to invest in these risky assets. The pattern of cross-border *gross* financial

flows and positions would resemble the one we observe in the data with the United States investing in foreign risky assets, issuing safe assets, and earning a risk premium.<sup>9</sup>

This line of research successfully accounts for the simultaneous deterioration in US current account imbalances (figure 4.2), the secular decline in real interest rates (figure 4.3), and the increased leverage of the US external portfolio since the 1980s (figure 4.1). These trends reflect a combination of shocks such as the collapse of the Japanese equity and housing bubble of the early 1990s and the Asian financial crisis of 1997, and trends such as the integration of China into the world economy with low initial levels of financial development and rapidly aging populations in Japan, Germany, and China.<sup>10</sup>

The flip side of the “exorbitant privilege” is an increased vulnerability of the United States’ external portfolio to global shocks, which H el ene Rey and I dubbed the “exorbitant duty” (Gourinchas et al. 2010). Indeed, we estimate that, at the peak of the global financial crisis, US valuation losses, corresponding to the valuation gains of the rest of the world, amounted to roughly 14% of US GDP.<sup>11</sup> We then build a model in which the United States has more risk-absorbing capacity than the rest of the world. The model replicates the external portfolio structure of the United States, long on risky assets and short on safe ones, the “exorbitant privilege” as well as the “exorbitant duty.” The model has one key implication: willingly or not, global suppliers of safe-haven assets must bear more exposure to global risks. These findings carry important lessons for regional safe-asset providers such as Germany or Switzerland, or for

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9. The implications in terms of overall current account surplus or deficit are more complex when both risky and safe assets are traded and depend on the relative scarcities in safe and risky assets. See Caballero et al. (2016).

10. On China, see Song et al. (2011) and Coeurdacier et al. (2015).

11. Gourinchas et al. (2012) explores the geographic distribution of valuation gains and losses during the financial crisis and finds that losses are concentrated in the United States, the Eurozone, and China.

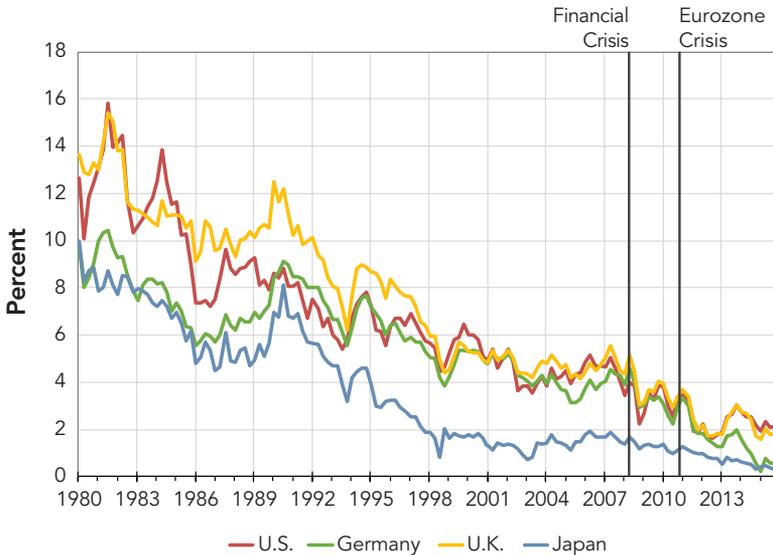


FIGURE 4.3. Global Interest Rates.

*Note:* The figure reports the yield on ten-year government securities for the United States, Germany, the United Kingdom, and Japan. Following the global financial crisis, long-term yields in many advanced economies declined to historically low levels, while policy rates remained at the ZLB.

*Source:* Global Financial Database.

future safe-asset providers, be they the Eurozone or China: lower funding costs come with a commensurate increase in the global exposure of their external balance sheet.

### **The international monetary system at the ZLB: Capital flows and currency wars**

With the global financial crisis and its aftermath, we have entered a new phase in the relationship between safe-asset imbalances and capital flows. The crisis triggered a sharp contraction in safe-asset supply and a surge in global safe-asset demand as households and the nonfinancial corporate sector attempted to deleverage. These shocks depressed further equilibrium real

interest rates, pushing policy rates throughout the developed world to the ZLB.<sup>12</sup>

In recent theoretical work, Caballero et al. (2015) argue that the safe-asset scarcity *mutates* at the ZLB, from a *benign* phenomenon that depresses risk-free rates to a *malign* one where interest rates cannot equilibrate asset markets any longer, leading to a global recession.<sup>13</sup>

The fundamental reason is that the decline in output generically reduces asset demand more than asset supply. To understand why, observe that by definition the supply of true safe assets does not change with a decline in output, hence the recession disproportionately affects safe-asset demand. Equilibrium in the asset market is restored by making savers poorer. Our analysis predicts the emergence of potentially persistent global liquidity traps, a situation that characterizes most of the advanced economies today.

Our theoretical model features nominal rigidities, so that the ZLB matters, and a non-Ricardian setting, so that heterogeneity in asset supply and demand affects interest rates. We use this framework to address two questions.

First, we ask: What is the role of capital flows at the ZLB? We find that, everything else equal, at the ZLB capital flows propagate recessions from one country to another. Countries with more severe safe-asset scarcities under financial autarky will experience milder recessions when integrated, and run current account surpluses. Current account surpluses help spread liquidity traps globally.

Second, we ask: What is the role of exchange rates? Here, our theoretical analysis delivers an important result: within a range,

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12. Most estimates of the natural rate of interest rate such as Laubach and Williams (2015) or Hamilton et al. (2015) are consistent with a substantial decline in the natural real interest rate. Strictly speaking, the ZLB should be defined as the lowest admissible nominal interest rate. As demonstrated by various central banks in recent months, this lowest admissible nominal interest rate may well be negative.

13. A related analysis is Eggertsson et al. (2015).

the nominal exchange rate becomes indeterminate. The fundamental reason is that exchange rates are indeterminate when countries follow pure interest rate targets, as is the case at the ZLB (Kareken and Wallace 1981). In our environment, this indeterminacy has real consequences: different values of the nominal exchange rate translate into different values of the real exchange rate and therefore affect the relative demand for domestic versus foreign goods. Our theoretical framework provides a powerful way to think about the current lively debate on currency wars. By pursuing policies that lead to a more depreciated exchange rate, a country can shift the burden of the global recession onto its trading partners, a *beggar-thy-neighbor* policy.<sup>14</sup>

Our analysis also uncovers a new and important dimension of the “exorbitant duty” faced by safe-asset net suppliers. In a ZLB environment, such nations either have more appreciated currencies, as a result of investors’ flight to safety, or lower funding costs, because their currencies are expected to appreciate in case of global shocks. The first effect tends to worsen the size of the ZLB recession for these countries. The second indicates that they are more likely to hit the ZLB in the first place and experience a recession. Either way, safe-asset suppliers shoulder a larger share of the burden. Yet, because issuance of safe assets anywhere, public or private, is beneficial everywhere, the global provision of safe assets may remain inadequate.

Because our model is non-Ricardian, there is an important role for debt policy. Issuing additional debt (or a balanced budget increase in government spending, or even helicopter drops of money, which are equivalent to debt policy at the ZLB) can potentially address the net shortage of assets and stimulate the economy in all countries, alleviating a global liquidity trap. They are both as-

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14. Outside the ZLB, this type of beggar-thy-neighbor policy is unnecessary since each country can reach potential output via traditional monetary policy while letting its currency fluctuate.

sociated with large Keynesian multipliers, which exceed one in the case of government spending. Yet, they also worsen the current account and net foreign asset position of the country undertaking the policy stimulus.

Our baseline model abstracted away from risk, focusing instead on the supply of “stores of value.” Yet the distinction between safe and risky assets is an important one. There is substantial evidence that the relevant asset shortage is a *safe* asset shortage, rather than a *general* shortage of stores of value. For instance, while real returns on *safe* assets have *declined* (see figure 4.3), estimates of the real returns on productive capital in the United States indicate that they are currently high, not low.<sup>15</sup> Similarly, current estimates of the equity risk premium indicate that it is at an all-time high (figure 4.4). How, it is sometimes argued, can the expected risk premium be so high given that price/earnings ratios have recovered from their decline during the crisis, and are high by historical norms?<sup>16</sup> The answer is that price/earnings ratios are high precisely because risk-free interest rates are at historical lows.

The evidence, I would argue, is consistent with a world where investors’ desire to hold safe assets has increased—some of which is undoubtedly the result of investor mandates and increased regulation of the financial sector—while the supply of safe stores of value has declined globally.<sup>17</sup>

To model differences in the net supply of safe asset, we allow heterogeneity in risk aversion within and across countries, and in

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15. See Gomme et al. (2015). These authors find that pre- and post-tax real returns on business capital and all capital have not been declining. In fact, they are now at the highest level over the past three decades. Their estimated real after-tax return to business capital is 8%.

16. For instance, the Standard and Poor’s 500 price/earnings ratio is close to 25, well below its maximum of 124 in May 2009, but also higher than its historical average of 15.6.

17. The supply of US safe assets may well have increased. For instance, US marketable debt is now in excess of 100% of GDP, up from 64% in 2006. Yet, what matters is the global supply of safe assets. Eichengreen (2016) estimates that the global supply of international liquid assets has declined from 60% of global GDP in 2009 to 30% now.

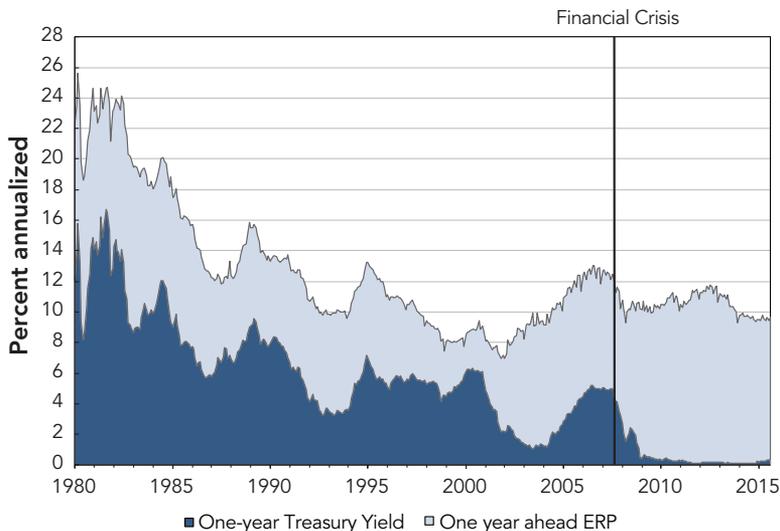


FIGURE 4.4. US Interest Rate and Expected Risk Premium.

*Note:* The graph shows the one-year US Treasury yield and the one-year expected risk premium (ERP), calculated as the first principal component of twenty models of the one-year-ahead equity risk premium. The figure shows that the equity risk premium has increased, especially since the global financial crisis.

*Source:* One-year Treasury yield: Federal Reserve H.15; ERP: Duarte and Rosa (2015).

the ability to produce safe assets. By introducing risk and heterogeneity, we are able to account for the increase in the expected risk premium (figure 4.4) and to rationalize the “exorbitant privilege.” In the model, the expected risk premium rises because the decline in output makes all savers poorer, reducing the demand for risky and safe assets altogether. Further, net safe-asset issuers run a permanent current account deficit, financed by the excess return of their (riskier) external assets on their (safer) external liabilities. Moreover, the model gives rise to a risk premium in the uncovered interest rate parity: because the currency of safe-asset net issuers is expected to appreciate in bad times, they face lower interest rates, which makes them more likely to enter the ZLB, even if the rest of the world is able to avoid it.

## Conclusion

This recent research illustrates that the *fundamental* structure of the international monetary system may largely transcend formal exchange-rate arrangements, with US dollar assets at the center. Going forward, this raises a number of important questions which current research is exploring. First, a recent and influential line of work is questioning whether floating exchange rates provide much insulation against foreign shocks, a central tenet of Mundell's trilemma (Rey 2013; Farhi and Werning 2014).<sup>18</sup> If they don't, monetary authorities may find that they are even more dependent on the monetary policy "at the center," as was the case during Bretton Woods.

Second, our results point to a modern—and more sinister—version of the Triffin dilemma. As the world economy grows faster than that of the United States, so does the global demand for safe assets relative to its supply (Farhi et al. 2011).<sup>19</sup> This depresses global interest rates and could push the global economy into a persistent ZLB environment, a form of "secular stagnation" (Summers 2015).

One likely response would be the endogenous emergence of alternatives to dollar-denominated safe assets produced either by the private sector or by other countries. This raises the difficult question of how different safe assets can coexist and compete in equilibrium and suggests that the safety of an asset is an equilibrium outcome, one that depends not only on the underlying fundamental characteristics of the asset itself but also on the coordination decisions of investors (Gourinchas and Jeanne 2012).<sup>20</sup>

Finally, a body of empirical evidence suggests that environments with low interest rates may fuel leverage boom and bust cycles. The vulnerability of emerging and advanced economies alike to these

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18. See also Bernanke (2016).

19. See also Obstfeld (2014).

20. See also He et al. (2015).

crises has been amply demonstrated in the past. At the country level, the empirical evidence suggests that self-insurance via official reserve (safe-asset) accumulation is an effective line of defense against leveraged booms (Gourinchas and Obstfeld 2012). But what is optimal at the level of an individual country may be inefficient at a global level if it fuels further the safe-asset scarcity and depresses global interest rates. This question is central to current discussions on global safety nets.

### References

- Aron, R. 1965. Le figaro. In *Les Articles du Figaro*, vol. II, 1994. Paris: Editions de Fallois, 1475.
- Bernanke, B. 2005. The global saving glut and the US current account deficit. Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia, Federal Reserve Board, March.
- Bernanke, B. 2016. Federal Reserve policy in an international context. Mundell-Fleming lecture. *IMF Economic Review* (forthcoming).
- Caballero, R., E. Farhi, and P. Gourinchas. 2008. An equilibrium model of “global imbalances” and low interest rates. *American Economic Review* 98, no. 1 (March): 358–93.
- Caballero, R., E. Farhi, and P. Gourinchas. 2015. Global imbalances and currency wars at the ZLB. NBER Working Paper no. 21670 (October).
- Caballero, R., E. Farhi, and P. Gourinchas. 2016. Safe asset scarcity and aggregate demand. *American Economic Review Papers & Proceedings* (May).
- Cochrane, J. Comments on “The fundamental structure of the international monetary system”, this volume.
- Coeurdacier, N., S. Guibaud, and K. Jin. 2015. Credit constraints and growth in a global economy. *American Economic Review* 105 (9): 2838–81.
- Corsetti, G., and P. Konstantinou. 2012. What drives US foreign borrowing? Evidence on the external adjustment to transitory and permanent shocks. *American Economic Review* 102 (2): 1062–92.
- Curcuru, S., T. Dvorak, and F. Warnock. 2008. Cross-border return differentials. *Quarterly Journal of Economics* 123 (4): 1495–1530.
- Duarte, F., and C. Rosa. 2015. The equity risk premium: A review of models. Staff reports 714, Federal Reserve Bank of New York (February).

- Eggertsson, G., N. Mehrotra, S. Singh, and L. Summers. 2015. A contagious malady? Open economy dimensions of secular stagnation. Mimeo. Brown University (November).
- Eichengreen, B. 2012. *Exorbitant privilege: The rise and fall of the dollar*. Oxford: Oxford University Press.
- Eichengreen, B. 2016. Financial scarcity amid plenty. *Project Syndicate*, June 14.
- Farhi, E., P. Gourinchas, and H. Rey. 2011. Reforming the international monetary system. CEPR e-book.
- Farhi, E., and I. Werning. 2014. Dilemma not trilemma? Capital controls and exchange rates with volatile capital flows. *IMF Economic Review* 62 (4): 569–605.
- Gomme, P., B. Ravikumar, and P. Rupert. 2015. Secular stagnation and returns on capital. St Louis Federal Reserve Bank Economic Synopses no. 19.
- Gourinchas, P., and O. Jeanne. 2012. Global safe assets. BIS Working Paper 399 (December).
- Gourinchas, P., and M. Obstfeld. 2012. Stories of the twentieth century for the twenty-first. *American Economic Journal: Macroeconomics* 4 (1): 226–65.
- Gourinchas, P., and H. Rey. 2007a. From world banker to world venture capitalist: US external adjustment and the exorbitant privilege. In *G7 Current Account Imbalances: Sustainability and Adjustment*, ed. R. Clarida. Chicago: University of Chicago Press.
- Gourinchas, P., and H. Rey. 2007b. International financial adjustment. *Journal of Political Economy* 115 (4): 665–703.
- Gourinchas, P., and H. Rey. 2014. External adjustment, global imbalances and valuation effects. In vol. 4 of *Handbook of International Economics*, ed. G. Gopinath, E. Helpman, and K. Rogoff, 585–645, Elsevier, Amsterdam.
- Gourinchas, P., H. Rey, and N. Govillot. 2010. Exorbitant privilege and exorbitant duty. Mimeo. University of California–Berkeley (May).
- Gourinchas, P., H. Rey, and K. Truempler. 2012. The financial crisis and the geography of wealth transfers. *Journal of International Economics* 88 (2): 266–83.
- Hamilton, J., E. Harris, J. Hatzius, and K. West. The equilibrium real funds rate: Past, present and future. NBER Working Paper no. 21476 (August).
- He, Z., A. Krishnamurthy, and K. Millbradt. A model of the reserve asset. Mimeo. Stanford GSB (November).
- Kareken, J., and N. Wallace. 1981. On the indeterminacy of equilibrium exchange rates. *Quarterly Journal of Economics* 96 (2): 207–222.
- Kindleberger, C. 1973. *The world in depression 1929–1939*. Fortieth-anniversary ed., Berkeley: University of California Press.

- Laubach, T., and J. Williams. 2015. Measuring the natural rate of interest. Federal Reserve Bank of San Francisco Working Paper 2015–16 (October).
- Mendoza, E., V. Quadrini, and J. Rios-Rull. 2009. Financial integration, financial deepness and global imbalances. *Journal of Political Economy* 117 (3): 371–410.
- Mundell, R. 1963. Capital mobility and stabilization policy under fixed and flexible exchange rates. *Canadian Journal of Economic and Political Science* 29 (4): 475–85.
- Obstfeld, M. 2012. Does the current account still matter? *American Economic Review* 102 (3): 1–23.
- Obstfeld, M. 2014. The international monetary system: Living with asymmetry. In *Globalization in an age of crisis: Multilateral economic cooperation in the twenty-first century*, ed. R. Feenstra and A. Taylor, Chicago University Press, Chicago, 301–342.
- Rey, H. 2013. Dilemma not trilemma: The global financial cycle and monetary policy independence. Proceedings of the Economic Policy Symposium, Jackson Hole, Federal Reserve Bank of Kansas City.
- Rogoff, K., and T. Tashiro. 2015. Japan's exorbitant privilege. *Journal of the Japanese and International Economies* 35 (March): 43–61.
- Rueff, J. 1961. The West is risking a credit collapse. *Fortune*, June.
- Shin, H. 2012. Global banking glut and loan risk premium. *IMF Economic Review* 60 (2): 155–92.
- Song, Z., K. Storesletten, and F. Zilibotti. 2011. Growing like China. *American Economic Review* 101 (1): 196–233.
- Steil, B. 2013. *The battle of Bretton Woods*. Princeton: Princeton University Press.
- Summers, L. 2015. Have we entered an age of secular stagnation? *IMF Economic Review* 63 (1): 277–80.
- Triffin, R. 1960. *Gold and the dollar crisis: The future of convertibility*. New Haven, CT: Yale University Press.

## DISCUSSION BY JOHN H. COCHRANE

My comments refer both to the underlying academic paper presented at the conference, as well as the excellent and less technical discussion of similar points included in this volume. My exact comments at the conference, relating only to the preceding paper and with funny slides, are available on my webpage [[http://faculty.chicagobooth.edu/john.cochrane/research/Papers/Gourinchas\\_comments.pdf](http://faculty.chicagobooth.edu/john.cochrane/research/Papers/Gourinchas_comments.pdf)].

These are great papers. I'm going to sound a bit critical, but I want you to know praise is coming at the end.

Twenty years ago, international economists were puzzled that capital and trade flows seemed *too small*, as characterized by the Feldstein-Horioka and home bias puzzles. Briefly, countries that wanted to save more seemed to do it at home, rather than abroad, and countries that wanted to invest more seemed to do it from domestic savings rather than borrowing abroad.

Then, the world started to look a bit more like our models, but international economists changed their minds. Now, they think capital and trade flows are *too large*, “global imbalances” and “savings gluts” needing strong policy remediation.

I seem to live in a different world. Let me summarize some key issues and differences between my world and this paper's world.

### Why are interest rates so low?

In the world of these papers, low interest rates and “global imbalances” come from an inability to “produce safe stores of value”

This is entirely a financial friction. Real investment opportunities are unchanged. Economies can't “produce” enough *pieces of paper*. In the model, there is a binding limit on how much of an investment project that firms can pledge to back finan-

cial assets, and government debt is financed only by taxing the young.

In my world, real interest rates are low because real investment opportunities are bad—the marginal product of capital is low. Exchange rates move when people in places with lower productivity and interest rates invest in places with higher productivity and interest rates, driving exchange rates up due to shipping and adjustment costs.

(Just why marginal products of capital are low isn't relevant for today. I think it's policy-induced sclerosis. It could also be Bob Gordon's theory that we've run out of good ideas, or the view that modern technology just doesn't need much capital. We had a discussion at the conference over the fact that corporate profits are high, but what matters in my model is the marginal product of new capital, marginal  $Q$ , and the fact that investment is low, new business formation is low, and expected returns are low, are all consistent with that view, even if existing businesses are making money.)

### **Why is growth so low?**

In Pierre-Olivier's world, it's all the zero lower bound: "Away from the ZLB, . . . a shock that creates an asset shortage . . . results in an endogenous reduction in real interest rates," and output gaps are all zero. "At the ZLB, . . . global output endogenously declines" instead. That output fall is all "gap," and none "potential."

In my world, low real interest rates mean low growth rates, and it's "potential" not "demand." In my world, the ZLB isn't a big, long-run problem.

### **Is the ZLB a problem?**

If we need a negative real rate, why does inflation not solve the problem? The model turns off inflation, first by assumption, then

using the standard (and in my view fragile<sup>21</sup>) new-Keynesian tricks to rule out the high-inflation equilibrium. In my world, inflation can adjust, and the zero bound is therefore not a first-order problem.

My first graph (figure 4.5) shows inflation and interest rates. The United States has had about two percent inflation, and negative two percent real rates since the recession ended. So, negative two is not enough?

I have a more general frustration. Zero bound models claim that a negative “natural” real rate is the driving cause of all our problems, the zero bound is the single relevant wedge or distorted price in the entire global economy—more than taxes, regulations, wage restrictions, social programs, or any other obvious wedge we see looking out the window. Yet, there is no independent quantitative measurement of this negative natural rate, beyond fitting the same models and naming the residuals.

The graph also shows that the behavior of inflation is identical in and out of the zero bound. *In the model* the ZLB is indeed a big “tipping point.” Dynamics are all different at the ZLB. In the data, as in my world, the Consumer Price Index and bond prices post-ZLB look just like they did before. You’ll see this in many of my graphs.

My second graph (figure 4.6) presents the exchange rate and the trade balance. You can see the big blips in fall 2008 and similar blips in many of my graphs. I do think that many parts of this model—“Financial Frictions,” a “flight to quality,” a huge demand for US Treasuries—are important to understanding the crisis period.<sup>22</sup>

But that’s over. This paper is about now, and it’s hard to see a big difference. The exchange rate, which we will talk about in a

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21. See John H. Cochrane, 2015, “The New-Keynesian Liquidity Trap,” [http://faculty.chicagobooth.edu/john.cochrane/research/papers/zero\\_bound\\_2.pdf](http://faculty.chicagobooth.edu/john.cochrane/research/papers/zero_bound_2.pdf)

22. In writing, see John H. Cochrane, 2011, “Understanding fiscal and monetary policy in the great recession: Some unpleasant fiscal arithmetic.” *European Economic Review* 55: 2–30, [http://faculty.chicagobooth.edu/john.cochrane?research/papers/understanding\\_policy\\_EER.pdf](http://faculty.chicagobooth.edu/john.cochrane?research/papers/understanding_policy_EER.pdf)

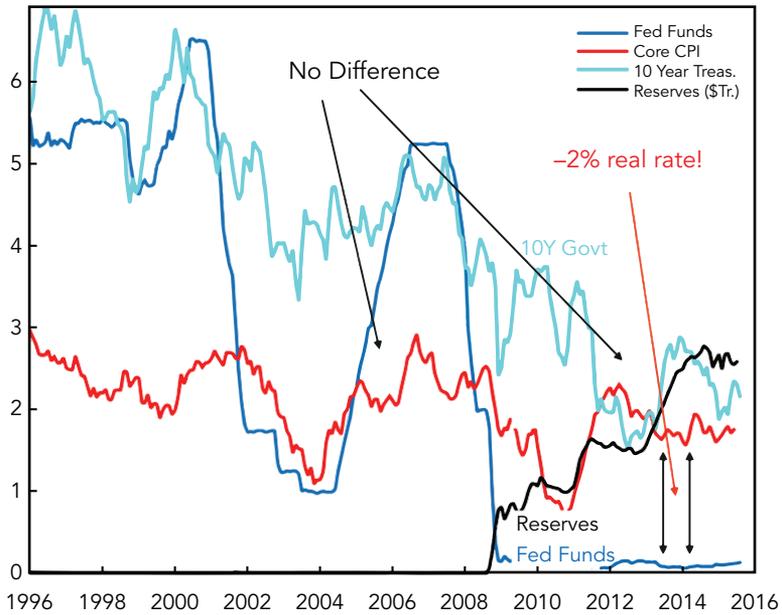


FIGURE 4.5.

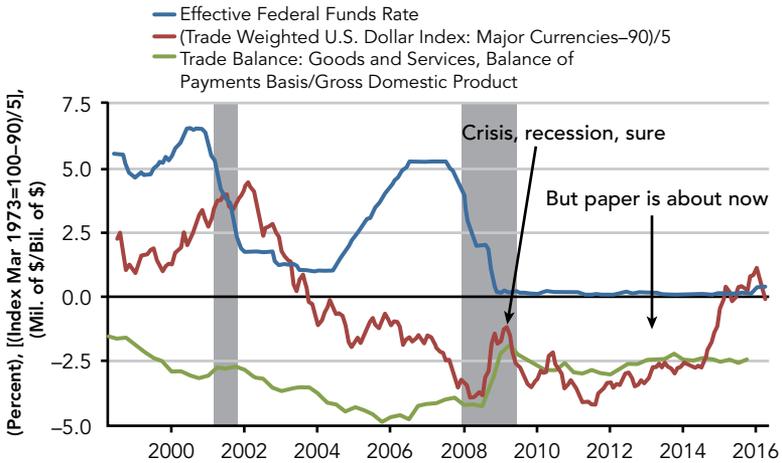


FIGURE 4.6.

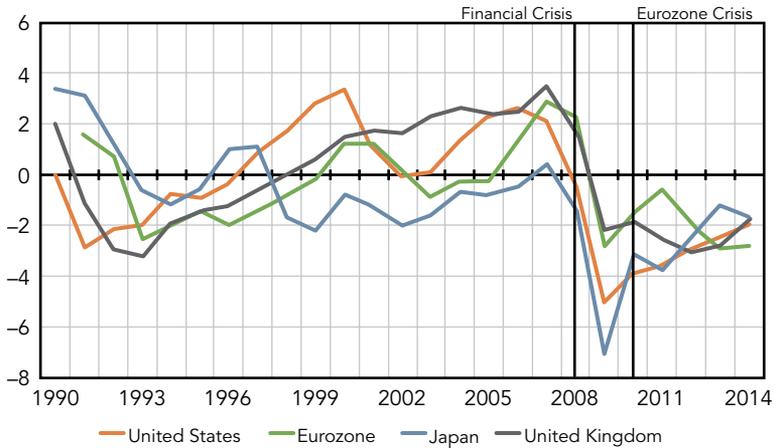


FIGURE 4.7. Output Gaps (percent).

minute, also is no more volatile now than it was out of the zero-bound regime.

The paper offers one piece of evidence for different behavior at the zero bound—“persistent increases in output gaps” as shown in figure 4.7.

First, in my world, this is reverse causality; low growth implies low interest rates.

Second, the model says that output should become more volatile and more correlated across countries at the zero bound “tipping point.” Again, outside the immediate crisis period, it’s hard to see anything.

More generally, is our disappointing output all “gap” from unchanged potential? Yes, in the model. But even measured gaps are falling—and it’s “potential” that’s doing the adjusting, not actual output. Low potential growth is our problem, not gaps.

Unemployment is back to normal. It’s eight years since the financial crisis, and seven since the trough. Just how long can we keep saying “insufficient demand”?

## Exchange rates

This is an international paper, so what about exchange rates? Pierre-Olivier's model is about indeterminacies, not standard supply and demand: "The . . . model has a critical degree of indeterminacy when at the ZLB."

In forward-looking models such as these, an interest rate peg, such as zero, can nail down expected inflation. But unexpected inflation can then be anything—there are the multiple equilibria. In a frictionless model, unexpected inflation also means unexpected exchange rate changes. With nominal rigidities, indeterminacies result in real fluctuations, too.

So the model predicts this extra multiple-equilibrium volatility in exchange rates, output, and trade balances at the bound. The data don't show any increase in volatility or signs of such indeterminacy.

The indeterminacy "creates fertile grounds for . . . beggar-thy-neighbor devaluations achieved by direct interventions in exchange rate markets." I was puzzled by this, reading the paper. If interventions can "change" exchange rates, why don't they "determine" rates? Pierre-Olivier explained in the talk that this is somewhat "outside the model," which makes sense.

"If agents coordinate" is, I think, the clue. In zero-bound multiple-equilibrium models, the central bank is reduced to talk, trying to "coordinate expectations" one way or another because it can't actually *do* anything. There is lots of talk therapy or "forward guidance" recommended in related policy advice. It's like a DJ calling, "put your left foot out, now put your right foot out" to get us all to dance the same way.

In my world, the value of government debt is the present value of primary surpluses that will retire that debt. Then inflation and exchange rate innovations are *determined* by innovations to the present value of fiscal surpluses. (My world includes price

stickiness, but I'm keeping it simple for a discussion.) Exchange rates are *volatile*, just as stock prices are volatile, and hard for pundits to explain ex-post. That volatility, however, has little to do with the zero bound, as in the data.

We have some agreement here. The section in the paper on “helicopter drops” points out, as in my equations, that if you can increase  $B$  without increasing  $G-T$ , you could get some inflation going, if you wanted to, which I don't.

### Safe-asset shortages

Next, I will address “safe-asset shortages.” The modeling problem is that normal investors are always happy to take a little more risk for a little more return. So, the paper adds infinitely risk averse agents.

The result: normally, we think of it as a good thing that the United States can issue at lower rates than other countries. But with “safe-asset scarcity,” that rate can get pushed to zero, where all the bad things are supposed to happen.

I'm skeptical, both of facts and theory requiring the sudden appearance of infinitely risk averse agents.

Safe asset shortage? 100 to 200% debt to GDP ratios, rapidly growing, are not enough? Plus government-guaranteed mortgage-backed securities, repurchase agreements, bank deposits, and so on?

A “safe-asset shortage” means a high risk premium for risky assets, because few people are willing to hold them. (Low prices, high expected returns over risk-free rates, and “risk premium” are all synonyms.) The paper provides this evidence in this picture.

The claim is astounding—that risk premiums be as high as they were in the depths of the crisis.

Every other estimate goes the other way. For example, figure 4.8 shows the Standard and Poor's 500 price/earnings ratio, which reliably forecasts returns. It took a big dip in the crisis. But

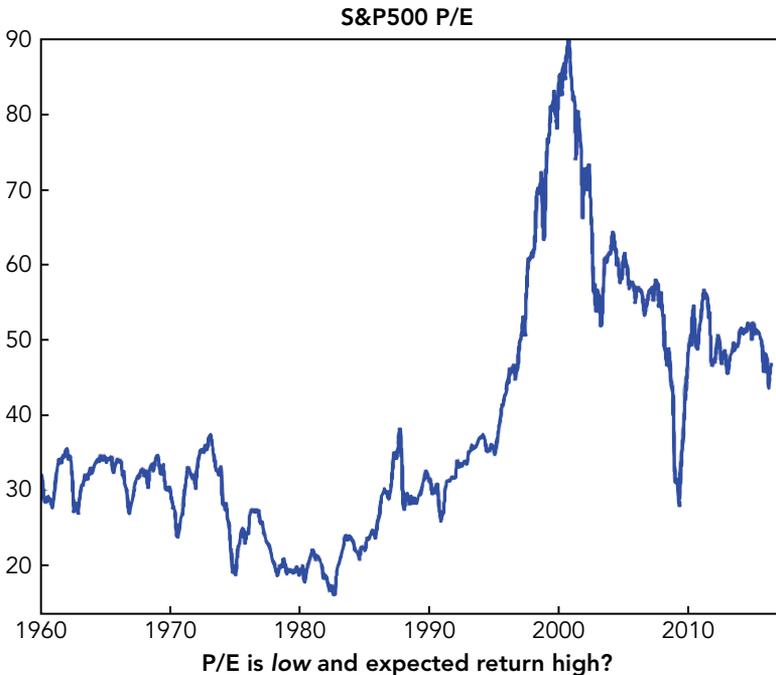


FIGURE 4.8.

now it's right back, and high by historical norms. House prices are now *low*, reflecting high-risk premiums (especially in Berkeley and Palo Alto)?

The same policy and pundit world is loudly complaining about “reach for yield,” “Fed-inspired bubbles” in stocks and houses—low risk premiums. Yes, that is completely inconsistent with the same world complaining about “safe-asset shortage.” Well, maybe the pundit world isn't right about everything.

Our worlds differ sharply on policy implications. In my world, central banks have done their jobs, killing inflation and bringing about Milton Friedman's optimal quantity of money. They can't raise productivity; that's the job of “structural reform.” They should stop trying to fix things beyond their control.

Pierre-Olivier's view is an explicit invitation to international macroeconomic dirigisme, exchange rate interventions, deliberate fiscal inflation, "managing expectations," and "managing" capital flows—denying your and my right to buy things abroad. You know which view is popular in central banks and international institutions!

### Summary

To summarize, I have a very simple view of today's world. Low productivity drives low interest rates and low growth. Nominal interest pegs, including zero, are determinate and stable. Prices are not infinitely sticky, so inflation can soak up slow moves in real rates. Exchange rates are volatile because they respond to the present value of fiscal surpluses, as well as to standard real interest differentials.

To be clear, I *am* sympathetic to the basic ingredients—financial frictions, a flight to US Treasury debt, a binding zero bound, inadequate "demand"—in the fall of 2008. But it's not groundhog day, forever 2008. At some point, financial crisis theory must give way to not-enough-growth theory.

As I promised to say at the start, this is a *great* paper. Three of the best minds in international macroeconomics have found ways to formalize all the blather we hear from the international policy community, "global imbalances," "savings gluts," "managing expectations," "flight to quality," "safeasset shortage," "ZLB contagion," and so on. As an economist, I am awed by their ability to write down a coherent model that captures these (to me) goofy ideas.

This being a policy conference, not a theory conference, I won't go over the clever ways they formalized these ideas. But this is why math and modeling is important in economics. Without it, we don't know what the chatter can possibly mean, nor whether it makes any sense.

To our media guests: you may think that economics works like regular science, where the equations come first, then tests in the data, then popular exposition with colorful language (“black holes!”), then, maybe, policy. No, we work backwards: first central banks feel their way to the policies they want to try, then colorful words like “global imbalances” are coined to describe their intuition about why, then theorists come up with equations that maybe make sense of the words, and finally we start testing theories in data. That second to last step is vital. Without it, we have no idea whether the colorful language makes any sense at all. Math in economics is vital.

Only with an explicit model can we begin to have a discussion. This model is great because I can read each ingredient—unpledgeable capital, taxes that fall only on the young, infinitely risk-averse agents—as *necessary*, not just *sufficient* to generate the policy blather. So I read this paper as a brilliant *negative* result. It shows just how extreme the implicit assumptions are behind the policy blather. It shows just how empty the idea is that our policymakers understand any of this stuff at a scientific, empirically tested level and should take strong actions to offset the supposed problems these buzzwords allude to.

Bottom line: you have in front of you two utterly different world-views. Each set of models is reasonably internally consistent. The question is, which model applies to which planet?

## GENERAL DISCUSSION

LEE OHANIAN: So in your paper and the other safe-asset-shortage papers, it seems that there is no ability for society to create more safe assets. So oftentimes in economics, if society wants more of a certain commodity, we find a way to produce that. Maybe not right away, but over time. What economic forces are you thinking about that prevent society from creating more safe assets? Are there things that we haven't thought about yet? Are there some fundamental restrictions that would have an analog in the model you have?

PIERRE-OLIVIER GOURINCHAS: You are correct. In the world we describe, there is a premium for issuing safe assets, so that should spur the creation of "private safe assets." But that supposes that the private sector can indeed generate these safe assets, and in sufficient quantities. Here counterparty risk and agency problems are important, and this is the main reason I think that the private sector is often unable to create truly safe assets, or at least in sufficient enough quantities, compared to the ability of some, not all, but some, public institutions. The question is: What ensures that something is safe? Counterparty risk is important: the likelihood that some private institution, financial or nonfinancial—think about JP Morgan, Facebook, or Apple, or General Motors—will be there and able to honor its obligations in the next 15 to 20 years is high, but it's less than one. The likelihood that the Greek government will be able to honor its promises in the next three years is certainly much less than one. I would argue that the same probability for the US Treasury is one. Now, as we've seen in the last crisis, there are strong incentives for the private sector to produce assets that look safe. Bernanke called them "private-label safe assets". But as the crisis illustrated, they were really not that safe in the end. So

yes: there is an important difference, arising from counterparty risks and agency problems, between true safe-asset providers, who are few and often public institutions backed by the power of taxation, and private institutions.

JOHN COCHRANE: The real question is, What do you mean by a demand for special safe assets? In fact, most estimates of risk premiums are quite low right now. Well, what's so special about safe assets?

PIERRE-OLIVIER GOURINCHAS: Real interest rates are at historical lows. Someone is willing to lend to the Japanese government and earn a negative rate. Someone lends to the US government and earns a negative rate. Estimates of risk premiums are not that low, as we show in our paper. They are in fact quite high.

JOHN COCHRANE: Stock price dividend ratios are high. Interest rate spreads are low. Credit spreads are low.

PIERRE-OLIVIER GOURINCHAS: The dividend price ratio is high precisely because risk-free rates are low.

JOHN COCHRANE: But it's not about the level of rates. The issue is risk premiums. I agree about the level. People want to save. There's not much to invest it in. Inflation is low. Sure, the level of all rates is low.

ROBERT HALL: So one thing I keep track of quite carefully and accurately is the marginal product of capital. And I'm sorry to say, John, that it's just remarkably high. And this has been discussed a lot in the financial press, too, that the earnings of capital, physical capital, which presumably reflect the marginal product, have remained astonishingly high and stable. So I think the whole declining-marginal-product-of-capital hypothesis can be crossed off.

But I think I agree with this question. First of all, there are supersafe assets, and there are pretty-safe assets. But privately creating pretty-safe assets through over-collateralization, which is an extremely powerful tool in spite of any abuses that occurred

in 2006, is an amazingly impressive way for private, pretty-safe assets to be created. And there's been an explosion and there continues to be an explosion of over-collateralization to satisfy demand. So the idea that there's a shortage and unsatisfied demand, I think, is crazy. We have a market equilibrium, which cannot be described as having a shortage, but it's one in which there's been a growing segment of the world's investors that have high risk aversion, not infinite. A coefficient of relative risk aversion of 2.5 for the risk-averse investors relative to 2.0 for the risk-tolerant investors is enough of a heterogeneity of risk aversion to generate the kind of low interest rates that we have today.

So we should dispense with this idea that there's something called a shortage or that only public instruments can be called "safe." Those are crazy ideas. The right ideas are that we have a world equilibrium, which delivers extremely low real interest rates and with low inflation, therefore, low nominal rates—dangerously low. But it's a market equilibrium. This idea that somehow only the public can do it, I think, is particularly dangerous.

PIERRE-OLIVIER GOURINCHAS: Can I come back to that? I think 2008 is a good example of when we see the tide going out and we see who is swimming without a swimsuit. At that point, what we see in the balance-of-payment data, in particular, is quite striking. All the gross inflows go into US Treasuries. They even come out of agencies at that point. They go to Treasuries and notes. They come out of everything else. And they come out of all the "private label" safe assets. So when the going got tough, private assets just did not cut it. Now perhaps it was because these assets were poorly regulated, or poorly collateralized. And perhaps savers are now looking at these assets suspiciously. But when the shocks are large enough, it is quite natural to expect these assets to fail before public assets do. And the fact that these assets don't necessarily have a backstop also makes them vulnerable to runs.

Now on the notion of the safe-asset shortage, I want to clarify an important point. The term does not describe the equilibrium outcome: in equilibrium, of course, things happen so that demand equals supply. What “safe-asset shortage” refers to is a shift in demand for these assets. If the price can adjust, then it will: interest rate will be low. If the price can’t adjust—i.e., interest rates cannot fall enough—then something else will adjust: we argue it is output. And I think we can all agree that there’s been a huge increase in the demand for this kind of asset, without a corresponding increase in supply: after all, real interest rates have declined. Some of it goes all the way back to the aftermath of the 1998 Asian financial crisis, and the surge in reserve accumulation by foreign officials, central banks. Some of it comes from the private sector too. A lot of gross demand for safe assets originates within the financial sector itself. In normal times, the financial sector should be a net provider of safe assets. But this masks large gross positions within the financial sector itself. Sight deposit accounts are a safe asset. But financial institutions also demand safe assets for collateral in repurchase-agreement transactions, for instance. Gary Gorton has written extensively on this. In times of crisis, the financial sector itself wants to get its hands on truly safe assets, so the financial sector itself becomes a net demander of safe assets.

And so I think you’re right that the private sector produces them in normal times, but then when we get the kind of very large shock that we experienced eight years ago, then this is not sufficient.

**ROBERT HALL:** Well-rated corporate bonds are a good example. They’re heavily over-collateralized. They’re treated as safe. It was only a very minor shock in 2008. It’s the less well-rated bonds that had a spike in their yields.

**SEBASTIAN EDWARDS:** Everything that Pierre-Olivier said was about 2007 and 2008. And then you added the shocks, the huge

shocks we had eight years ago. So I go back to John Cochrane's point. The crisis is over, man. So I would buy what you're saying for 2008, maybe 2009, but not for 2015. I think that's still something that you have to persuade us about, that there is not enough supply of these safe assets at this very precise moment. So timing is of the essence in this narrative.

VARADARAJAN CHARI: It's interesting as theory. But I think that taken to the next level, it would really help a lot if we would start putting some numbers behind these kinds of things. I want to begin by reiterating a point. John took a larger number. But looking at federal debt held by the public as a percentage of gross domestic product, it's very similar to the picture John had. In the 2000s—this is just public debt—it was roughly 35% of GDP. Now, it's 75% of GDP. And yes, the Fed has bought up a bunch of that stuff, but the Fed has issued reserves, which are just as safe, in exchange for that. So what I want to know is, suppose I put in that kind of an increase—40%. So we're talking six trillion dollars. Same thing for Japan. Same thing for the European Union. Are you going to get the kinds of effects you're talking about? There's just not enough of this stuff? That's one.

The second thing that bothers me a lot is that price rigidity assumptions have to play a critical role. In your model, there has to be a stationary equilibrium in the long run, so to speak, and John's of the view—and I'm sympathetic—that eight years is close enough for macroeconomists to the long run. You'd think that if this was a real problem, the inflation rate now would be minus two percent, not plus two percent. Because the main thing that you guys are focusing on, this very worthwhile thing, is you're trying to account for this so-called secular stagnation. But your view of secular stagnation relies very heavily on the idea that you can't have an equilibrium with minus two percent inflation for five or six years, because that's the steady state in which you get back to the normal market-clearing kind

of stuff. You're shutting down a lot of those mechanisms. It's bothering me.

The last thing, just one more thing: I didn't understand the stuff about flows. You said that all the data said the flows were from bonds or from agencies to Treasuries. It can't be a statement about the flows, because the aggregate stock of agency securities didn't change. For every buyer there was a seller. It has to be some statement about prices. So somehow you're saying that the demand for safety went up? That may be right, but it seems to me a lot closer to what Bob Hall was talking about.

PIERRE-OLIVIER GOURINCHAS: Lots of very interesting points here. First on inflation: what I presented today doesn't have any inflation. But we have a whole section in the paper where we bring in inflation. Then the amount of deflation you would get once you're in the liquidity trap (since output is below potential) is something that is controlled by a bunch of things, such as the elasticity of your inflation rate to the output gap. In steady state, what you get is deflation, not inflation. Deflation does not help you: it keeps real rates high and therefore output depressed, which is why you remain stuck. Now, on whether in 2016 events that occurred in 2008 should have receded into the background: that is not clear to me. Clearly, the low real rates and high-risk premium indicate that investors don't view the situation as normalized.

JOHN COCHRANE: I think Chari misspoke. The steady state you want has *inflation*, right? If you need to generate a persistent steady state with negative two percent real, the answer is two percent positive inflation, and it takes a lot of tricks to keep that from being the steady state that emerges.

PIERRE-OLIVIER GOURINCHAS: In the model with inflation there are multiple equilibria. If the inflation target is high enough, there is an equilibrium with sufficiently high inflation and output at potential: there is no trap. If the inflation target is too low,

this equilibrium does not exist anymore. But regardless of the inflation target, there is another equilibrium with low inflation (or deflation) and output below potential. In an international environment, there are also asymmetric equilibria where one country is in the trap (and experiences deflation) and the other is not. Now we can disagree about the underlying, dynamic process that may or may not allow us to reach that global liquidity trap equilibrium. I think that's a healthy scientific discussion. But that is maybe beyond the point you were raising.

Now on Chari's point about flows and stock, Chari is absolutely correct: the stock does not change, so prices must adjust and a new equilibrium obtains given the changes in demand. Risk free rates fall and expected risky returns increase. What the financial account gives us is a window into that shift in demand. If all investors were identical, there would be no flows, just an adjustment in prices. But not all investors are identical, so we're going to see international flows. And there was a big domestic actor here that stepped up and made sure that the prices of the agencies wouldn't move too much: the Fed. What the Fed was doing was issuing central bank liabilities, which are very safe. In fact, it is almost the definition of a safe asset: you cannot run against it and its nominal value is fixed. What we see in the balance of payment data is the private sector running for the exits on these supposedly safe assets—even ones with implicit guaranties from the US-government-like agencies.

The real disagreement with the view of the world that John presented is the disagreement about whether the marginal product of capital and the decline in the marginal product of capital is sufficient to generate everything we see. And here, I'm fully siding with Bob Hall. I don't see the evidence in terms of the corporate profitability that would justify that.

JOHN COCHRANE: Since you both said it, can I have one second on that? Bob Hall and I have this discussion all the time. But in-

vestment is very low, and real interest rates and expected returns on stocks are really low. So there are two pieces of evidence that the marginal product of capital and marginal Q are really low. It makes sense that existing businesses are doing great, but no one wants to invest in new businesses, and we can all discuss obvious reasons why. That's at least a consistent story—if not one that will keep Bob happy—for how you can see high corporate profits, and very low investment, and very low rates of return.