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The safe asset frontier

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Abstract

We identify the frontier between safe and unsafe assets and show how the growth rate of the economy and its fiscal capacity interact with differences of opinion amongst investors to determine the safe asset equilibrium. Multiple equilibria emerge in our set-up due to strategic complementarities across counterparties, and the safety of the bond depends on the extent to which investors’ opinions diverge from the credit rating of the asset.

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1. Introduction

Investors typically perceive government bonds – particularly those issued by the advanced economies – as “safe” and so use them as liquid collateral in a wide range of financial transactions. But, as recent events in Europe demonstrate, assets that are supposedly “safe” can easily lose that quality as the frontier between “safe” and “unsafe” assets shifts over time (Gourinchas and Jeanne, 2012). The downgrading of government debt in the euro area lead to a sharp rise in the haircuts applied by transacting counterparties, constraining the availability of secured financing. Figure 1 shows how margin requirements were triggered once peripheral euro area government bond spreads breached a threshold of 450 basis points.¹

Figure 1: Ten year peripheral euro area government bond spreads against German Bunds (in basis points).

In an important recent contribution, Dang et al. (2010) call attention to the fact that safe assets are “information insensitive” – the safer the asset, the less its payoff is affected by new information, allowing investors to agree about the value of the security without collecting costly information about underlying collateral. But when doubts about collateral quality (or borrower solvency in the case of government debt) emerge, it becomes profitable for potential sellers and buyers of the security to collect information about the issuer and reassess counterparty risk. In the limit, funding markets may shut down in the face of heightened adverse selection and suspicion about the motives for trade.

In this paper, we develop a model to clarify how the frontier between safe and unsafe govern-

¹The Bank of England (2012) estimates that, in the event of a reappraisal of US Treasuries, some $850 million of additional collateral would be required for every 50 basis point increase in haircuts on US-backed collateral in bilateral OTC derivatives markets.
ment debt is determined endogenously and relates to factors such as fiscal capacity and differences in investor opinion. Multiple equilibria emerge in our set-up due to strategic complementarities across counterparties, and the safety of the bond depends on the extent to which investors’ opinions diverge from the credit rating of the asset. The smaller the divergence, the more likely the bond is information insensitive. But as investor opinion becomes increasingly distinct from the official certification, a safe bond can suddenly transform into an illiquid and informationally sensitive asset.

We demonstrate that the frontier between safe and unsafe government bonds is non-linearly related to macroeconomic fundamentals, namely the growth rate of the economy and the fiscal capacity of the government. The results are intuitive. High growth rates and sizable fiscal capacity can support information insensitive (and hence safe) assets. But other combinations may also be feasible. When growth rates are low, safe assets can continue to be supported when fiscal capacity is large. Conversely, when growth rates are high, a weak fiscal position may be consistent with the information insensitivity of the bond. As differences in opinion on the bond’s characteristics diminish, the safe asset is supported for a wider range of fundamentals as the frontier between safe and unsafe assets shifts downwards.

Our paper is related to several strands of literature. First, in taking a general equilibrium perspective on the macroeconomic effects of safe asset shortages, we build on the seminal contribution of Caballero et al. (2008), as well as recent work by Gourinchas and Jeanne (2012) and Caballero and Farhi (2013). Second, our focus on the information sensitivity of assets draws on insights developed by Gorton and Pennacchi (1995) and Dang et al. (2010). Alternative perspectives on the acquisition of information by investors are presented in Yang (2012) and Farhi and Tirole (2012), while Gorton and Ordoñez (2013) show how government bonds, by replacing private safe assets, constitute net wealth in a crisis.

2. The model

2.1. The market for safe assets

The world economy consists of $N$ islands evolving in discrete time steps $t = 1, 2, 3, \ldots$ There is a single financial asset – a bond – that is a perpetual claim to a fraction $\delta$ of global GDP, namely the sum of resources on all islands, $X_t$. Despite yielding a dividend $\delta X_t$, there is some default risk associated with the bond, which we describe below. The world economy is assumed to grow at a constant rate, $g$.

The population mass is constant and equal to one. In each period $t$, a risk neutral agent is born on every island and is economically active for the period, before dying at the start of period $t + 1$ to make way for the next generation. Agents born in period $t$ receive a perishable endowment
\[(1−\delta)X_t\] at birth, but can only consume their resources at the time of death. This discrepancy between income and expenditure creates a demand for stores of value. Agents can purchase a bond from agents on islands with which there is a trading relationship. The full set of bilateral trading opportunities is represented by the adjacency matrix \(A \in \{0,1\}^{N \times N}\), where \(A_{ij} = A_{ji} = 1\) implies that a (symmetric) trading opportunity exists between residents of islands \(i\) and \(j\). We denote the set of possible trading partners for island \(j\) by \(\mathcal{N}_j = \{i | A_{ij} = 1\}\), and the number of trading partners by \(k_j = |\mathcal{N}_j|\).

An agent born on island \(j\) in period \(t\), thus, purchases a bond from an agent born in period \(t−1\), consumes the dividend at the end of period \(t\), and sells the bond at the start of period \(t+1\) to a younger generation agent residing on another island with which there are trading relations. The younger agent, residing on island \(i\), to whom the bond is sold is randomly selected from the set of islands, \(\mathcal{N}_j\), with probability \(1/k_j\). Any capital gain from the sale of the bond is consumed by agent \(j\), just prior to his death, at the start of period \(t+1\). We assume that agents born at \(t = 0\) are each endowed with a bond.

Defaults are idiosyncratic credit events that are independent across time periods. Following Gourinchas and Jeanne (2012), we interpret default as a political “revolution” in which current bondholders are hurt to the benefit of future generations. Accordingly, the probability of default of the bond is either “high” or “low”. In the “high” default state, the authorities expropriate current bond holders for sure, while in the “low” state expropriate risk, as measured by the parameter \(\alpha \ll 1\) is modest.

In the event that default occurs in period \(t\), the bond is taken from agent \(j\) and handed to his offspring, i.e., the agent born on the same island in period \(t+1\). As a result, agent \(j\) cannot consume either the dividend from the bond or the capital gains from its potential sale. Instead, the period \(t\) agents consume the resources on their islands, which diminishes output available in the next period.\(^2\) If a young agent believes that the bond will default for sure, he will not purchase the bond from an old agent, and trade breaks down. We assume that, at birth, all agents hold a prior belief, \(\alpha\), on the probability of default.\(^3\)

\(^2\)Accordingly, the future expected value of GDP is
\[
E_t[X_{t+k}] = (1−\alpha)(1+g)E_t[X_{t+k−1}] + \alpha g E_t[X_{t+k−1}]
= E_t[X_{t+k−1}](1+g−\alpha)
= \left((1−\alpha)(1+g)E_t[X_{t+k−2}] + \alpha g E_t[X_{t+k−2}]\right)(1+g−\alpha)
= ... = X_t(1+g−\alpha)^k.
\]

\(^3\)This prior belief might be the result of a pronouncement on the state of sovereign political risk by a credit rating agency outside the model.
The period \( t \) utility function for agent \( j \) is

\[
E_t[u(c_{j,t}) + \beta_t u(c_{j,t+1}) | z_{j,t}], \tag{1}
\]

where \( c_{j,t} \) and \( c_{j,t+1} \) denote per period consumption, \( u(\cdot) \) is an increasing convex utility function, \( \beta_t = 1/(1+r) \) is the discount rate, \( r \) is the real interest rate, and \( z_{j,t} \in \{0,1\} \) is a discrete decision taken by the agent to gather information about expropriation risk at the time of purchase.\(^4\) The objective of agent \( j \) is to select \( z_{j,t} \) to maximize his utility. In section 2.2 we characterize the binary choice problem facing agent \( j \) and show how it can be represented by a probability distribution over alternatives.

The market value of the bond is given by the discounted sum of future dividends. Formally, at time \( t \), the value of the bond is

\[
V_t = \sum_{j=0}^{\infty} \delta E_t[X_{t+j}] = \frac{\delta X_t}{r + \alpha - g}, \tag{2}
\]

where we assume \( g < r + \alpha < 1 \) so that the value of the bond is always positive. And, at the beginning of period \( t+1 \), the agent attempts to sell the bond to younger generation agents for

\[
V_{t+1} = \frac{\delta X_{t+1}}{1+r} + \frac{\delta X_{t+2}}{(1+r)^2} + ... = \frac{\delta X_t(1+g)}{r + \alpha - g}, \tag{3}
\]

netting a capital gain of \((V_{t+1} - V_t)/V_t = g\).

For the bond to serve as a secure promise of future repayment in the global economy it should be “informationally insensitive” in the sense of Dang et al. (2010) – investors should not have any incentive to challenge the initial prior belief on default, \( \alpha \), and attempt to gather information about expropriation risk. But such information insensitivity depends critically on the behavior of participants in the market in which the bond is traded. In particular, the willingness of a \( t+1 \) agent to trade the bond will depend on the actions of their younger generation trading partners which, in turn, depends on the actions of their younger generation trading partners, and so on.

Let \( \pi_{t+1} \in [0,1] \) be the fraction of period \( t+1 \) agents who agree that the bond’s probability of default is \( \alpha \). The expected return on the bond must equal the return on the bond if there is no default, minus the expected valuation loss in the event that the credit risk materializes. If all period \( t+1 \) agents are in agreement, the market is liquid and there is no delay in executing transactions. In this case \( \pi_{t+1} = 1 \) and the capital gains are realized in their entirety. But if

\(^4\)To ensure dynamic efficiency, we tacitly assume the presence of an additional island \( i = N + 1 \), in which the agent born at \( t = 0 \) is endowed with a bond and lives forever. In the event of default in period \( t \), this agent does not consume the dividend in period \( t \), but consumes it instead at period \( t+1 \). In the “high” default state the agent will only consume in every alternate period.
some younger generation agents have differing assessments of default risk, \( \bar{\pi}_{t+1} < 1 \), and delays in executing transactions lead to real costs, \( C \), for the seller. Thus,

\[
rV_t = (1 - C[1 - \bar{\pi}_{t+1}]) [V_{t+1} - V_t] + \delta X_t - \alpha V_t. \tag{4}
\]

Without loss of generality, we set \( C = 1 \) in what follows.

The aggregate financial wealth of the population, \( W_t \), evolves according to

\[
\bar{\pi}_{t+1} (W_{t+1} - W_t) = -W_t + (1 - \delta)X_t + rW_t - \alpha W_t. \tag{5}
\]

Equation (5) states that savings decreases with the death of agents, increases with the endowment allocated to new generations, increases with the return on the bond, and decreases in default risk. In the event that \( \bar{\pi} = 0 \), the bond is not traded across islands and the wealth of an agent born in period \( t \) does not grow since capital gains cannot be realized. In the steady state, i.e., \( \bar{\pi}_{t+1} = \bar{\pi}_t \), the market value of the bond must equal the aggregate wealth, so that \( W_t = X_t \). Accordingly, the equilibrium interest rate is

\[
r \equiv r(\bar{\pi}) = \delta + \bar{\pi} g - \alpha, \tag{6}
\]

which is decreasing in the default risk, \( \alpha \), and increasing in agents' agreement over default risk, \( \bar{\pi} \). When default risk increases, the real interest rate must decline in order to keep the value of the bond constant in equilibrium. And as more investors are willing to take on the bond, it becomes easier to trade and earn a capital gain. This dictates that the real interest rate must increase in order to keep the value of the bond constant.

2.2. Choice over alternatives

To ascertain the stationary value of \( \bar{\pi} \), we first characterize the period \( t \) decision by agent \( j \) on whether to gather information about expropriation risk or not. This decision is a discrete choice. In accepting the bond, agent \( j \) must decide if he agrees with the default risk, \( \alpha \), certified by the rating agency or, instead, engage in surveillance of the collateral underlying the bond. Denote by \( z_{j,t} = 1 \) the decision by agent \( j \) to accept the credit rating and value of the bond without monitoring, and by \( z_{j,t} = 0 \) the decision to conduct due diligence.

Monitoring is costly. Although agents are aware that the bond is backed by a fraction \( \delta \) of global GDP, they are unsure about the underlying makeup of the collateral. Some parts of the world economy may perform above par, while others perform below par, and this can change over time. The greater the size of the global economy, the more due diligence the agent must conduct on the composition of GDP to properly evaluate the bond. We therefore assume that the cost of monitoring \( M_{j,t} \) scales with the present value of tradable output, so that \( M_{j,t} = \mu_j V_t \).
Figure 2 illustrates the decision tree facing agent $j$. If he decides to monitor, then $z_{jt} = 0$. With probability $\gamma$, agent $j$ finds the bond to have been incorrectly rated and no trade takes place. The payoff to the agent in this event is

$$-M_{jt} = -\mu_j V_t.$$  

With probability $1 - \gamma$, agent $j$ agrees with the certification of the rating agency and pays $V_t$ to buy the bond. The agent earns both a dividend and capital gains to net a payoff\(^5\)

$$V_{t+1} - V_t + \delta X_t - M_{jt} = V_t (r + \alpha - \mu_j). \quad (7)$$

If, instead, agent $j$ decides to accept the value of the bond without collecting additional information, then $z_{jt} = 1$. The payoff to agent $j$ now depends on whether younger generation trading partners also accept that $\alpha$ is the probability of default, or opt to conduct their own due diligence. Defining $\bar{\pi}_{jt}$ to be the fraction of $j$'s younger generation trading partners who agree with $\alpha$ being the probability of default,

$$\bar{\pi}_{jt+1} = \frac{1}{k_j} \sum_{l \in N_j} z_{l,t+1}, \quad (8)$$

the probability that a randomly selected younger generation investor checks the bond and decides

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\(^5\)While reduced form, our modeling of information acquisition captures a key feature from the recent literature on Bayesian updating and search models for information diffusion and percolation, e.g., Duffie et al. (2010) and Livan and Marsili (2013). Specifically, when two agents meet and exchange information, the posterior belief held by both agents is the sum of their individually held beliefs. If, however, one of the agents has an uninformed prior, then a chance meeting with that agent does not alter the views held by the other agent. In this context, $\gamma$ may be regarded as the probability agent $j$ acquires information from an informed agent, while $1 - \gamma$ is the probability that $j$ is matched with an uninformed agent.
not to accept it is $\gamma (1 - \bar{\pi}_{j,t+1})$. In this case, the payoff to agent $j$ is
\[ -V_t + \delta X_t = -V_t (1 + g - (r + \alpha)). \] (9)

With probability $1 - \gamma (1 - \bar{\pi}_{j,t+1})$, the randomly selected younger generation agent accepts that the bond is correctly graded. Trade occurs and the payoff to $j$ is
\[ V_{t+1} - V_t + \delta X_t = V_t (r + \alpha). \] (10)

Note that the payoff to agent $j$ from choosing $z_{j,t} = 1$ is increasing in the fraction $\bar{\pi}_{t+1,j}$. Moreover, by recursively writing out the payoffs for $j$'s future generation trading partners, their payoffs from choosing not to monitoring are also increasing in the fraction of future generation agents who do not monitor. There are, thus, strategic complementarities across counterparties.

In summary, the expected payoff in period $t$ to agent $j$ from accepting the bond without monitoring is
\[ u(z_{j,t} = 1) \equiv E_t [u(c_{j,t}) + \beta_t u(c_{j,t+1}) | z_{j,t} = 1] = V_t \left[ r + \alpha - \gamma (1 - \bar{\pi}_{j,t+1})(1 + g) \right], \] (11)
while the expected payoff from conducting due diligence is
\[ u(z_{j,t} = 0) \equiv E_t [u(c_{j,t}) + \beta_t u(c_{j,t+1}) | z_{j,t} = 0] = V_t \left[ (1 - \gamma)(r + \alpha) - \mu_j \right]. \] (12)

2.3. Nash equilibrium

We now focus on the Nash equilibrium of the model and solve for the steady state value of $\bar{\pi}$. Comparing the payoffs between conducting due diligence and not monitoring, agent $j$ selects $z_{j,t} = 1$ for sure (with probability $p_1 = 1$) whenever
\[ r + \alpha - \gamma (1 - \bar{\pi}_{j,t+1})(1 + g) > (1 - \gamma)(r + \alpha) - \mu_j, \] (13)
which, upon rearranging, yields the optimal choice
\[ z^*_{j,t} = \Theta \left[ \gamma \left( \frac{1 + g}{k_j} \sum_{l \in \mathcal{N}_j} z_{l,t+1} - (1 + g - r - \alpha) \right) + \mu_j \right], \] (14)
where the Heaviside function $\Theta[x] = 1$ whenever the argument $x > 0$, and equals zero, otherwise.

Further insight into the nature of the equilibrium can be obtained by assuming that the structure of interactions is locally tree-like, i.e., each agent has exactly $k$ trading partners. If $\ell$ denotes the number of trading partners who agree with the probability of expropriation risk, then agent
will also agree should the value of $\ell$ be such that the argument of the Heaviside function in Equation (14) is greater than zero, i.e., when

$$\ell > \frac{k}{1+g} \left[ R - \frac{\mu j}{\gamma} \right],$$  \hspace{1cm} (15)$$

where $R = 1+g-r-\alpha$. What matters for agent $j$ is the absolute number of trading partners who agree rather than their individual identities. With $k$ trading partners, the number of different combination of $\ell$ agents who agree is $\binom{k}{\ell}$. Each of these $\ell$ agents also has exactly $k$ trading partners, so Equation (14) provides identical conditions on the number of their trading partners who agree for “agreeing” to be a best response for each of the original trading partners, and so on.

Recursively defining similar conditions for all future generations of trading partners, the probability that agent $j$, with marginal cost of monitoring, $\mu_j$, will agree with the probability of expropriation risk

$$\pi(\mu_j) = \sum_{\ell > \frac{k}{1+g} \left[ R - \frac{\mu j}{\gamma} \right]} \binom{k}{\ell} \bar{\pi}^\ell (1-\bar{\pi})^{k-\ell},$$  \hspace{1cm} (16)$$

where $\bar{\pi}$ is the unconditional probability that a randomly selected agent will agree with the probability of default and not monitor. Taking expectations over $\mu$ in Equation (16), and recalling that $r = r(\bar{\pi}) = \delta + \bar{\pi} g - \alpha$, we obtain the following fixed point equation for $\bar{\pi}$ which, by the law of large numbers, is the fraction of agents who agree with the bond’s probability of default and choose not monitor in equilibrium,

$$\bar{\pi} = \sum_{\ell=0}^{k} \binom{k}{\ell} \bar{\pi}^\ell (1-\bar{\pi})^{k-\ell} \text{Prob} \left\{ \mu > \gamma \left[ R(\bar{\pi}) - \frac{(1+g)\ell}{k} \right] \right\}. \hspace{1cm} (17)$$

Figure 3 plots the solutions to Equation (17) for different values of $\gamma$, where the function $F(\bar{\pi})$ corresponds to the right-hand side of Equation (17). For small $\gamma$ – where there is a high degree of congruence between the credit rating agency’s appraisal and the due diligence of agents – there is a unique solution with $\bar{\pi} = 1$. All agents willingly trade the bond without monitoring and the asset is “informationally insensitive”. As $\gamma$ increases, a second solution $\bar{\pi} = 0$ emerges. Here all agents monitor and the active trading of the bond is curtailed. And as $\gamma$ is steadily increased, the two (stable) solutions are separated by a third (unstable) solution for intermediate values of $\bar{\pi}$. The basin of attraction for the $\bar{\pi} = 0$ solution grows, while that for the $\bar{\pi} = 1$ solution rapidly depletes.

3. **The safe asset frontier**

In this section we clarify the relationship between information sensitivity, fiscal capacity and economic growth. We suppose that there are many islands, each with a large number of trading
partners, i.e., $N$ and $k$ are large. When $k$ is large, we can approximate the Binomial distribution in Equation (17) by a normal distribution that is sharply peaked around its mean.\footnote{Formally, according to the de Moivre-Laplace theorem we have that} Defining $s = \ell/k$, we obtain

\[
\bar{\pi} = \int_0^\infty \delta(s - \bar{\pi}) \text{Prob}\{\mu > \gamma[R(\bar{\pi}) - (1 + g)s]\} \, ds \\
\quad = \text{Prob}\{\mu > \gamma[R(\bar{\pi}) - (1 + g)\bar{\pi}]\}
\]

If marginal monitoring costs, $\mu$, are exponentially distributed, then the fixed point equation for the fraction of agents who readily accept the bond may be written as

\[
\bar{\pi} = \min\left\{1, \exp\left(-\frac{\gamma}{\mu} \left[1 + g - (1 + 2g)\bar{\pi}\right]\right)\right\},
\]

where we denote the right-hand side of Equation (19) by $G(\bar{\pi})$. In what follows, the parameter $\delta$ can be interpreted as a measure of fiscal capacity since it amounts to a tax on (world) economic output.

Figure 4 illustrates the fixed point solution to Equation (19). Multiple $\bar{\pi}$ solutions begin to emerge once $G(\bar{\pi})$ becomes tangent to the 45 degree line, i.e. $G'(\bar{\pi}) = 1$. For parameter values where $G'(\cdot) > 1$, there is only one fixed point at $\bar{\pi} = 1$, while there are multiple solutions at $\bar{\pi} =
1 and $\bar{\pi} < 1$ once $G'(\cdot) < 1$. We can therefore identify a frontier in terms of $\delta$ and $g$ at which multiplicity attains. Solving $G'(\cdot) = 1$ together with the fixed point condition $\bar{\pi} = G(\cdot)$ yields

$$\delta = H(g, \Gamma) \equiv 1 + g - \left(\frac{1 + \log(\Gamma (1 + 2g))}{\Gamma}\right),$$

(20)

where $\Gamma = \gamma/\bar{\mu}$. The partial derivatives of $H(g, \gamma)$ with respect to $g$ and $\Gamma$ are

$$\frac{\partial H}{\partial g} = 1 - \frac{2}{\Gamma (1 + 2g)}, \quad \text{and} \quad \frac{\partial H}{\partial \Gamma} = \frac{\log(\Gamma (1 + 2g))}{\Gamma^2},$$

respectively. The derivative with respect to $g$ is strictly negative for $\Gamma (1 + 2g) < 2$. Thus, if the average monitoring cost is large, the frontier between safe and unsafe assets is downward sloping in the growth rate. The derivative of $H$ with respect to $\Gamma$ is strictly positive for $\Gamma (1 + 2g) > 1$. Thus, as the difference in opinion over the bond increases, the frontier between safe and unsafe assets shifts upwards, diminishing the region where the bond is informationally insensitive.

Figure 5 illustrates the frontier in $(g, \delta)$ space. It shows, for any given growth rate, how
large fiscal capacity must be to support the global fixed asset. Intuitively, a high growth rate economy with sizable fiscal capacity (the upper right-hand quadrant) can support informationally insensitive (and hence safe) assets. Low growth and weak fiscal capacity have the opposite effect.

But, as Figure 5 makes clear, information insensitivity can also be supported in low growth-high fiscal capacity cases, as well as in high-growth-low fiscal capacity situations.

Figure 6 plots the interest rate as a function of $\gamma$. There is a critical value of $\gamma$, below which $\bar{\pi} = 1$ and the world interest rate is $r = \delta + g - \alpha$ as implied by Equation (6). Above this threshold, however, $\bar{\pi} = 0$ and a low interest rate solution, $r = \delta - \alpha$, emerges. Note that, immediately above the threshold, both high and low interest rate solutions co-exist for a range of $\gamma$ values.

![Figure 6: The world interest rate $r$, as a function of $\gamma$.](image)

As Figure 6 suggests, far from the tipping point, an incremental change in $\gamma$ does not impact the decisions of agents to accept the value of the bond without monitoring. In particular, each agent will argue that all future generation agents will accept the bond without monitoring, and therefore find it optimal to not monitor. This behavior persists as $\gamma$ increases beyond the tipping point, and the high interest rate solution remains. But the high $r$ equilibrium is fragile. If there is any doubt whatsoever concerning the actions of future generation agents, all agents immediately turn to monitoring, and the interest rate collapses to the low $r$ solution. An informationally insensitive asset can, all of a sudden, be transformed into an illiquid and informationally sensitive one.7 The advent of new information that changes perceptions about the safety of the bond can, thus, lead to a fall in the equilibrium real interest in order to maintain the value of the asset.

7By the same argument, starting from a high $\gamma$ state, where all agents choose to monitor, following an incremental decrease in $\gamma$, all agents will continue to monitor. The probability must decrease all the way to the tipping point for the high $r$ solution to emerge. If, however, a large enough fraction of agents start to doubt whether future generation agents will monitor, the high $r$ solution may be regained earlier.
4. Conclusion

Although simplistic, the mechanisms at work in our model shed light on both the sovereign debt crisis in Europe and debates about the future of the US dollar as the preeminent reserve currency. Prior to the onset of the global financial crisis in 2007, spreads on debt securities issued by European states were low, reflecting the belief of investors that the bonds were liquid and readily interchangeable. But following large-scale financial sector bailouts, investors began to query whether growth rates and fiscal policies were consistent with safe asset status. The endogenous reduction in safe asset supply that has resulted has destabilized the euro, and highlighted how different eurozone countries have very different growth prospects and very different debt burdens with little scope for transferring fiscal resources between them.

Finally, our analytical results point to a testable hypothesis for the determinants of safe government debt, suggesting a non-linear relationship between fiscal variables, growth, and information sensitivity of government debt. Empirical analysis of the model along these lines would complement existing studies, e.g., Cecchetti et al. (2010) and Fontana and Scheicher (2010), and is left for future research.
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