Here we provide the full details of the derivation of the RoW demand function for Hegemon debt in equation (1).

**Proposition A.1.** Focusing only on demand functions for debt that depend positively on its expected return, we conclude that either RoW agents are expecting debt to be safe and the demand function is

$$R^s(b) = \bar{R}^r - 2\gamma(w^* - b)\sigma^2,$$

or, if the agents are expecting the debt to be risky, it is priced identically to the risky asset and demand is indeterminate.

**Proof.** We start with the the generic maximization problem

$$\max_{b, C^*_1} \mathbb{E}[C^*_1] - \gamma \text{Var}(C^*_1),$$

$$w^* R' + b(Re - R') = C^*_1, \ b \geq 0.$$

The optimality condition is

$$R\bar{e} - \bar{R}' = \gamma[2b(2\sigma^2 + \sigma^2 - 2R\sigma\sigma_e) + 2w^* R \sigma \sigma_e - 2w^* \sigma^2],$$

where $\bar{e} = \mathbb{E}^+[e]$ and $\sigma_e = \text{Var}^+(e)$. Suppose agents were expecting debt to be safe, then $\bar{e} = 1$ and $\sigma_e = 0$, so we have

$$R^s(b) = \bar{R}' + \gamma[2b\sigma^2 - 2w^* \sigma^2] = \bar{R}' - 2\gamma(w^* - b)\sigma^2.$$

This proves the first part of the proposition.

Suppose agents were expecting Hegemon debt to be risky, then $\bar{e} = \bar{R}' / R^r_H$ and $\sigma_e = \sigma / R^r_H$ since we assumed $e_L = R^r_L / R^r_H$. Substituting these expressions into (A.1) and solving for $R$ as a function of $b$, we have two roots

$$R_- = R^r_H \quad \text{and} \quad R_+ = R^r_H \left( 1 + \frac{\frac{\bar{R}' - \bar{R}'}{2\gamma\sigma^2} - w^*}{b} \right).$$

The first root, which we will select, implies that the risky bond is now a perfect substitute for the risky asset and demand for the bond is therefore indeterminate. We exclude the second root on economic grounds (and by assumption in this proposition) since it generates a backward bending demand function: higher expected rates of returns on debt lower the demand for debt.

Here we provide the conditions under which the full-commitment equilibrium prices in Proposition 1 are free of arbitrage.

**Proposition A.2.** (Absence of Arbitrage under Full Commitment). The full-commitment equilibrium prices are arbitrage free if and only if $R^r_H > R^s(b^FC) > R^r_L$, i.e. if and only if $\gamma w^* \sigma^2 < (R^r_H - R^r_L)(1 - \lambda)$.

**Proof.** Let $M$ be a valid SDF in this economy. We have two states and two linearly independent securities, so markets are complete, hence $M$ is unique. Absence of arbitrage is equivalent to $M$ being strictly positive.
Requiring that $M$ prices the two assets we have

$$\mathbb{E}[M|R^s(b_{FC})] = 1,$$

$$\mathbb{E}[MR'] = 1.$$  

These are two equations in two unknowns. Solving for $M$ we obtain

$$M_H = \frac{1}{1 - \lambda} \frac{R^s(b_{FC}) - R'^s_L}{R'^s_H - R'^s_L},$$

$$M_L = \frac{R'^s_H - R^s(b_{FC})}{\lambda R^s(b_{FC})(R'^s_H - R'^s_L)}.$$  

Therefore $M_L > 0$. We have $M_H > 0$ if and only if $R^s(b_{FC}) > R'^s_L$, i.e. if and only if $\gamma w^* \sigma^2 < (R'^s_H - R'^s_L)(1 - \lambda)$. \hfill \Box

We note that the condition $\bar{R}' - 2\gamma w^* \sigma^2 > 0$, imposed in the main text, is not sufficient to guarantee the absence of arbitrage, but that the stronger condition $\bar{R}' - 2\gamma w^* \sigma^2 > 1$ is.

**Proof of Proposition 2.** We proceed by proving some useful claims

**Claim 1.** The Hegemon never chooses to issue so much debt $b > \bar{b}$ as to lose the safety premium for sure.

**Proof.** Note that $V(0) = 0$ and $V(b) = -\lambda \tau (1 - \epsilon_L) < 0 \ \forall b \in (\bar{b}, w^*]$. \hfill \Box

**Claim 2.** If the full-commitment equilibrium level of debt $b_{FC}$ lies in the Safety zone, then the Hegemon issues that level of debt and the only equilibrium is the safe equilibrium.

**Proof.** Recall $b_{FC} = \arg\max (V_{FC}(b))$. If $b_{FC} \leq \bar{b}$ then $\max (V_{FC}(b)) = \max (V(b))$ since $V_{FC}(b) \geq V(b)$ and equality holds only for $b \in [0, \bar{b}]$. \hfill \Box

Let us create a pseudo value function $\tilde{V}(b) = (1 - \alpha) V_{FC}(b) - \alpha \lambda \tau (1 - \epsilon_L)$. Notice that $\tilde{V}(b) = V(b) \ \forall b \in [\bar{b}, \tilde{b}]$. If $b_{FC} > \tilde{b}$ we could have several cases that are summarized below.

**Claim 3.** Assume $b_{FC} > \tilde{b}$, then the Hegemon issues either $b = \bar{b}$ or $\min(b_{FC}, \tilde{b})$, whichever generates higher expected profits. If the Hegemon issues $\bar{b}$ there is a unique safe equilibrium. If the Hegemon issues $\min(b_{FC}, \tilde{b})$ there are multiple equilibria: the safe and the collapse equilibria.

**Proof.** In the zone of debt issuance in which only the safe equilibrium is possible ($b \in [0, \bar{b}]$), the local maximum of $V$ is achieved at the upper boundary for $b = \bar{b}$. To verify this claim recall the assumption $b_{FC} = \arg\max (V_{FC}(b)) > \bar{b}$, the fact that $V(b) = V_{FC}(b)$ for all $b \in [0, \bar{b}]$, and that $V_{FC}(b)$ is a strictly concave function.

The Hegemon therefore issues $b = \bar{b}$ iff this local maximum is also the global maximum, i.e. when $V_{FC}(\bar{b}) = \max_{b \in [0, \bar{b}]} V$. Note that by claim 1, we can ignore the Collapse zone since $\arg\max (V(b)) \in (0, \bar{b}]$.

Suppose $V_{FC}(\bar{b}) < \max_{b \in [\bar{b}, \tilde{b}]} V$, then the Hegemon issues $b_{FC}$ if $b_{FC} \in (\bar{b}, \tilde{b}]$ and otherwise issues $\bar{b}$. To verify this claim notice that globally $\arg\max (V(b)) = \arg\max (V_{FC}(b))$, since $V(b) = a V_{FC}(b) + c$ with constants $a > 0$ and $c < 0$. Furthermore $\tilde{V}(b)$ is a strictly concave function. Therefore, $\arg\max_{b \in [\bar{b}, \tilde{b}]} V(b)$ takes value $b_{FC}$ if $\bar{b} \geq b_{FC}$ or equals the upper bound $\tilde{b}$. \hfill \Box

The claims above prove items 1, 2, and 3 of the Proposition. The presence of an ex-ante safety premium in all equilibria follows from the expected return on debt

$$\mathbb{E}[-[R(b, \omega) e(b, \omega)] = (1 - \alpha(b)) R^s(b) + \alpha(b) \bar{R}'$$

noticing that the optimal issuance level is always below $w^*$, so that at the optimal issuance one has $R^s(b) < R'$, and $\alpha(b) < 1$. We conclude that $\mathbb{E}[-[R(b, \omega) e(b, \omega)] < \bar{R}'$ and there is an exorbitant privilege. \hfill \Box

A.2
The next proposition verifies under which conditions equilibrium prices in the model with limited commitment are arbitrage-free.

**Proposition A.3. (Absence of Arbitrage under Limited Commitment).** The equilibrium prices at time $t = 0^+$, conditional on debt being safe, are arbitrage free if and only if $R_H^t > R^s(b^*) > R_L^t$, where $b^*$ is the equilibrium issuance, i.e. if and only if $2\gamma \sigma^2 (w^* - b^*) < (R_H^t - R_L^t)(1 - \lambda)$. If issuance takes place at $b^* = b^FC$ then this condition is the same as that of Proposition A.2. If issuance takes place at $b^* = b$ then this condition is less stringent than the requirement in Proposition A.2. Conversely, if issuance takes place at $b^* = \tilde{b}$ then this condition is more stringent than the requirement in Proposition A.2.

**Proof.** The proof is entirely analogous to that of Proposition A.2. \qed

Here we provide details for the derivations in Section IV. RoW solves the following maximization problem

$$\max_{b \in C^*_1} E^+ [C^*_1] - \gamma \text{Var}^+ (C^*_1) - \gamma_L (\tilde{b} - \min(b, \tilde{b}) 1_{\{E^+[\epsilon] = 1\}})^2,$$

subject to

$$w^* R^t + b (Re - R^t) = C_1^*, \quad b \geq 0,$$

where $\gamma_L > 0$, $\tilde{b}$ is an exogenous threshold, and $1_{\{E^+[\epsilon] = 1\}}$ is the indicator function that takes value one if its argument is satisfied. If debt is safe (i.e. $E^+[\epsilon] = 1$), then the extra utility (liquidity) value of owning bonds is $\gamma_L (\tilde{b} - b)^2$ for $b < \tilde{b}$ and zero otherwise. If debt is risky (i.e. $E^+[\epsilon] < 1$), then the extra utility loss $\gamma_L \tilde{b}^2$ is the one that would have occurred if the agent had chosen $b = 0$ in the presence of safe debt.

We assume, for simplicity, that $\tilde{b} = \frac{\tau}{R_H^t}$. This implies that if debt is expected to be safe, then the demand curve is given by

$$(A.2) \quad R^s(b) = \tilde{R}^t - 2\gamma (w^* - b) \sigma^2 - 2\gamma_L (\tilde{b} - b) 1_{\{b < \tilde{b}\}}.$$  

The above equation is the demand curve reported in the main body of the paper in equation (10). If debt is expected to be risky, which can only happen for $b > \tilde{b}$, then the result from Proposition A.1 applies and $R = R_H^t$, so that risky debt is a perfect substitute for the risky asset. Therefore, if the debt is safe, the demand function has an extra liquidity component for all $b \leq \tilde{b}$ and is otherwise identical to the one considered in the previous sections.

We now introduce a Lemma that proves equation (11).

**Lemma A.1. (Welfare as the Area Under the Demand Curve).** RoW welfare can be computed according to

$$V_{RoW}(b) = V_{RoW}(R^s(0)) + (1 - a(b)) \int_{R^s(0)}^{R^s(b)} b(R^s) d\tilde{R}^s,$$

where $b(R^s)$ is given by

$$b(R^s) = \frac{R^s - R^t + 2\gamma \sigma^2 w^* + 2\gamma_L b 1_{\{b \leq \tilde{b}\}}}{2\gamma \sigma^2 + 2\gamma_L b 1_{\{b \leq \tilde{b}\}},}$$

and

$$V_{RoW}(0) = w^* \tilde{R}^t - \gamma \sigma^2 w^* \gamma - \gamma_L \tilde{b}^2.$$  

**Proof.** The maximization problem of RoW is

$$\max_{b^*, s^*} E^+ [C^*_1] - \gamma \text{Var}^+ (C^*_1) - \gamma_L (b - \min(b, \tilde{b}) 1_{\{E^+[\epsilon] = 1\}})^2,$$

subject to

$$s^* R^t + b Re = C_1^*, \quad b + s^* = w^*, \quad b \geq 0.$$

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43We impose the parameter restriction $\tilde{R}^t - 2\gamma w^* \sigma^2 - 2\gamma_L \tilde{b} > 0$, by analogy with the previous sections.
Assume the debt is safe, then we can write the problem as

$$\begin{align*}
\max_{b,s^*} & \quad bR^s + s^* \tilde{R}^t - \gamma s^2 \sigma^2 - \gamma_L (b - w^* + s^*)^2 1_{\{w^* - s^* \leq \tilde{b}\}} = bR^s + v(s^*) \quad \text{s.t.} \quad s^* + b = w^*.
\end{align*}$$

This problem leads to optimality conditions that describe demand functions $b(R^s)$ and $s^*(R^s)$. In particular, optimality requires

$$\begin{align*}
(A.3) \quad R^s = v'(s^*).
\end{align*}$$

We then write $V_{RoW}^s(R^s) = b(R^s)R^s + v(w^* - b(R^s))$, and take the partial derivative w.r.t. $R^s$ to get

$$\begin{align*}
V_{RoW}^s(R^s) = b(R^s) + b'(R^s)R^s + v'(w^* - b(R^s))b'(R^s).
\end{align*}$$

Substituting in the above equation the optimality condition in equation (A.3), we obtain $V'(R^s) = b(R^s)$. Integrating over both sides we obtain

$$\begin{align*}
V_{RoW}^s(R^s) = V_{RoW}^s(R^s_0) + \int_{R^s_0}^{R^s} b(\tilde{R}^s)d\tilde{R}^s,
\end{align*}$$

where $R^s_0 = \tilde{R}^t - 2\gamma \sigma^2 w^* - 2\gamma_L b^2$ and $V_{RoW}^s(R^s_0) = w^* \tilde{R}^t - \gamma \sigma^2 w^* - \gamma L b^2$.

If instead we assume that debt is risky, then RoW welfare is given by

$$\begin{align*}
V_{RoW}^r = w^* \tilde{R}^t - \gamma \sigma^2 w^* - \gamma L b^2.
\end{align*}$$

Note that $V_{RoW}^r = V_{RoW}^s(R^s_0)$.

We define RoW welfare from an ex-ante perspective, before the equilibrium sunspot is selected, to be

$$\begin{align*}
V_{RoW}(b) = (1 - \alpha(b))V_{RoW}^s(R^s(b)) + \alpha(b)V_{RoW}^r,
\end{align*}$$

where we have found it convenient to write $V_{RoW}(b)$ as a function of $b$ and $V_{RoW}^s(R^s)$ as a function of $R^s$. We conclude that

$$\begin{align*}
V_{RoW}(b) = V_{RoW}(R^s(0)) + (1 - \alpha(b)) \int_{R^s(0)}^{R^s(b)} b(\tilde{R}^s)d\tilde{R}^s.
\end{align*}$$

Continuation of the Proof of Proposition 3. We continue the proof initiated in the main text. We prove the second statement of the proposition: for a demand curve that is sufficiently convex one can have over-issuance by the Hegemon.

We start by deriving a bound on $\tilde{\gamma}_L(\tau)$ such that the Hegemon does not want to issue in the interior of the Safety zone for $b^{FC} > \tilde{b}(\tau)$. Recall that the value function within the Safety zone is: $V(b) = (\tilde{R}^t - R^s(b))b$ for $b \in [0, \tilde{b}]$. Hence, in that zone $V'(b) = \tilde{R}^t - R^s(b) - bR^s(b)$. Since $V'(0) > 0$, and $V(b)$ is concave, then to have that $V'(b) > 0$ for $b \in [0, \tilde{b}]$, it is sufficient to have $V'(b) > 0$ which imposes the bound

$$\begin{align*}
\gamma_L < \gamma \sigma^2 \left( \frac{w^*}{\tilde{b}(\tau)} - 2 \right).
\end{align*}$$

We define the function $\tilde{\gamma}_L(\tau)$ to be the highest value (as a function of $\tau$) that $\gamma_L$ can take in the above bound

$$\begin{align*}
\tilde{\gamma}_L(\tau) = \gamma \sigma^2 \left( \frac{w^* R^t_H}{\tau} - 2 \right).
\end{align*}$$

In what follows, we assume $\gamma_L \in [\eta \tilde{\gamma}_L(\tau), \tilde{\gamma}_L(\tau)]$ for $\eta \in (0,1]$. We take the limit as $\tau \downarrow 0$, so that $b^{FC} = w^*/2 > \tilde{b}(\tau)$ since $\lim_{\tau \downarrow 0} \tilde{b}(\tau) = 0$. In this limit, and as described in the text more generally in
Similarly, welfare of RoW at issuance level $\bar{b}(0)$ for all $\alpha \leq \alpha_m$ and issues $b(0)$ for all $\alpha > \alpha_m$. Below we prove that in this limit we have

$$\lim_{\tau \downarrow 0} \alpha_m^*(\tau) = \frac{2\gamma \sigma^2 w^*}{R' - 2w^* \gamma^2 \sigma^2} - \frac{2\gamma^2 \sigma^2}{R_H} \in (0, 1).$$

Similarly, we can compute a threshold $\alpha_{row}^*(\tau)$ such that RoW investors would have preferred the equilibrium issuance $\bar{b}(\tau)$ for all lower $\alpha$s and otherwise would have preferred the lower issuance $b(\tau)$.

We change the notation slightly from Lemma A.1 and define the welfare of RoW investors to be the function $V_{RoW}(b, \alpha)$, to make the dependence on $\alpha$ more explicit. At issuance level $\bar{b}(\tau)$, we have

$$V_{RoW}(\bar{b}, 0) = bR^\tau(\bar{b}) + (w^* - \bar{b})R' - \gamma(w^* - \bar{b})^2 \sigma^2.$$  

Similarly welfare of RoW at issuance level $b$ is given by

$$V_{RoW}(b, \alpha) = (1 - \alpha) \left(bR^\tau(b) + (w^* - b)R' - \gamma(w^* - b)^2 \sigma^2\right) + \alpha(w^* R' - \gamma w^2 \sigma^2 - \gamma_1 b^2)$$

$$= V_{RoW}(\bar{b}, 0) - \alpha(V_{RoW}(\bar{b}, 0) - V_{RoW}(0, 0)).$$

Notice that $V_{RoW}(\bar{b}, 0)$ is independent of $\alpha$ and $V_{RoW}(b, \alpha)$ is continuous and decreasing in $\alpha$. Furthermore, $V_{RoW}(\bar{b}, 0) > V_{RoW}(b, 0)$ and $V_{RoW}(\bar{b}, 1) < V_{RoW}(\bar{b}, 0)$. So that we conclude $V_{RoW}(\bar{b}, 0) = V_{RoW}(\bar{b}, \alpha_{row}^*)$, with

$$\alpha_{row}^* = \frac{V_{RoW}(\bar{b}, 0) - V_{RoW}(\bar{b}, 0)}{V_{RoW}(\bar{b}, 0) - V_{RoW}(0, 0)}.$$  

Below we prove that in the limit $\tau \downarrow 0$, we have

$$\lim_{\tau \downarrow 0} \alpha_{row}^*(\tau) = 0.$$  

We conclude that for $\eta \in (0, 1]$ and $\gamma_L \in [\eta \gamma_L(\tau), \gamma_L(\tau)]$, in the limit at $\tau \downarrow 0$ one has

$$\lim_{\tau \downarrow 0} \alpha_{row}^*(\tau) = 0 < \frac{2\gamma^2 w^*}{R' - 2w^* \gamma^2 \sigma^2} - \frac{2\gamma^2 \sigma^2}{R_H} \in (0, 1) = \lim_{\tau \downarrow 0} \alpha_m^*(\tau).$$

Since $\alpha_{row}^*(\tau)$ is a convex combination of $\alpha_{row}^*(\tau)$ and $\alpha_m^*(\tau)$ with interior non-vanishing weights on each of the elements, we obtain the result in the Proposition.

We now prove the limits in equations (A.4) and (A.5). We prove the results only for $\eta = 1$. The generalization is straightforward. We start by proving that $\lim_{\tau \downarrow 0} \alpha_{row}^*(\tau) = 0$. For small $\tau$, we have

$$\gamma_L(\tau) = \frac{\gamma \sigma^2 w^* R'_H}{\tau} - 2\gamma \sigma^2,$$

$$\bar{b}(\tau) = \frac{\tau}{R'_H},$$

$$\bar{b}(\tau) = \frac{\tau}{R' - 2w^* \gamma^2 \sigma^2} + O(\tau^2),$$

$$R^2(0) = R' - 4\gamma \sigma^2 w^* + 4\gamma \sigma^2 \frac{\tau}{R'_H},$$

$$R^2(\bar{b}(\tau)) = R^2(0) + 2\gamma \sigma^2 w^* - 2\gamma \sigma^2 \frac{\tau}{R'_H},$$
\[ R'(\hat{b}(\tau)) = R'(\hat{b}(\tau)) + 2\gamma \sigma^2 \left[ \frac{\tau}{R' - 2\gamma \sigma^2 w^*} - \frac{\tau}{R_H} \right] + O(\tau^2). \]

We can now compute consumer welfare using the area under the demand curve formula

\[ V_{RoW}(\hat{b}(\tau), \alpha) = V_{RoW}(0, \alpha) + \int_{R'(0)}^{R'(\hat{b}(\tau))} b(R^*) dR^*. \]

We get

\[ V_{RoW}(\hat{b}(\tau), \alpha) = V_{RoW}(0, \alpha) + \frac{2\gamma \sigma^2 w^* + 2\gamma \tau(\hat{b}(\tau)) - R'}{2\gamma \sigma^2 + 2\gamma \tau} [R^*(\hat{b}(\tau)) - R^*(0)] + \frac{1}{2} \frac{(R'(\hat{b}(\tau)))^2 - (R'(0))^2}{2\gamma \sigma^2 + 2\gamma \tau}, \]

which yields

\[ V_{RoW}(\hat{b}(\tau), \alpha) = V_{RoW}(0, \alpha) + \frac{\gamma \sigma^2 w^*}{R_H} \tau + O(\tau^2). \]

We use

\[ V_{RoW}(\hat{b}(\tau), \alpha) = V_{RoW}(0, \alpha) + (1 - \alpha)[V_{RoW}(\hat{b}(\tau), \alpha) - V_{RoW}(0, \alpha)] + (1 - \alpha) \int_{R'(0)}^{R'(\hat{b}(\tau))} b(R^*) dR^*. \]

We get

\[ V_{RoW}(\hat{b}(\tau), \alpha) = V_{RoW}(0, \alpha) + (1 - \alpha)[V_{RoW}(\hat{b}(\tau), \alpha) - V_{RoW}(0, \alpha)] + O(\tau^2). \]

This immediately implies that

\[ \alpha^*_RoW(\tau) = O(\tau). \]

We can also compute Hegemon welfare

\[ V(\hat{b}(\tau), \alpha) = \frac{2\gamma \sigma^2 w^*}{R_H} \tau + O(\tau^2), \]

\[ V(\hat{b}(\tau), \alpha) = (1 - \alpha) \frac{R'_H}{R' - 2w^* \gamma \sigma^2} V(\hat{b}(\tau), \alpha) - \alpha \lambda (1 - e_L) \tau + O(\tau^2). \]

This implies that

\[ \alpha^*_m(\tau) = \frac{2\gamma \sigma^2 w^*}{R' - 2w^* \gamma \sigma^2} - \frac{2\gamma \sigma^2 w^*}{R_H} + O(\tau), \]

where

\[ \frac{2\gamma \sigma^2 w^*}{R' - 2w^* \gamma \sigma^2} - \frac{2\gamma \sigma^2 w^*}{R_H} + \lambda (1 - e_L) \in (0, 1). \]

Conditions for Footnote 39. The reduction in profits from competition when issuing in the Safety zone is \(2\gamma \sigma^2 \hat{b} \times \hat{b}\), where \(2\gamma \sigma^2 \hat{b}\) is the increase in the interest rate arising from the issuance of \(\hat{b}\) by the first issuer and \(\hat{b}\) is the issuance by the second issuer. Under some conditions stated below, the reduction in profits from competition when issuing in the Instability zone is bounded below by \(2\gamma \sigma^2 \hat{b} \times 1/2 \times \hat{b}\), which is greater than the corresponding reduction when issuing in the Safety zone. The term \(-2\gamma \sigma^2 \hat{b}\) is the increase in the interest rate arising from the issuance of \(\hat{b}\) by the first issuer, 1/2 is the probability that there is no collapse and that, therefore, the debt of the second issuer is safe. A sufficient condition for this lower bound
to hold is that $\bar{b}$ be less than the full commitment level that the second issuer would have chosen to issue with a zero probability of collapse in the presence of the first issuer issuing $b$. For example, this condition holds for sure when $\tau$ is low enough and is both compatible with $2\bar{b} < \bar{b}$ and with the condition that a true Hegemon issues $\bar{b}$ when $\alpha = 0$ but prefers to cut back issuance to $\bar{b}$ when $\alpha = 0.5$. Under these conditions, both issuers issuing in the Safety zone is an equilibrium under duopoly.

### A.2 Details for Generalizing the Framework

#### A.2.A Endogenous Reputation, Coordination, and the Competition

In this section, we present an infinite-horizon extension of the baseline model. Time is discrete and the horizon is infinite. Reserve countries issue one-period bonds in each period. The issuers are infinitely lived, risk neutral, and have rate of time preference $\delta \in (0,1)$. We maintain the assumption that $\delta^{-1} = \bar{R}$. RoW is populated by overlapping generations with each generation alive for 1 period. The young are born at period $t$ with constant endowment $w^r$ and invest in the bonds and the risky technology. The young have mean-variance preferences over consumption at the end of their lives at $t+1$ and consume all proceeds of investment at that time. We dispense entirely with the exogenous fixed costs of devaluation ($\tau = 0$).

The timing of decisions within each date is identical to the one-period model. At each date the issuers choose the devaluation of the exchange rate $e_t = \{1,e_L\}$. Disasters are i.i.d. over time, with per-period probability $\lambda$.

Consider first this model with a Hegemon under full commitment. The Hegemon decides not to devalue in bad times, the debt is safe, and the equilibrium is characterized by exactly the same equations as in Proposition 1. Similarly, the equilibrium with $n$ issuers, who compete in quantities à la Cournot under full commitment, is a repeated version of that in Section VI.A and also converges to perfect competition as the number of issuers increases to infinity.

We now turn to limited commitment. We assume that if an issuer chooses to devalue in bad times at time $t$ when ex-ante facing an interest rate consistent with expectations of no devaluation ($R^s_{t-1}(b_t) < R^s_H$), then with some probability $\chi$, it is punished forever by a bad continuation equilibrium in which RoW agents expect a devaluation of the currency conditional on disaster, which indeed occurs in equilibrium. In that bad continuation equilibrium, RoW demand for this issuer’s debt is perfectly elastic at $R^s(\bar{b}) = R^s_H$ for $z > t$. There is, instead, no punishment going forward for devaluations by an issuer who is currently facing the interest rate $R^s_H$ and has not previously devalued as described in the previous case. While we are allowing for non-Markovian strategies to depend on interest rates for safe debt $R$ and past default, we are not allowing the strategies to depend on the history of issuances.

#### A.2.B The Hegemon Model with Endogenous Reputation

We first analyze the equilibrium for a given amount of debt issued by a single issuer. Since the trigger strategies that we consider do not punish a devaluation following a period in which $R = R^s_H$, the issuer always devalues ex-post (if a disaster occurs) when ex-ante facing $R = R^s_H$. We assume that this equilibrium outcome, which can occur for all levels of $b$, is selected with probability $\alpha \in (0,1)$ for levels of debt when a safe debt equilibrium also exists, and otherwise with probability 1. By analogy with the main text we abuse the notation and denote this criterion by a function $\alpha(b)$.

The expected value for the issuer of issuing debt $b$ forever and not devaluing, unless faced with interest rate $R^s_H$, is

$$V(b) = \sum_{z>t} \delta^{z-t} b(1-\alpha(b))E_x^t [\bar{R}^t - R_x] = b(1-\alpha(b)) \frac{\bar{R}^t - R^s(b)}{R^t - 1}.$$  

\[44\] While for simplicity we have made our trigger strategies very stark, so that a devaluation in a disaster runs the risk of losing the privilege forever, one could study more lenient punishments with finite duration. The Nixon shock of 1971 and the float of the U.S. Dollar in 1973 did not cause a major drop in the use of the Dollar as an international reserve currency (see Figure I Panel (d)). This can be rationalized in our model with stochastic punishment as a “lucky draw” whereby the Hegemon devalues but ends not being punished for this deviation.
A devaluation at time \( t \), when facing the favorable interest rate \( R^t(b) < R^t_{\text{FC}} \), causes this real expected value to be lost with probability \( \chi \); in that case the trigger strategy imposes \( a(b) = 1 \) in the continuation equilibrium for all levels of \( b \), and the continuation value is zero. Hence the long-term expected cost of a devaluation is

\[
\chi V(b) = \chi b (1 - a(b)) \frac{R^t - R^\infty(b)}{R^t - 1}.
\]

The one-off short-term benefit of a devaluation is \( b R^\infty(b) (1 - \epsilon_L) \). The issuer therefore decides not to devalue if and only if

\[
\chi b (1 - a(b)) \frac{R^t - R^\infty(b)}{R^t - 1} \geq b R^\infty(b) (1 - \epsilon_L).
\]

Substituting in the condition above the demand for safe debt \( R^s(b) = R^t - 2\gamma \sigma^2 (w^* - b) \), we obtain the upper bound for the issuance of safe debt

\[
\tilde{b}^\infty_i = w^* - \frac{R^t (R^t - 1)}{2\gamma \sigma^2 \left[ \frac{\chi (1 - \alpha)}{1 - \epsilon_L} + R^t - 1 \right]}.
\]

We use the superscript \( \infty \) to distinguish the variables in this infinite-horizon model from the analogous concepts in the one period model. Note that \( b^\infty_{\alpha=0} > 0 \) and finite, \( b^\infty_{\alpha=1} = 0 \), and the upper boundary decreases in the probability of the collapse equilibrium selection: \( \partial b^\infty_i / \partial \alpha < 0 \).

The problem of the Hegemon is

\[
\max_{b \in [0, b^\infty_{\alpha}]} (1 - \alpha) b \frac{R^t - R^\infty(b)}{R^t - 1} = (1 - \alpha) V^{\text{FC}}(b),
\]

s.t. \( R^s(b) = R^t - 2\gamma \sigma^2 (w^* - b) \).

The Hegemon chooses to issue \( b^{\text{FC}} = w^*/2 \), if it is credible, or \( \tilde{b}^\infty_\alpha \), if it is not. Hence Hegemon issuance can be written as

\[
\min(b^{\text{FC}}, \tilde{b}^\infty_i).
\]

### A.2.C The Multipolar Model with Endogenous Reputation

**Competition with endogenous reputation and the erosion of franchise value.** We now analyze the multipolar world with \( n \) competing issuers. We set \( \alpha = 0 \) for simplicity. By analogy with the above analysis of the Hegemon, issuer \( i \)'s best response to total issuance \( b_{-i} \) from other issuers is to issue the minimum between what it would have issued in best response under full commitment and the maximum credible amount that it can issue

\[
b_i = \min \left( b^{\text{FC}}_i (b_{-i}), \tilde{b}^\infty_i (b_{-i}) \right).
\]

Crucially the upper bound of credible issuance depends on the other players’ total issuance

\[
\tilde{b}^\infty_{i} (b_{-i}) = w^* - b_{-i} - \frac{R^t (R^t - 1)}{2\gamma \sigma^2 \left[ \frac{\chi}{1 - \epsilon_L} + (R^t - 1) \right]}.
\]

The upper boundary decreases faster than the full-commitment best response issuance: \( \partial \tilde{b}^\infty_i (b_{-i}) / \partial b_{-i} = -1 < -1/2 = \partial b^{\text{FC}}_i (b_{-i}) / \partial b_{-i} \).

We construct and analyze a symmetric equilibrium in which all issuers issue at their upper bound.\(^{45}\)

\(^{45}\)Asymmetric equilibria exist but all feature the same amount of total issuance. Since the emphasis of this section is on total issuance, we focus on symmetric equilibria.
We denote the symmetric issuance at the upper bound by

\[ \hat{b}_n^\infty = \frac{1}{n} \left[ w^* - \frac{\tilde{R}' (\tilde{R}' - 1)}{2\gamma \sigma^2 \left[ \frac{\tilde{x}_L}{1-\tilde{r}_L} + (\tilde{R}' - 1) \right]} \right], \]

and restrict parameters such that \( \hat{b}_n^\infty < w^*/2 = b\text{FC} \) so that the Hegemon would have issued the maximum credible amount \( \hat{b}_1^\infty \). We emphasize that \( \hat{b}_n^\infty = \hat{b}_1^\infty / n \) and conclude that as the number of issuers increases \( (n \to \infty) \) the total supply of the reserve assets remains constant at the level \( \hat{b}_1^\infty \) that the Hegemon would have issued alone. We collect the result in the proposition below.

**Proposition A.4. (Competition and the Erosion of Franchise Value).** Assume that debt is always safe (\( \alpha = 0 \)), then if the Hegemon would have chosen to issue the maximum credible amount of reserve assets \( \hat{b}_1^\infty \), competition never increases the total amount of reserve assets. As the number of competing issuers increases to infinity, the equilibrium does not converge to perfect competition, and instead total issuance stays constant at the level optimally chosen by a Hegemon: \( \hat{b}_n^\infty = \hat{b}_1^\infty / n \). All issuers share equally the equilibrium monopoly rents.

The key intuition for this proposition is that equilibrium issuance and per-period profits of a given issuer are inversely proportional to the number of issuers. To see why this is indeed an equilibrium, note that the short-term benefits of devaluing are proportional to equilibrium issuance, and that the long-term costs of devaluing are proportional to per-period profits. As a result, as the number of issuers increases, both the benefits and costs of devaluing decrease proportionately along the equilibrium path.

In the context of competition among private banks within a country Jiang, Levine and Lin (2017) provide empirical evidence supporting the notion that competition erodes discipline (commitment) due to loss of franchise value.\textsuperscript{46}

**Nurkse instability and the erosion of franchise value.** To highlight the interaction between competition and coordination we extend the modeling of Nurkse instability from Section VI.B to the repeated model setup of this section.

We reintroduce the assumption from Section VI.B that in a duopoly, exactly one country \( \tilde{i} \) out of the two is selected at random at \( t = t^+ \) to face the most favorable expectations for that period, while the other country \( -\tilde{i} \) faces the least favorable expectations. The selection of which country faces which expectations is i.i.d. over time. Each country \( i \) now optimally behaves as a Hegemon with \( \alpha_i = 0.5 \). As in Section VI.B, we assume that a true Hegemon would have faced the most favorable expectations \( \alpha = 0 \).

In each period, the issuer that faces unfavorable expectations devalues ex post if a disaster occurs since there is no punishment in this case. In each period, the issuer that faces favorable expectations does not devalue ex post, conditional on a disaster, if and only if

\[ \frac{1}{2} \lambda b \frac{R' - R^2(b)}{R'^2 - 1} \geq b (R(b)(1 - \epsilon_L)). \]

This leads to an upper boundary on the amount of credible debt equivalent to that of a true Hegemon facing the most favorable investors expectations with 50% probability: \( \hat{b}_\infty^{\alpha = 0.5} \), as defined in equation (A.6).

In each period, each issuer decides how much debt to issue before knowing which investor expectations it will face. Each issuer \( i \), therefore, anticipates that either it will face the perfectly elastic demand at

---

\textsuperscript{46}Marimon, Nicolini and Teles (2012) analyze monopolistic competition among issuers of differentiated monies in the presence of limited commitment and find that each issuer’s choice of issuance does not depend on the elasticity of substitution between different monies. The equilibrium is inefficient and is associated with real balances that are too low, and both inflation and nominal interest rates that are too high. We model competition as an increase in the number of issuers of safe assets in a Cournot equilibrium, rather than as an increase in the elasticity of substitution between monies. In their model, total issuance, individual issuance, the individual short-term benefits of inflating, and the individual long-term costs in terms of lost future rents, are all independent of the degree of competition. In our model, total issuance is also independent of the degree of competition, but individual issuance, the individual short-term benefits of devaluing, and the individual long-term costs in terms of lost future rents, all decrease with the degree of competition and are exactly inversely proportional to the number of issuers.
$R'_H$ and make no expected profits for that period, or it will face the demand $R^s(b_i) = \bar{R} - 2\gamma\sigma^2(w^* - b_i)$. Each issuer solves the problem given below

$$\max_{b_i \in [0,\tilde{b}^\alpha_{i=5}]} \frac{1}{2} b_i R' - R^s(b_i) = \frac{1}{2} \nu FC(b_i)$$

where

$$R^s(b) = \bar{R}' - 2\gamma\sigma^2(w^* - b).$$

The optimal issuance is $\min(b^{FC}, \tilde{b}^\alpha_{i=5})$. We collect the result in the Proposition below.

**Proposition A.5. (Nurske Instability and the Erosion of Franchise Value).** Assume that a true Hegemon faces the most favorable investor expectations ($\alpha = 0$) in every period, but that in a duopoly exactly one country $i$ out of the two is selected at random at $t = t^+$ to face the most favorable expectations for that period, while the other country $\bar{i}$ faces the least favorable expectations. The selection of which country faces which expectations is i.i.d. over time. Optimal issuance for each issuer in the duopoly is given by $\min(b^{FC}, \tilde{b}^\alpha_{i=5})$. The effective total stock of reserve assets is lower under a duopoly than under a Hegemon if $\tilde{b}^\alpha_{i=5} < b^{FC}$.

Coordination undercuts commitment by reducing the expected future monopoly rents for each issuer. In this case, since each issuer only expects monopoly rents in 50% of the periods, the present value of future monopoly rents is cut by exactly 50%. Each issuer, therefore, behaves as a true Hegemon who faces the favorable expectations only half of the time. In a world of high demand for reserves ($\tilde{b}^\alpha_{i=5} < b^{FC}$), the entrance of a second issuer and the emergence of coordination problems then reduces the total effective supply of reserve assets.

### A.2.D Private issuance of reserve assets

**Private issuance within each country.** We extend the model to allow for private issuance of reserve assets from entities located within the Hegemon country. We assume that there is a mass $\mu$ of private issuers within the Hegemon country, each of which can issue one unit of debt denominated in the reserve currency. Each issuer can issue at cost $c$; for simplicity, we assume the cost to be uniformly distributed over $[0, \xi]$ across issuers. We denote the total issuance as $b^T$. Since the marginal private issuer is defined by a cutoff $\bar{c} = \bar{R}' - R^s(b^T)$, we conclude that

$$b^T = b + \frac{\mu}{\xi} (\bar{R}' - R^s(b^T)),$$

for $R' - R^s(b^T) \in [0, \xi]$. Solving this equation, we derive a simple relationship between total issuance $b^T$ and public issuance $b$ in the form of

$$b^T = b + \frac{\mu}{\xi} 2\gamma\sigma^2 w^* \frac{1 + \frac{\mu}{\xi} 2\gamma\sigma^2}{1 + \frac{\mu}{\xi} 2\gamma\sigma^2}.$$ 

We can then rewrite the demand curve for reserve assets as a function of $b$ in the following way

$$\hat{R}^s(b) = \bar{R}' - 2\hat{\gamma}\sigma^2 (w^* - b),$$

where $\hat{\gamma} = \gamma/[1 + (2(\mu/\xi)\gamma\sigma^2)]$. Hence, private issuance decreases the slope of the demand curve $R^s(b)$ for reserve assets, making it more elastic.

If the Hegemon does not take into consideration the welfare of private issuers, then the Hegemon problem is isomorphic to the one solved in Section II.A, with $\gamma$ replaced by $\hat{\gamma}$. If, instead, the Hegemon takes into consideration the welfare of private issuers gross of entry costs, then the Hegemon problem is isomorphic to the one solved in Section II.A, with $b$ and $\gamma$ replaced by $b^T$ and $\hat{\gamma}$, respectively.\(^{47}\)

This model is consistent with the empirical regularity that the consolidated (private and public) external balance sheet of the Hegemon consists of low return safe and liquid liabilities and high return risky and illiquid assets, as emphasized by Despres, Kindleberger and Salant (1966); Gourinchas and Rey (2007a). In

\(^{47}\)If the Hegemon takes into consideration the welfare of private issuers net of entry costs, then the objective function...
particular, the model is consistent with the notion that it is the private sector — not the government — that holds foreign risky assets, while the government issues safe assets to finance current spending. It is also consistent with the evidence by Accominotti (2012) that private safe assets issued/guaranteed by London merchant banks played an important role in the 1920s gold-exchange standard and the Pound collapse in 1931.

Third-party issuance across countries. We now consider the incentives to issue in Hegemon currency for issuers located outside of the Hegemon country. To sharpen the model, we start by considering an equilibrium in which the Hegemon issues safe debt $b$ and does not devalue its currency in bad times.\textsuperscript{48} We introduce a small issuer, located outside the Hegemon country, with time 1 utility function $U$ who must raise real resources $\kappa$ at date 0 to finance consumption at date 0.

We assume that the small issuer can either denominate its debt in reserve currency (the Hegemon currency) or in a risky currency that depreciates by $(1 - \epsilon_L)$ in bad times, and that this issuer is too small to influence the equilibrium. The small issuer decides to issue in the Reserve currency if and only if

$$\text{(A.7)} \quad - \kappa R^S(b) > CE^- [- \kappa R^R],$$

where we define $CE^- [- \kappa R^R] = U^{-1}(E^- [U(- \kappa R^R)])$. This condition makes clear that the small issuer is more likely to issue in Hegemon currency, the lower $R^S(b)$, the higher and the more volatile $R^R$, and the higher the risk aversion embedded in the utility function $U$ of the small issuer.

This helps rationalize the evidence in Chitu, Eichengreen and Mehl (2014) reproduced in Appendix Figure A.1 showing that third party issuance was predominantly denominated in pounds during the 1920s, when the British pound was the main reserve currency, and has subsequently switched to being denominated in dollars as the U.S. Dollar emerged as the main reserve currency. This also helps understand why countries that suffer from “original sin”, so that they cannot issue in their own currency, predominately issue in the reserve currency. Relatedly, Du and Schreger (2015) and Bruno and Shin (2015) show that emerging market corporations predominantly borrow in U.S. dollar.

A.2.E Liquidity and Networks Effects

We have derived the linear demand curve for reserve assets in equation (1) on the grounds of risk and risk aversion (mean-variance preferences). The reader is encouraged to interpret $\gamma$ not as a deep parameter of household risk aversion, but as a proxy for features of the world economy that lead RoW to demand reserve assets (institutional constraints, regulatory requirements, financial frictions, etc., see e.g. Maggiori (2017)). In this spirit, we now show that our model can also capture elements of liquidity and network effects, while maintaining the simplicity of the linear demand curve.

We extend the model by adding a “reserve asset in the utility function” component, which captures the extra utility benefits that accrue from holdings of reserve assets. Importantly, we follow Stein (2012) in assuming that these liquidity benefits of holding bonds only arise if the bonds are safe, and are hence reserve assets.\textsuperscript{49} We further allow for network effects by assuming that the liquidity benefits depend not only on individual holdings, but also on aggregate holdings (see e.g. Tobin (1980)). This captures in reduced form the notion that a reserve asset becomes increasingly liquid as more people use it; for example, it is easier to find a counterparty and to net out currency risk.

Formally, the RoW utility function now takes the form

$$E^+[C_t] - \gamma Var^+(C_t^+) + (B^T \tilde{\omega} + B^T \Omega B) 1_{[E^+[\varepsilon]=1]},$$

of the Hegemon as a function of $b^T$ is different and is given by

$$V(b^T) = 2 \gamma \sigma^2 b^T (w^* - b^T) - \frac{\mu}{\xi} \left[2 \gamma \sigma^2 (w^* - b^T)^2 \right]^2.$$
where $B = (b, \tilde{b})^T$ is a vector such that $b$ represents individual holdings and $\tilde{b}$ represents aggregate holdings, $\tilde{w}$ and $\Omega$ are a $2 \times 1$ vector and a $2 \times 2$ matrix, respectively, and $\mathbf{1}_{\{E^+\varepsilon\varepsilon = 1\}}$ is an indicator function that takes value 1 if the debt is safe, i.e. $E^+\varepsilon\varepsilon = E^\varepsilon\varepsilon = 1$, and zero otherwise. We assume that $\omega_1 \geq 0$ and $\Omega_{11} \leq 0$, capturing the positive but decreasing marginal liquidity benefits that arise from individual bond holdings. We also assume that $\Omega_{12} = \Omega_{21} \geq 0$, capturing the increase in the marginal liquidity benefits from individual bond holdings with aggregate bond holdings, and that $\Omega_{11} + \Omega_{12} < \gamma\sigma^2$, so that this effect is not too strong and the demand curve is upward sloping.

If the debt is expected to be safe, then the optimality condition for individual portfolios is

$$R^i(b) = \tilde{R} - 2\tilde{\gamma}\sigma^2(w^* - b) + \omega_1 - 2\Omega_{11}b - (\Omega_{12} + \Omega_{21})\tilde{b}.$$  

Imposing the equilibrium condition $b = \tilde{b}$, we obtain the demand curve for reserve assets

$$R^s(b) = \tilde{R} - 2\tilde{\gamma}\sigma^2w^* - \omega_1 + 2(\gamma\sigma^2 - \Omega_{11} - \Omega_{12})b,$$

which can be rewritten as

$$R^s(b) = \tilde{R} - 2\tilde{\gamma}\sigma^2(\tilde{w}^* - b),$$

where $\tilde{\gamma} = \gamma - (\Omega_{11} + \Omega_{12})/\sigma^2$ and $\tilde{w}^* = w^*/\tilde{\gamma} + \omega_1/(2\tilde{\gamma}\sigma^2)$. Therefore, under this formulation, the liquidity benefits and network effects that arise from bond holdings modify the level and the slope of the demand curve $R^s(b)$. They are isomorphic to a renormalized version of the baseline model with different values of $\tilde{w}^*$ and $\tilde{\gamma}$. Larger marginal liquidity benefits ($\uparrow \omega_1$) decrease the level of $R^s(b)$, while stronger decreasing returns in liquidity benefits ($\downarrow \Omega_{11}$) increase the level and the slope of $R^s(b)$. Similarly, larger network effects ($\uparrow \Omega_{12}$) decrease the level and the slope of $R^s(b)$.$^{30}$ If the debt is expected to be risky, then the demand curve is the same as the one in the basic mean-variance case ($R^s = \tilde{R}_{\uparrow\uparrow}$). We put this extension to use in Section A.2.F, in which we analyze the endogenous emergence of a Hegemon in the presence of network effects.

Recalling from equation (A.8) that liquidity and network effects are isomorphic to changes in $\gamma$ and $w^*$, we conclude that higher liquidity benefits ($\uparrow \omega_1$) and stronger network effects ($\uparrow \Omega_{12}$) increase both the level of issuance and the size of the exorbitant privilege.

### A.2.F Endogenous Emergence of a Hegemon in a Multipolar World

In this section, we analyze whether the IMS has a natural tendency towards a Hegemon and, in this case, what the key determinants of Hegemon status are. We emphasize three characteristics: fiscal capacity, reputation, and currency of pricing in the goods market. We study configurations of the multipolar model in which differences in these characteristics lead to asymmetric equilibria with a large and a small issuer of reserve assets. Such asymmetric equilibria can be interpreted as leading to the natural emergence of a Hegemon. We emphasize how networks effects and the interactions of limited commitment and coordination can amplify small differences in characteristics.

**Fiscal capacity.** We consider a scenario in which in a duopoly $i \in \{1, 2\}$ issuers differ in their fiscal capacity. We model fiscal capacity as the social cost of public funds whereby repaying $bR$ actually requires resources $bR\phi$ with $\phi > 1$. We consider a small difference between the two issuers: $\phi_1 < \phi_2$, with $\phi_2 - \phi_1 < \epsilon$ and $\epsilon$ arbitrarily small. For simplicity, we assume that $\alpha_i = 0$ for both countries $i \in \{1, 2\}$ so that there are no coordination problems. Furthermore, we assume that $\tau$ is sufficiently large that the full-commitment outcome is outside of the Collapse zone for each country. We introduce liquidity and network effects along the lines of the extension presented in Section II.A and we use the corresponding notation. We assume that each RoW household receives marginal liquidity benefits from holding reserve currency $i$ given by $\omega_1 + 2\Omega_{11}(b_1 + b_{-i}) + (\Omega_{12} + \Omega_{21})b_i$. In other words, marginal liquidity benefits excluding network effects

$^{30}$ For a liquidity/safety assessment of the demand for US treasuries, see Krishnamurthy and Vissing-Jørgensen (2012). For risk based empirical assessments of Dollar currency premia, see Hassan (2013); Hassan and Mano (2014); Verdelhan (2016).
\[ \omega_1 + 2 \Omega_{11} (b_1 + b_{-i}) \] depend only on total holdings \( b_1 + b_{-i} \) while network effects \( (\Omega_{12} + \Omega_{21}) \bar{b}_i \) are specific to each reserve currency. The aggregate demand curves for each reserve currency are therefore given by

\[
R_i^e(b_i; b_{-i}) = \hat{R} - 2\gamma \sigma^2(w^* - (b_i + b_{-i})) - \omega_1 - 2\Omega_{11}(b_i + b_{-i}) - (\Omega_{12} + \Omega_{21})b_i,
\]

where we have substituted in the aggregation condition \( b_i = \bar{b}_i \). The difference in equilibrium issuance is given by:

(A.9)

\[
b_1 - b_2 = \frac{\hat{R}' \left( \frac{1}{\bar{b}_1} - \frac{1}{\bar{b}_2} \right)}{2(\gamma \sigma^2 - \Omega_{11} - \Omega_{12} - \Omega_{21})},
\]

where by analogy with the extension in Section II.A we assume that \( \gamma \sigma^2 - \Omega_{11} - \Omega_{12} - \Omega_{21} > 0 \). Note that not only is the issuer with the greater fiscal capacity issuing more \( b_1 > b_2 \), but also the difference in fiscal capacities is amplified by network effects \( \Omega_{12} + \Omega_{21} > 0 \) through a multiplier (the denominator in equation (A.9)). This captures the notion that the depth and liquidity of U.S. financial markets is an equilibrium outcome that amplifies a fiscal capacity advantage and consolidates the role of the U.S. Dollar as the dominant reserve currency.

**Reputation.** We analyze the role of differences in reputation by studying a duopoly \( i \in \{1, 2\} \) with differences in the ability to commit \( \tau_1 > \tau_2 \). For simplicity, we assume that \( a_i = 1 \) for both countries \( i \in \{1, 2\} \), capturing severe coordination problems. In this case, both issuers decide to issue inside their respective Safety zones, but issuer 1 has a larger Safety zone \( \hat{b}_1 = \tau_1 / R_{H1} > \tau_2 / R_{H2} = \hat{b}_2 \). This corresponds to a standard Cournot duopoly with heterogeneous capacity constraints given here by \( \hat{b}_1 \) and \( \hat{b}_2 \). In equilibrium, the issuer with the higher capacity constraint (issuer 1) issues more. These differences in the ability to commit can arise from institutional and historical factors. In the next paragraph we show that they can also arise endogenously from goods pricing.

**IMS meets IPS.** We consider a duopoly \( i \in \{1, 2\} \) and assume that prices are fully rigid in one of the two reserve currencies, say \( i = 1 \), rather than in RoW currency as assumed in Section V. This captures the empirical regularity that prices are disproportionately quoted in the dominant reserve currency, in U.S. dollars at present and in British sterling in the 1920s, a fact dubbed the International Price System (IPS) by Gopinath (2015).

In this case, the real return of debt denominated in reserve currency 1, in which the goods are priced, is always safe. The crucial consequence is that country 1 endogenously acquires de facto full commitment, while country 2 still faces limited commitment as in our analysis so far.\(^{51}\) We solve for an illustrative equilibrium by assuming that country 2 faces the least favorable expectations with \( a_2 = 1 \). This is isomorphic to a standard Cournot model with two firms, one of which has a fixed capacity constraint while the other is unconstrained, where \( \hat{b} \) plays the role of the fixed capacity constraint. In equilibrium, country 1 issues more, potentially much more, than country 2. This offers one rationalization for the association in the data between currency of pricing in the goods market and currency denomination of reserve assets.

**A.2.G Endogenous Entry and Natural Monopoly**

To model endogenous entry, we add an ex-ante state to the model, where potential reserve issuers choose whether to incur a fixed cost \( K \) to increase their reputation from 0 to \( \tau \). This entry cost \( K \) could proxy for the various costly steps that must be taken over time by countries who desire to play a significant international role, for example by slowly building a reputation for currency stability in times of crisis at the cost of domestic welfare. Not only could these costs be large, but the opportunities to demonstrate good behavior and boost reputation might be very infrequent.

\(^{51}\)In practice debt reductions could be engineered either through an exchange rate devaluation or through an outright default. The pricing of goods in the reserve currency reduces the ex-post incentives to devalue. While the incentives to default are unchanged, such defaults are rarer in practice perhaps because of higher true or perceived associated costs.
A potential reserve issuer who incurs $K$ faces no cost of devaluing his currency, and hence cannot issue any positive amount of reserve assets since RoW investors rationally expect its debt to be risky. By contrast, a potential reserve issuer who incurs $K$ faces a cost $\tau$ of devaluing his currency and can therefore issue some reserve assets and earn some monopoly rents.

Monopoly rents per issuer depend on the number of entrants and on the extent of coordination problems via a particular equilibrium selection. A natural monopoly arises when with large fixed costs and small variable costs, total monopoly rents are too small to sustain entry by a large number of reserve issuers. This tendency to a small number of reserve issuers is accentuated when coordination problems in the post-entry equilibrium worsen with entry.

A.2.H Risk-sharing, LoLR Arrangements and the Triffin Dilemma

One approach to mitigating the Triffin dilemma and the associated instability of the IMS is to introduce policies that reduce the demand for reserve assets at all levels of global savings $w^*$. Such policies have often been proposed by economists looking to reform the IMS (Keynes (1943); Harrod (1961); Machlup (1963); Meade (1965); Rueff (1963); Farhi, Gourinchas and Rey (2011)). Their most recent incarnations have included swap lines amongst central banks, credit lines by the IMF as LoLR, and international reserve sharing agreements such as the Chiang Mai initiative.

Our framework can capture the rationale behind these policies with a simple extension of the demand curve for reserve assets in equation (1). We assume that each of the many countries in RoW is saddled with an idiosyncratic background endowment risk $\omega_i$. We also assume that if variance ($C_i^2$) is above a variance threshold in equilibrium, then international investors penalize variance at the margin with “risk aversion” $\hat{\gamma}$, rather than $\gamma < \hat{\gamma}$. This is a simple reduced-form way of capturing a form of precautionary savings. We assume that the variance of $\omega_i$ is so large that the variance of future consumption remains above the variance threshold even when the country invests all its savings in reserve assets; however, the variance of future consumption falls below the variance threshold in the absence of idiosyncratic background risk, even when there are no reserve assets. In that case, a sufficiently good idiosyncratic risk-sharing arrangement among RoW countries reduces the equilibrium demand for reserve assets by lowering marginal “risk aversion” to the lower level $\gamma$.

In a world with more idiosyncratic risk-sharing and lower “risk aversion”, the Hegemon finds issuing in the Safety zone relatively more attractive than issuing in the Instability zone. Indeed, assuming that $\hat{b} < b^{FC} < \hat{b}(\gamma)$ for both values of $\gamma$, the profits from issuing $b^{FC}$ are equal to $(1 - \alpha)b^{FC}2\gamma^2(w^* - b^{FC}) - \alpha\lambda\tau(1 - e_L)$ and the profits from issuing $\hat{b}$ are equal to $\hat{b}2\gamma^2(w^* - \hat{b})$. Hence, the profits from issuing $b^{FC}$ decrease more than the profits from issuing $\hat{b}$ when $\gamma$ drops from $\hat{\gamma}$ to $\gamma$. 

A.14
**APPENDIX FIGURES**

![Graph showing the percentage of sovereign debt issued in pounds or dollars as a fraction of all sovereign debt issued in foreign currency by the rest of the world.](image)

**Figure A.1:** Third Party Issuance in Reserve Currencies

*Note:* Source: Chitu, Eichengreen and Mehl (2014). The figure plots the percentage of sovereign debt issued in pounds or dollars as a fraction of all sovereign debt issued in foreign currency by the rest of the world. See original source for details.

**APPENDIX REFERENCES**


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A.15


