Safe U.S. Assets and U.S. Capital Flows

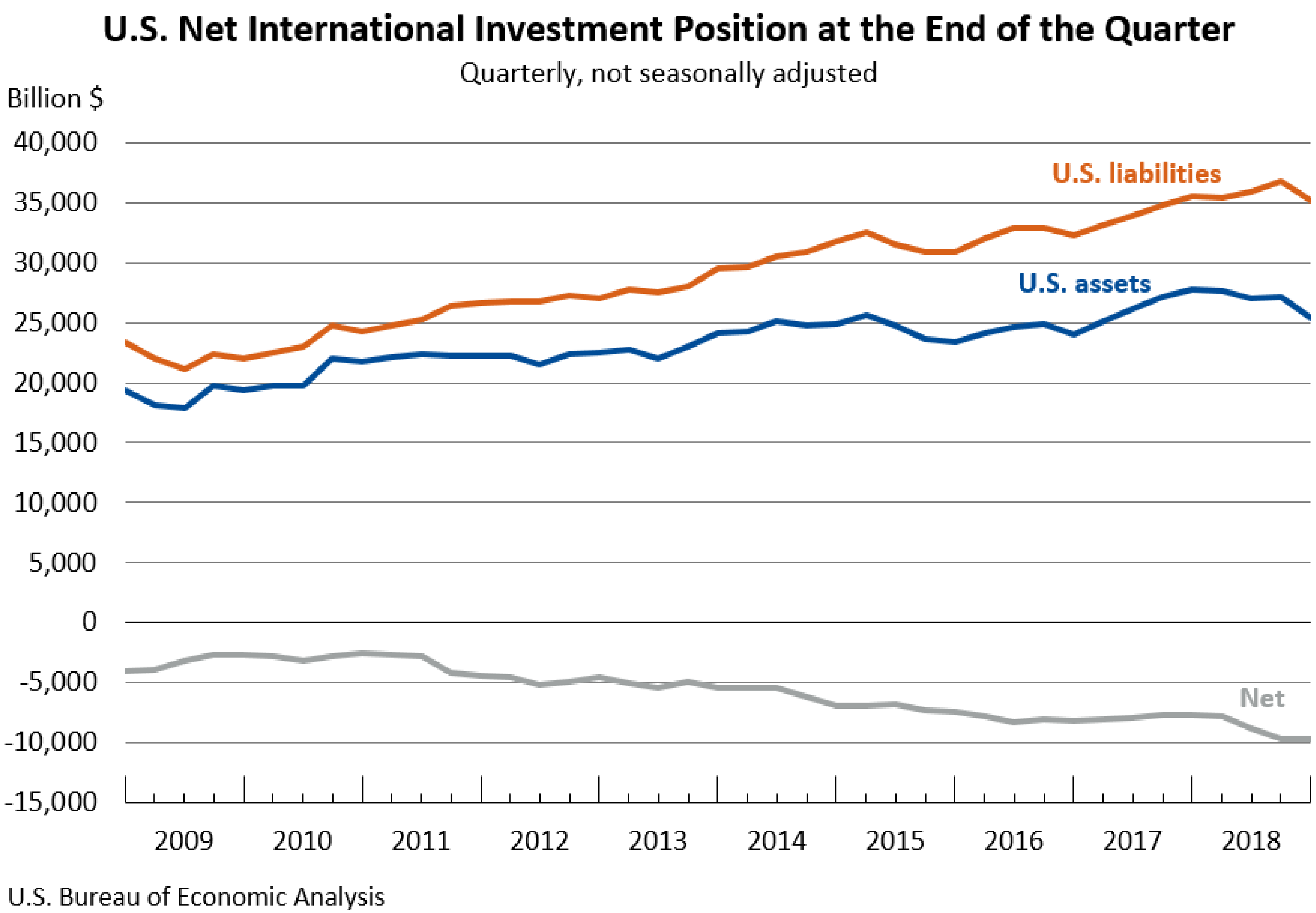
Charles Engel
University of Wisconsin
NBER and CEPR

Prepared for conference on “Global Safe Assets, International Reserves, and Capital Flow”May 20-21, 2019, City University of Hong Kong.

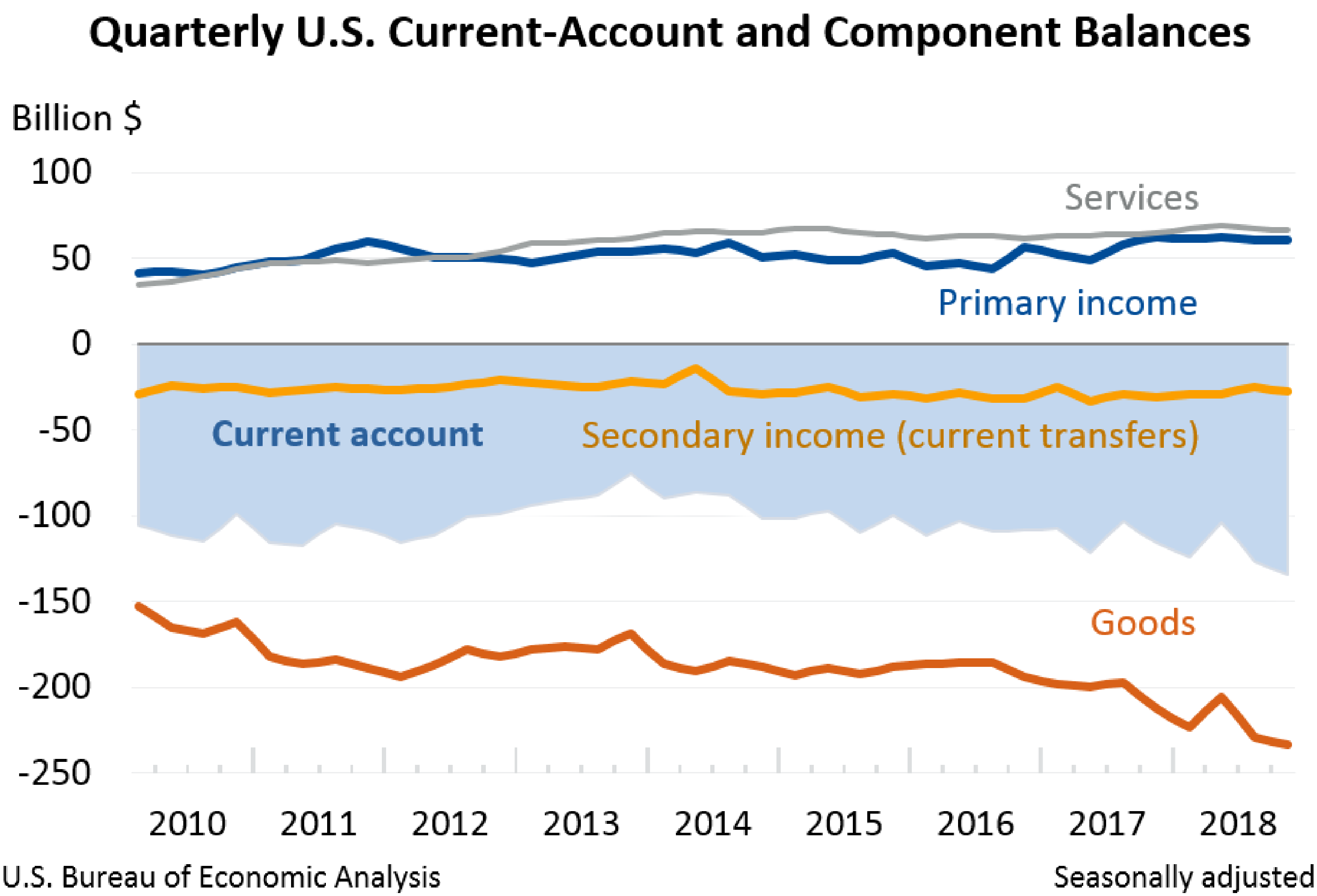
- It is well known that the U.S. is a net debtor but that its net foreign income is positive.

- These facts imply that the U.S. earns more on its foreign investments than foreigners earn on U.S. investments.

- A back-of-the-envelope calculation suggests the magnitude of the difference in returns: The annual net foreign income receipts for the U.S. in 2018 amounted to $1060 bn. The U.S. net international investment position at the end of 2017 was -$9635 bn, on $36,729 bn in liabilities to foreigners versus $27,094 bn ownership of foreign assets. For example, if the U.S. earned on average a return of 5.0 percent on its investments abroad, then, in order to reconcile these numbers, it must have had to pay only a 0.8 percent return on its assets held by foreigners.



U.S. Net International Investment Position at the End of the Quarter
Quarterly, not seasonally adjusted
Billion $
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
U.S. liabilities
U.S. assets
Net
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
U.S. Bureau of Economic Analysis


Quarterly U.S. Current-Account and Component Balances
Billion $
100
50
0
-50
-100
-150
-200
-250
Services
Primary income
Current account
Secondary income (current transfers)
Goods
2010
2011
2012
2013
2014
2015
2016
2017
2018
U.S. Bureau of Economic Analysis
Seasonally adjusted

- The U.S. is said to have an "**exorbitant privilege**"

- The fact that U.S. assets are able to pay such a low return relative to foreign assets is attributed to the fact that U.S. assets are "**safe assets**"

- What is a "safe asset"?
    - There seems to be no consensus on the meaning of "safe". As Humpty Dumpty is alleged to have said, "When I use a word, it means just what I choose it to mean – nothing more nor less."

- Gorton (2017) states: "A safe asset is an asset that is (almost always) valued at face value without expensive and prolonged analysis. By design, there is no benefit to producing (private) information about its value, and this is common knowledge."

- “Safety” and “liquidity” are closely related:
- Investopedia (Nickolas, 2018) defines liquid assets as: “cash on hand or an asset that can be readily converted to cash. An asset that can readily be converted into cash is similar to cash itself because the asset can be sold with little impact on its value.”
- Safe assets are liquid; liquid assets are safe.
- U.S. government assets are safe and liquid. They pay a “convenience yield”. That is, the monetary return on Treasury assets is lower than, for example, LIBOR, or other comparable “riskless” assets.
- This represents the safety of the U.S. Treasuries, and their liquidity or usefulness as collateral.

Plan of talk today:

1. Simple model

2. Empirical effect of convenience yield on real exchange rate

3. Empirical effect of convenience yield on U.S. current account, via real exchange rate

4. Discussion

Model

Non-quantitative 2-period, 2-country model to illustrate the role of convenience yield on real exchange rate and current account.

Countries are the foreign country and the home (the U.S.)

Foreigners can hold a portfolio of two assets – capital (K) and an internationally traded bond (B). Home will want to borrow in period 0, and pay back in period 1.

Bonds are the *liquid* asset issued by U.S. They are costless to redeem.

Capital is *illiquid*. This is modeled as an ad hoc, deadweight cost of redeeming the asset (using the asset for production) in period 1.

Foreign Country

Consumers maximize:

(1) $U = \ln\left(C^*_{T,0}\right) + \ln\left(C^*_{N,0}\right) + \ln\left(C^*_{T,1}\right).$

In the initial period, the foreign household chooses a portfolio of U.S. bonds, *B*, and the productive asset, K^* with $K^* \geq 0$.

We also assume $B \geq 0$ -- the foreign country can lend to the U.S. at the interest rate *r*, but it cannot borrow from the U.S. at that rate.

U.S. bonds pay a gross interest rate of $1+r$ in units of the tradeable good. This interest rate will be determined in equilibrium.

The asset K^* can be thought of as a unit of capital, and is produced from the nontraded good.

Foreign households receive an endowment of nontraded output in the initial period, $Y_{N,0}^*$,

Each unit of capital produces μ units of the traded good in period 1. The capital depreciates entirely, or is otherwise worthless since there is no consumption of the nontraded good in period 1.

The initial price of a unit of nontraded goods in units of the traded good is p_0^*. Hence the gross return in units of traded goods on K^* is $\frac{\mu}{p_0^*}$.

The asset K^* is illiquid. This is modeled simply as a cost in period 1 of disposing of the asset.

We assume the cost is given by $\frac{\delta}{2} p_0^* K^* \left(\frac{K^*}{Y_{N,o}^*} \right)$, where $\delta > 0$ is a cost parameter. The functional form can be given an economic interpretation. The cost is incurred in period 1, and is in units of the tradeable good. The greater the value of the asset in period 0, $p_0^* K^*$, the higher the liquidation cost. But the costs are also increasing as the share of nontraded output devoted to the illiquid asset, $\frac{K^*}{Y_{N,o}^*}$, increases.

The salient assumption is that there are increasing costs in the amount invested in the asset. Ultimately, the household puts a limit on the amount invested in K^*, even though in equilibrium the gross return $\frac{\mu}{p_0^*}$ is greater than *r*.

δ is the key parameter in this model. An increase in δ means that the real asset is less liquid, or, relatively speaking, U.S. bonds are more liquid. We are interested in how an increase in δ affects equilibrium returns, the initial trade balance, and the initial real exchange rate.

The initial budget constraint is given by:

(2) $p_0^* C_{N,0}^* + C_{T,0}^* = Y_{T,0}^* + p_0^* Y_{N,0}^* - B - p_0^* K^*$

$Y_{T,o}^*$ is the foreign household's endowment of the traded good in period 0. In period 1, the foreign households consume only the traded good.

(3) $C_{T,1}^* = \left(1+r\right)B + \mu K^* - \dfrac{\delta p_0^* \left(K^*\right)^2}{2Y_{N,o}^*}.$

The foreign household chooses $C_{N,0}^*$, $C_{T,0}^*$, $C_{T,1}^*$, B, and K^* to maximize utility given in equation (1), subject to the constraints in (2), and (3). From the first-order conditions, we derive:

(4) $p_0^* C_{N,0}^* = C_{T,0}^*$

(5) $C_{T,1}^* = \left(1+r\right) C_{T,1}^*$

(6) $R^* - \left(1+r\right) = \dfrac{\delta K^{*,}}{Y_{N,0}^*}$, where

(7) $R^* \equiv \dfrac{\mu}{p_0^*}$.

This last condition says that the gross return on the real asset exceeds that on the U.S. bonds by an amount due to the marginal liquidation cost. This gap represents the convenience yield on the U.S. bonds.

In equilibrium, households must allocate the nontraded endowment between consumption and the capital good:

(8) $$Y^{*}_{N,0} = C^{*}_{N,0} + K^{*}.$$

Equations (2)-(8) allow us to solve for $C^{*}_{N,0}$, $C^{*}_{T,0}$, $C^{*}_{T,1}$, B, K^{*}, R^{*} and p^{*}_{0} in terms of *r* and the exogenously given endowments.

Home country (U.S.A.)

The households in the home country have utility functions similar to those of the residents of the foreign country:

(9) $U = \ln\left(C_{T,0}\right) + \ln\left(C_{N,0}\right) + \ln\left(C_{T,1}\right)$,

The consumption variables are defined analogously to those in the foreign country. To keep matters simple, the home households receive endowments $Y_{N,0}$, $Y_{T,0}$, and $Y_{T,1}$. It faces the budget constraints:

(10) $p_0 C_{N,0} + C_{T,0} = Y_{T,0} + p_0 Y_{N,0} + B$,

(11) $C_{T,1} = Y_{T,1} - \left(1 + r\right) B$.

The first-order conditions are given by:

(12) $$C_{T,0} = p_0 C_{N,0}$$

(13) $$C_{T,1} = (1 + r) C_{T,0}.$$

Equations (10)-(13) allow us to solve for $C_{T,0}$, $C_{N,0}$, $C_{T,1}$, and *B* in terms of *r*.

Equilibrium

Equating the bond supply from the home country and the bond demand from the foreign country allows us to solve for *r*.

Equations (2)-(8) hold for the foreign country, and equations (10)-(13) for the foreign country, along with the bond market equilibrium condition. We assume the endowments and parameters are such that in equilibrium, $B > 0$.

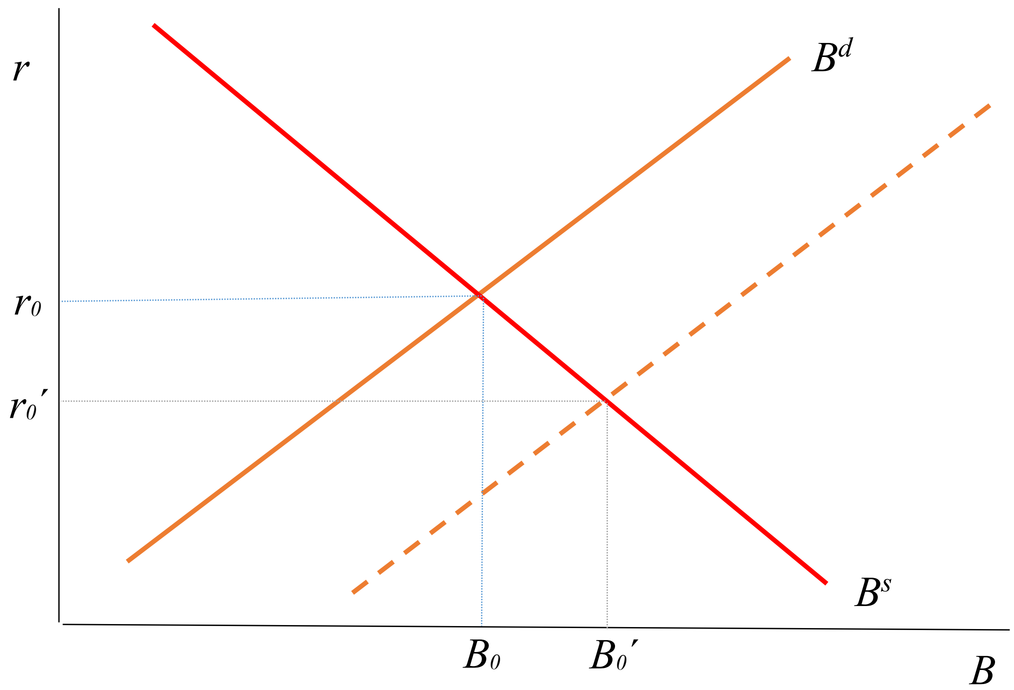
We find $\frac{dr}{d\delta} < 0$, $\frac{dB}{d\delta} > 0$, $\frac{dp_0^*}{d\delta} < 0$, and $\frac{dp_0}{d\delta} > 0$. Here, we can illustrate these findings graphically.

Figure 3 shows the supply by the home country, and demand from the foreign country, for *B* as a function of *r*, holding the prices of nontraded goods constant.

The demand for the liquid bond is upward sloping, as the foreign country purchases more as the return to the bond increases; and, similarly, the home country supplies more of the bond (i.e., borrows more) the lower the interest rate.

Figure 3

Market for Liquid Bond, *B*



When there is a reduction in the liquidity of the foreign real investment, so δ increases, the foreign household will rebalance its portfolio from K^* to B.

The increase in demand for the bond will drive down *r* and increase the equilibrium amount of borrowing by the home country.

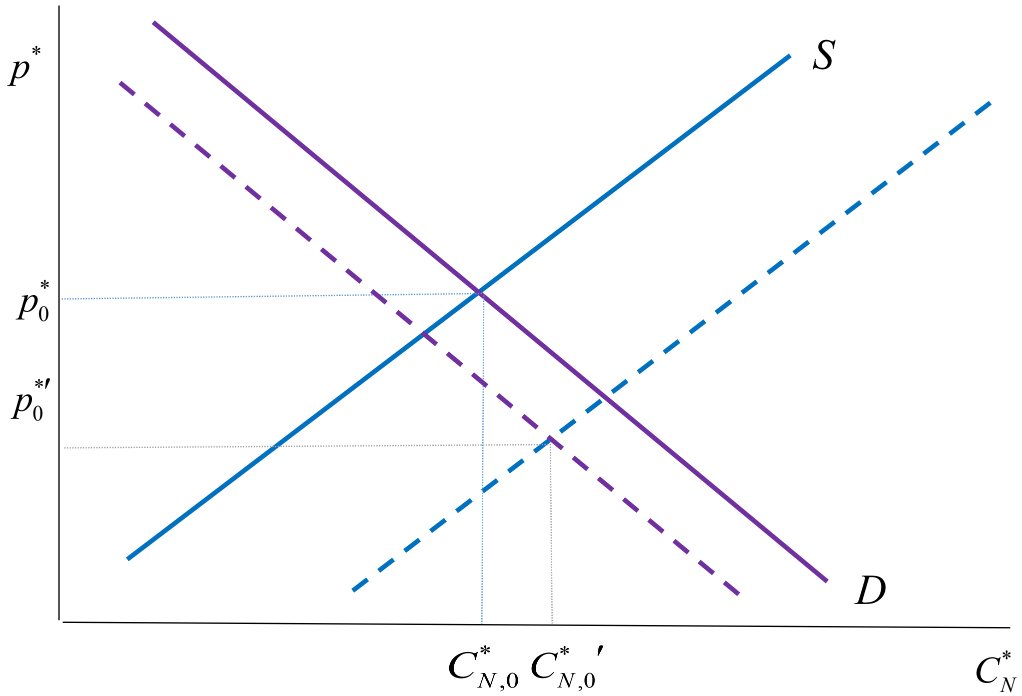
In other words, an increased liquidity demand for the home-country bond leads to capital inflows, increasing the financial account surplus in period 0.

The effect of the portfolio shift toward the liquid asset is that households in the foreign country consume less of the traded good in period 0, while households in the home country consume more.

Holding prices (p_0^* and p_0) constant, there must be a reduction in consumption demand for the foreign nontraded good and an increase in demand for the home nontraded good. In addition, in the foreign country, the decline in demand for K^* leaves a greater supply of the nontraded good available for consumption. Hence, p_0^* falls, while p_0 rises. The market for the foreign nontraded good is depicted in Figure 4.

Figure 4

Market for the Nontraded Good in the Foreign Country



Engel and Wu estimate the following regression, for each of the G10 currencies, using fixed effects, for the period January 1999 – December 2017:

$$s_t - s_{t-1} = \beta_1 q_{t-1} + \beta_2\left(\eta_t - \eta_{t-1}\right) + \beta_3\left(i_t - i_t^* - \left(i_{t-1} - i_{t-1}^*\right)\right) + \beta_4 \eta_{t-1} + \beta_5\left(i_{t-1} - i_{t-1}^*\right) + z_{j,t}$$

s_t is the log of the home currency price of foreign currency

i_t is each country's 12-month government bond yield

q_t is the log of the real exchange rate, $q_t = s_t + p_t^* - p_t$

The important new variable in this empirical work is η_t, the measure of the liquidity or convenience yield of government bonds in the home country relative to the foreign country.

$$\eta_t = \left(i_t^m - i_t\right) - \left(i_t^{m*} - i_t^*\right) = f_{t,t+1} - s_t + i_t^* - i_t$$

$$s_t - s_{t-1} = \beta_1 q_{t-1} + \beta_2 \left(\eta_t - \eta_{t-1}\right) + \beta_3 \left(i_t - i_t^* - \left(i_{t-1} - i_{t-1}^*\right)\right)$$
$$+\beta_4 \eta_{t-1} + \beta_5 \left(i_{t-1} - i_{t-1}^*\right) + z_{j,t}$$

$\beta_1 < 0,\ \beta_2 < 0,\ \beta_3 < 0$

η_t is the home minus foreign liquidity yield

q_t is the log of the real exchange rate

2A. Estimation of: $\Delta s_{j,t} = \alpha_j + \beta_1 q_{j,t-1} + \beta_2 \Delta\eta_{j,t} + \beta_3 \Delta i^R_{j,t} + \beta_4 \eta_{j,t-1} + \beta_5 i^R_{j,t-1} + u_{j,t}$

Currency	$q_{i,t-1}$	$\Delta\eta_{j,t}$	$\Delta i^R_{j,t}$
AUD	-0.0284***	-5.2710***	-5.7441***
	(0.0071)	(0.7181)	(0.5356)
CAD	-0.0267***	-4.6086***	-5.4603***
	(0.0062)	(0.6238)	(0.4910)
EUR	-0.0203***	-4.6406***	-5.0187***
	(0.0059)	(0.5179)	(0.4103)
JPY	-0.0400***	-4.3863***	-6.3171***
	(0.0102)	(0.9532)	(0.7367)
NZD	-0.0276***	-6.2906***	-6.0200***
	(0.0082)	(0.7275)	(0.6082)
NOK	-0.0190***	-4.0106***	-4.8711***
	(0.0068)	(0.6138)	(0.4877)
SEK	-0.0226***	-4.5193***	-4.5991***
	(0.0062)	(0.5796)	(0.4631)
CHF	-0.0129**	-2.3197***	-2.7587***
	(0.0065)	(0.7129)	(0.5557)
GBP	-0.0227***	-3.3495***	-5.2385***
	(0.0067)	(0.6655)	(0.5212)
USD	-0.0113*	-6.4388***	-4.7717***
	(0.0068)	(0.7198)	(0.5691)

We begin with a reduced-form vector autoregression in three variables: the real exchange rate, q_t, where an increase indicates a real U.S. depreciation; the relative convenience yield, η_t; and, the U.S. minus the foreign one-year government bond yield, i_t^R. The reduced-form VAR is written as:

(14) $$\begin{bmatrix} q_t \\ \eta_t \\ i_t^R \end{bmatrix} = A + B \begin{bmatrix} q_{t-1} \\ \eta_{t-1} \\ i_{t-1}^R \end{bmatrix} + u_t,$$

where *A* is a 3x1 vector of constants, *B* is a 3x3 vector of parameters, and u_t is a 3x1 vector of regression errors.

VAR for U.S. Real Exchange Rate, Convenience Yield and Interest Rates

Reduced Form VAR Estimates					
Dependent Variable		Intercept	q_{t-1}	η_{t-1}	i_{t-1}^R
q_t		-0.53903 (0.0047)	0.9340 (0.0298)	-6.7735 (2.4955)	0.2203 (0.5153)
η_t		0.00152 (0.0002)	0.0006 (0.0012)	0.6064 (0.0988)	0.0254 (0.0204)
i_t^R		0.00327 (0.0004)	0.0038 (0.0023)	0.3138 (0.1922)	0.9383 (0.0397)
Structural VAR Estimates					
E Matrix					
			q_t	η_t	i_t^R
q_t			1	11.4383	2.8642
η_t			0	1	-0.0599
i_t^R			0	0	1

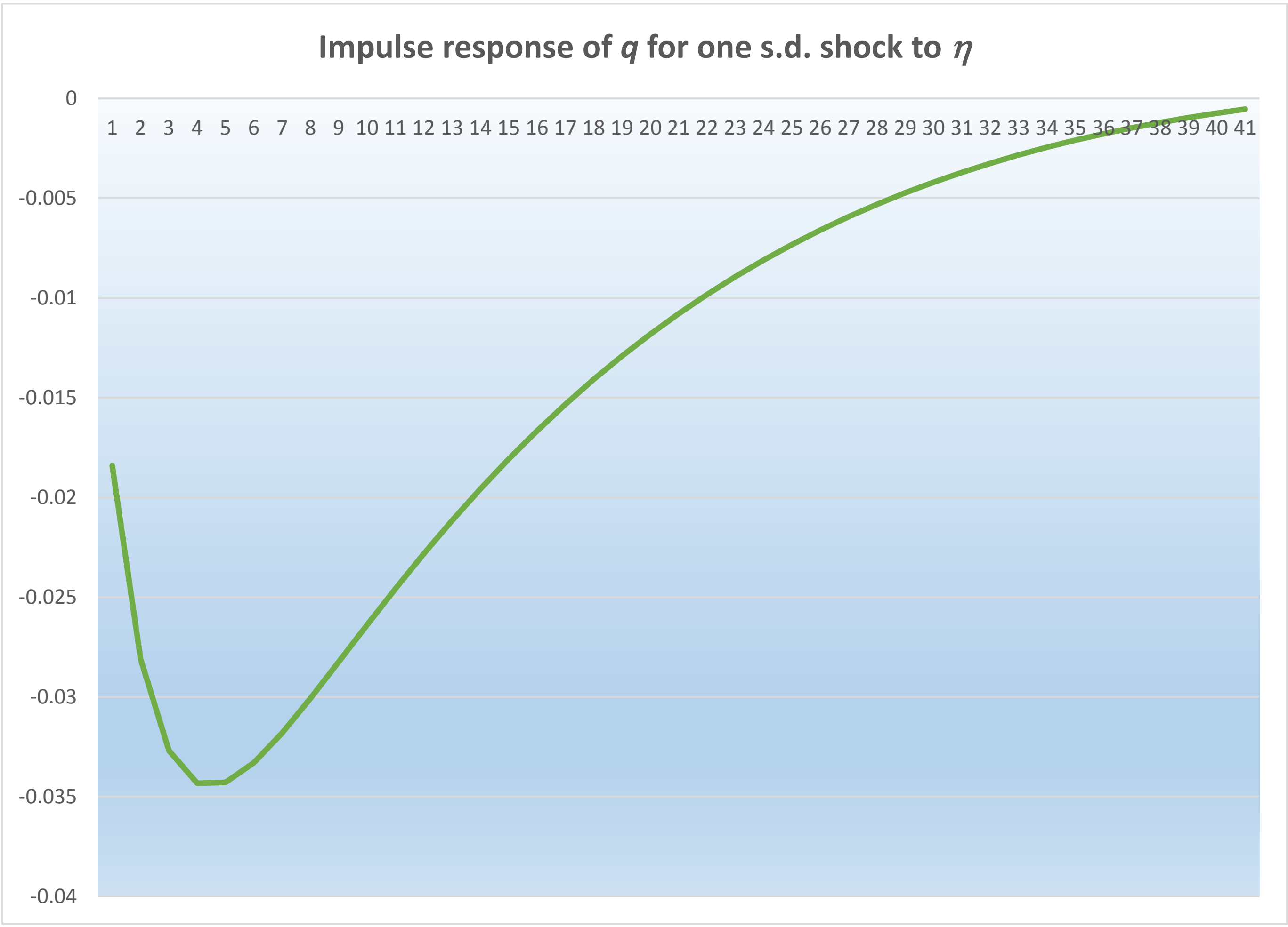
We can write the structural system as:

$$(15)\; E\begin{bmatrix} q_t \\ \eta_t \\ i_t^R \end{bmatrix} = F + G\begin{bmatrix} q_{t-1} \\ \eta_{t-1} \\ i_{t-1}^R \end{bmatrix} + \varepsilon_t .$$

E is upper triangular. Table 2 reports the coefficient estimates. The effect of a unit shock to η_t on q_t according to that table is -11.4383.

A one standard deviation of η_t is measured to be 0.00161, so a one-standard deviation shock that increases the relative liquidity yield on U.S. Treasury bonds leads to an initial impact on the real exchange rate of -0.0184, or in another words, a 1.84% real appreciation.

Figure 5


Impulse response of q for one s.d. shock to η
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
-0.035
-0.04
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

Next, we turn to the impact of the liquidity yield on the current account, working through its effects on the real exchange rate. We consider a recursive system, where the financial market variables affect the trade balance only through their effect on the real exchange rate.

The VAR reported in Table 1 can be considered a first-stage of a dynamic two-stage least squares system. We take the fitted values of the real exchange rate from that system, denoted $\hat{q}_t$ as exogenous inputs into the dynamic system for the current account.

We estimate a model of the current account to GDP ratio for the U.S. (denoted ca_t) and the HP-filtered GDP, y_t. We estimate the reduced form VAR:

(16) $$\begin{bmatrix} ca_t \\ y_t \end{bmatrix} = Q + R \begin{bmatrix} ca_{t-1} \\ y_{t-1} \end{bmatrix} + S\hat{q}_t + T\hat{q}_{t-1} + w_t,$$

Table 2 reports the coefficients and standard errors from this VAR.

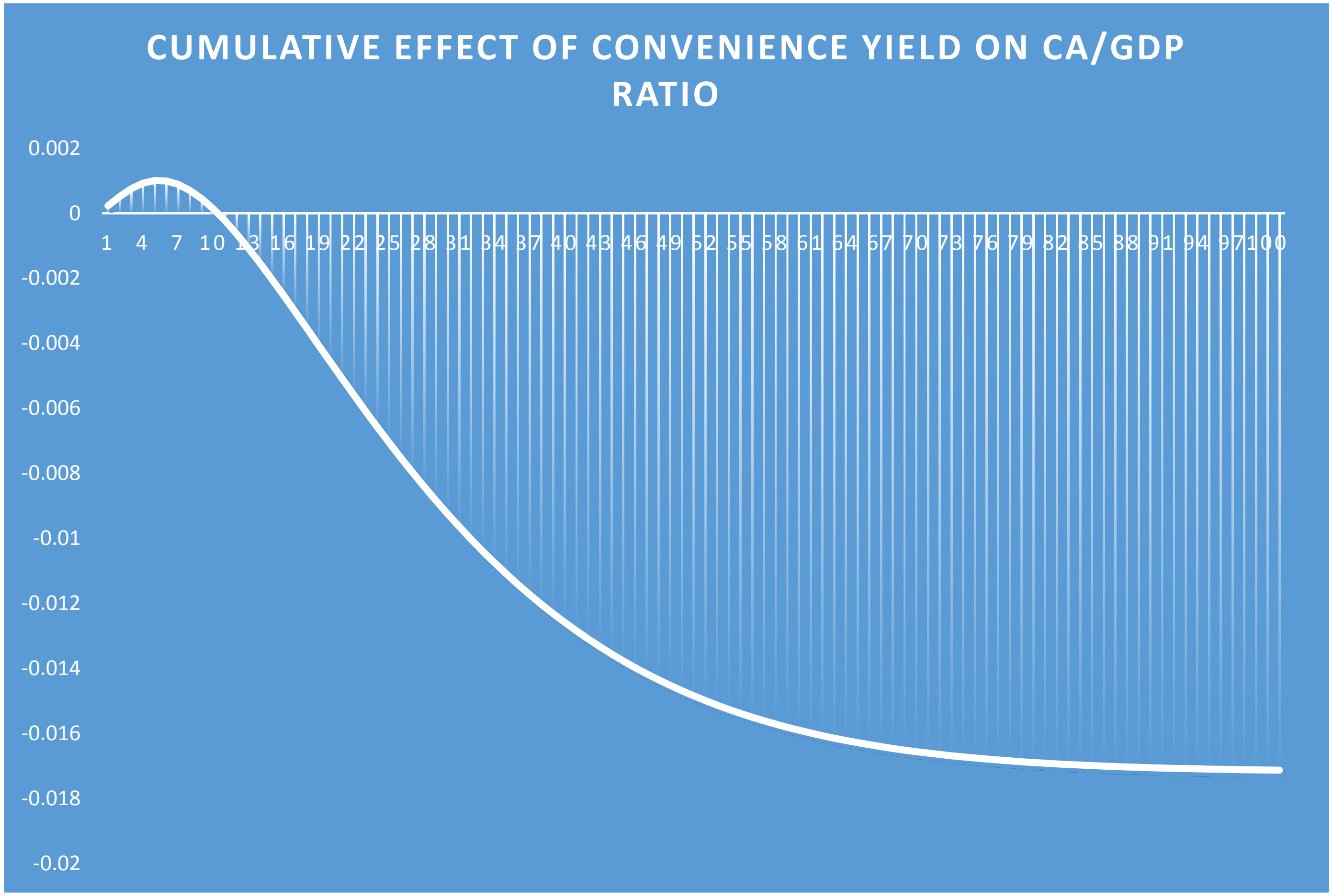
Table 2

U.S. Current Account Dynamics

Dependent Variable		ca_{t-1}	y_{t-1}	$\hat{q}_t^R$	$\hat{q}_{t-1}$
ca_t		0.9348 (0.0349)	-0.0419 (0.0374)	-0.0148 (0.0099)	0.0188 (0.0099)
y_t		-0.0416 (0.0533)	0.8892 (0.0572)	0.0206 (0.0151)	-0.0150 (0.151)

Quarterly, 1999:I – 2017:IV. Standard errors of parameter estimates are in parentheses.

Figure 4


CUMULATIVE EFFECT OF CONVENIENCE YIELD ON CA/GDP RATIO
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100

How is the U.S. current account affected not by a permanent change in the relative liquidity premium, η_t?

Figure 6 plots the impulse response of the U.S. current account to a structural shock to η_t that is permanent and where η_t changes from zero to its actual sample average (of 20.3 basis points) in the long run.

The overall U.S. current account deficit is roughly 5 percent of GDP, and Figure 4 shows that the influence of the liquidity premium contributes ultimately an effect on the current account of 2 percent of GDP. That is, absent the effects of the "exorbitant privilege", the current account deficit would be 40 percent smaller. Figure 4 also shows that it takes a long period of time for these effects to be fully felt.

Why are U.S. Bonds Safe?

Properties that safe government assets possess:

- There is little chance of default on the assets
- Little risk that the value of the assets will be reduced by unexpected inflation.
- Network externalities. The deeper the market for the security, the lower the transactions costs for selling it. There are liquidity gains from choosing the asset of one country to be the liquid asset that is widely held. Once the asset of one country has established itself as the prime safe asset, it will be difficult to dislodge.

There are other factors at play into the desirability of one asset as the choice of international investors for liquidity. He, et al. (2019) present a model of safe asset determination.

On the one hand, investors value the liquidity, but on the other, they pay for it by having to accept a lower rate of interest on the government bond.

If we consider two competing countries that can offer equally safe bonds, investors would prefer the one with the lower price (the higher rate of interest.) Holding demand for safe assets constant, the country that can supply more safe government bonds will pay a higher interest rate in equilibrium.

While an increase in the supply of assets drives down its price when the government bonds are truly safe, the higher supply also raises the likelihood of default.

He, et al. (2019) then highlight a tradeoff: When the demand for safe assets is high, investors favor the country that can supply the assets plentifully at a lower price. But when the demand for safe assets slacks off, having a large supply may be detrimental if it heightens the likelihood of default. In that case, investors prefer the country with the bonds that are relatively less likely to default.

Governments prefer to issue debt denominated in their own currency. As Engel and Park (2018) have noted, debt in the borrower's currency has a natural insurance aspect.

During times of recession, a country would like to follow expansionary monetary policy to exploit the Phillips curve. However, that will likely lead to a depreciation of the currency. If debt is issued in local currency, that depreciation is beneficial to the country – the real value of the debt repayment is lowered.

However, if the debt is issued in foreign currency, the value of payment in foreign currency terms does not change depending on the state of the economy.

The conclusion is that debt issued in the sovereign’s currency is less likely to be defaulted on because of this natural insurance aspect to the debt.

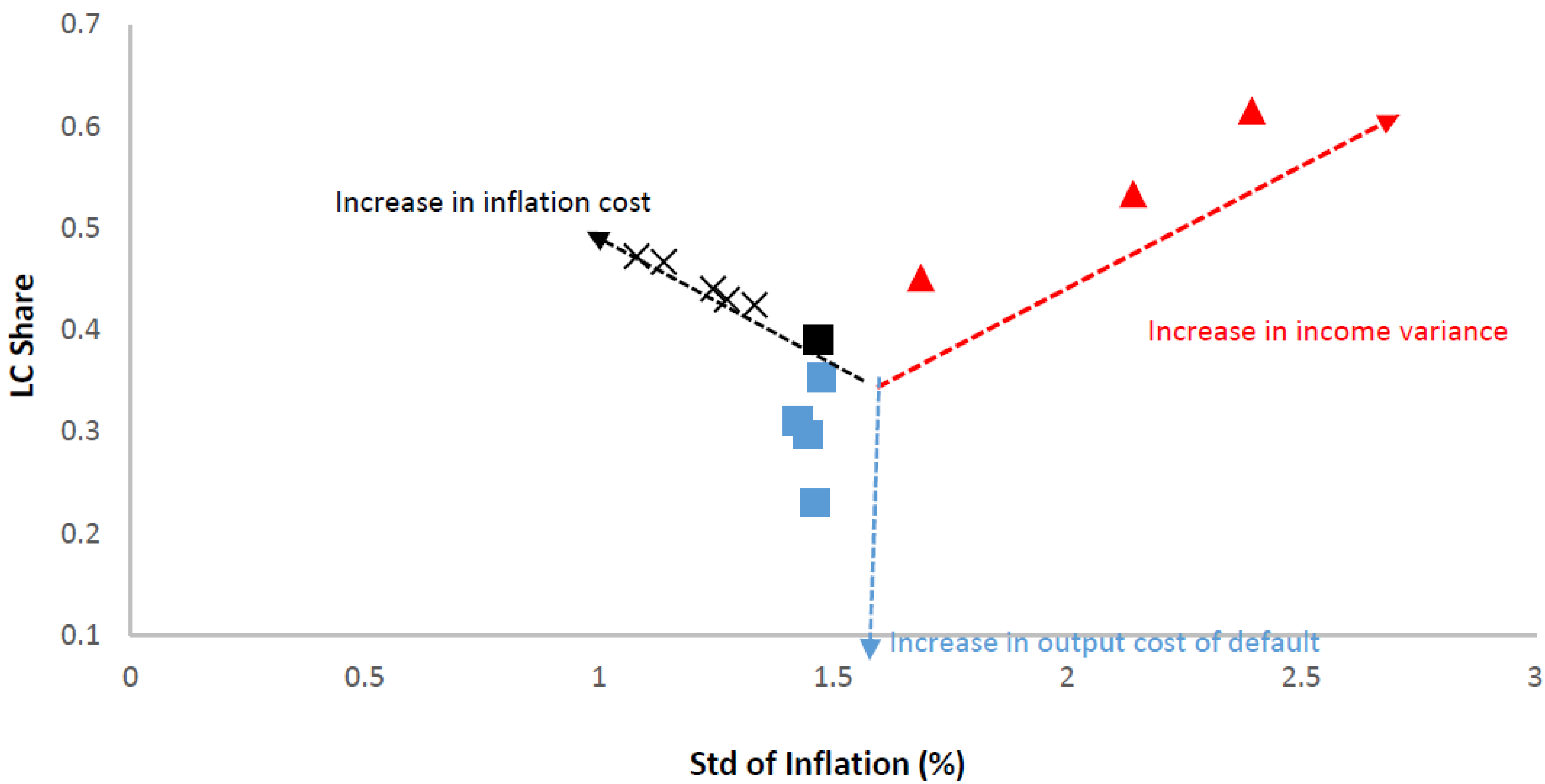
Why would lenders buy debt issued in the borrower’s currency? It is costly for the domestic economy when governments incur too much inflation. As Engel and Park (2018) argue, the distortionary effects of inflation are not the only check on the sovereign borrower’s temptation to debase the currency. The very threat of losing the ability to borrow in local currency itself is a strong deterrent to overinflation. Because countries value the ability to borrow in local currency, they often will not abuse the privilege.

Eichengreen and Hausmann (1999) found that past economic performance is not useful in predicting which countries are able to issue local-currency debt. Engel and Park (2018) offer a possible explanation. Poor inflation performance in some countries may reflect the fact that the policymakers perceive there to be low costs to inflation

For some countries, more volatile inflation may represent an optimal monetary policy with a high degree of commitment. Countries that are subject to a lot of shocksmight find the need for more active demand management. Or, countries that have a flatter Phillips curve, so the output cost of inflation is relatively low, might find it more beneficial to more actively exploit the inflation/unemployment tradeoff.

Figure 6

Scatterplots of Volatility of Inflation and Average LC Share



Benefits and Costs of the Exorbitant Privilege

Exorbitant privilege is a wealth transfer, in a sense, to the U.S.

The U.S. exports government assets in return for goods.

Appelbaum (2019) notes that in 2018, the U.S. exported $65.3 bn of currency! Most of that currency held abroad is in the form of one-hundred dollar bills. It costs the U.S. Treasury only 14.2 cents to print a one-hundred dollar bil.

The U.S. is able to maintain a consistent deficit in goods, and enjoy higher consumption as a result, because it can produce nominal assets – currency and Treasury bills, notes and bonds – that are valued over and beyond the monetary yield on those assets.

However, there are possible drawbacks:

1. Persistent current account deficits lead to expansion of the nontraded sector relative to the traded sector. But the traded sector may pay higher “efficiency wages”.
2. Low interest rates may lead to financial instability. “Search for yield” or relaxation of borrowing constraints for U.S. investors.
3. The global saving glut lowers real interest rates. Pushes countries closer to the ZLB for nominal interest rates. This is particularly true in the U.S., which enjoys the exorbitant privilege. At the ZLB, monetary policy is more difficult to conduct.

Conclusions

To some extent, the exorbitant privilege arises from the convenience yield.

This explanation has the benefit of explaining why the world buys U.S. assets in a crisis. (The standard "insurance" story could not account for this. You would not buy insurance after the crisis occurs. The dollar should pay off in the crisis – i.e., dollar depreciation.)

The exorbitant privilege allows higher U.S. consumption levels, but with the possible costs of too much employment in the non-traded sector, and interest rates that are inefficiently low.