Safe Assets at Financial Globalization

Ly Dai Hung

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hunglydai@gmail.com

Vietnam Institute of Economics, Hanoi

Abstract.

Purpose: The paper explores the impact of safe assets on the economic growth on the financial globalization context.

Methodology: The method employs both cross-section and panel data regression on a data sample of 150 economies, both advanced and developing ones, over the 1990-2019 period. The robustness analysis is carried out by controlling for different sub-sampling data, including advanced economies compared with emerging and developing economies, and 3 consecutive 10-year periods from 1990 to 2019.

Findings: The empirical evidence establishes an inverted-U-shaped dependence pattern of economic growth on the assets safety, measured by the sovereign debts rating. The economic growth is first increasing then decreasing on the assets safety, with the turning point being the value at 12.0 of sovereign debts rating. Thus, the assets safety only exerts a positive impact on the economic growth for the low safety level.

Research implications: The paper can be extended to account for the interaction of assets safety with some other macroeconomic variables on shaping the economic growth. This direction can provide additional evidence and policy discussion on enhancing the economic growth, especially for the developing economies.

Practical implications: For politcy discussion, the economies with low sovereign debts rating, the policy which upgrades the rating can contribute on raising the economic growth rate. Moreover, the policy enhancing the trade openness and political stability are also crucial to make significant contribution on the economic growth rate.

Originality: The paper makes contribution on the economic growth literature by uncovering an inverted-U-shaped pattern of economic growth, and also on the safe assets literature by charactering the impact of sovereign debts rating, a proxy for the safety of government debts, on the economic growth.

Keywords: Economic Growth; Safe Assets; Globalizaton; Cross-Section Regression.

JEL classification: E52; F21; F41.

1. Introduction.

The recent financial globalization is featured by the global shortage of safe assets, i.e, the supply is much less than the demand for safe assets (Bernanke et al, 2011). Before the 2008 global financial crisis, the supply of safe assets accounts for 36.9% of world output. But, this ratio drops substaintially to just 18% in 2011, right after the crisis. This phenomenon can even results in an endogenous reduction of aggregate demand, especially when the interest rate is at zero-lower bound, thus, leading to the economic stagnation phenomenon (Caballero et al, 2017). The reduction of safe assets supply, in turn, raises a new research question on the macroeconomic impact of safe assets at the financial globalization. Our paper aims to fill in this research gap.

The paper focuses on the relationship between the economic growth and the safe assets at the context of financial globalization.

The paper's objective is to quantify the impact of safe assets on the economic growth rate. The method employs both cross-section and panel data regression on a data sample of 150 economies over the 1990-2019 period. The method is applied on various sub-samples including three 10-year periods (1990-2000, 2001-2010, 2011-2019) to account for the potential time dimensinal change, and two groups of advanced economies, and emerging and developing economies, to account for the economic development level.

The empirical evidence establishes that the dependence pattern of economic growth on the assets safety follows an inverted-U-shaped curve. The economic growth rate is first increasing then decreasing on the sovereign debts rating. On other words, the assets safety only exerts a positive impact on the economic growth for the low safety level. This evidence is robust on different sub-samples including three 10-year periods and two groups of economies.

The paper falls into a nexus of two dynamic literatures, including the economic growth and the safe assets.

The paper is closely related to the literature on the economic growth. On the neoclassical growth model, postulated by Solow (1956) and Swan (1956), the income per capita grows with the technology progress and labor force growth rate. In practice, the technology progress is measured by the productivity level, which is a Solow residual based on a constant-return-to-scale production function with labor-augmented technology (Freenstra et al, 2015). Thus, the productivity and labor fore growth rates jointly determines the long-run economic growth rate.

Moreover, the endogenous growth theory focuses on the source of technology progress. This progress can be due to the accumulation of capital across domestic firms on the AK model (Frankel, 1962), or by the expansion of new variety of product on the product variety model (Romer, 1990), or by the creative destruction (Aghion and Howitt, 1992). Beside the theory, the empirical evidence also records various determinants of economic growth such as the institutional quality (Robinson and Acemoglu, 2012), the financial development level (Levine et al, 1997), the capital account openness (Bussière and Fratzscher, 2008), and the human capital (Mankiw et al, 1992).

The current paper complements to these aforementioned papers by proving that the assets safety also contributes on enhancing the economic growth rate. In particular, the impact of assets safety on the economic growth can follow an inverted-U-shaped curve. This implies

that the safety of assets can be beneficial or trimental to the economic growth, depending on the lelve of safety.

The paper also belongs to the safe assets at financial globalization. The safe assets can have impact on three macroeconomic fundamental variables, including the economic growth, inflation and exchange rate. The supply of safe assets underlines the secular stagnation (Caballero and Farhi, 2017). When an economy has scarcity of safe assets, it can fall into a safety trap in which, the only way to restore the equilibrium is an endogenous reduction of aggregate demand, then, leading to lower economic growth rate. Moreover, the safe assets can also influence the inflation rate. The fiscal theory of price level implies that an increase in the primary deficits leads to an inrease in the price level, i.e, the inflation, by devaluating the outstanding debt. Based on this theory, Brunnermeier et al (2019) show that the increase of safe assets supply can reduce the pressure that the primary deficit can exert on the inflation rate. Furthermore, a higher supply of safe assets also raises the inflows of capital, then, leading to the appreciation of domestic currency (Caballero et al, 2015). The appreciation of the currency owned by the country issuing the safe assets is also needed to rebalance the demand for that currency by the foreign country (Gopinath and Stein, 2021).

The current paper contributes on the line of research on the safe assets by providing an empirical evidence on the macroeconomic role of safe assets at the international integration context. The safety of assets, proxied by the sovereign debts rating, shapes the economic growth rate. This evidence holds both on the cross-section sample, which accounts for the comparison across advanced and developing economies, and on the panel sample, which considers the macroeconomic fluctuations over time.

The paper is structured as following. After the first section on Introduction, the second section presents the literature review on the safe assets. Then, the third section describes the analysis framework and associated empirical evidence on the impact of assets safety on the economic growth. Finally, the fourth section closes the paper with a conclusion and policy discussion.

2. Literature Review.

The line of research on the safe assets belongs to a dynamic literature on international macro-finance. The results can be classified into two categories, including the definition of safe assets and the macroeconomic role of safe assets on the economy.

2.1 Concepts and Determinants.

There are two main concepts of safe assets. The safe assets can include all information-insensitive assets. According to this definition, the asymmetric information and its associated problems, such as moral hazard and adverse selection, does not affect the value of safe assets. Recently, this type of definition is used by Dang et al (2017) to differ the financial assets issued by banks from that by other assets on financial market, through the safeness and liquidity. Another concept of safe assets mentions all uncertainty-insensitive assets as the safe assets. In particular, the rate of return on safe assets is constant in all realized states of nature. Recently, this approach is employed by Caballero et al (2016) to analyze the safe assets scarcity on the credibility of domestic demand.

The safe assets are affected by various factors. He et al (2016) show that the safety of assets is based on the interaction of investors' belief and assets supply. When the investors believe that the assets are safe, their behavior would lead to confirmation of assets' safety. Only

when the issuance of assets are large enough to satisfy the demand by the investors, the beliefs of investors are fulfilling, and their safety are ensured. In another paper, Farhi and Maggiori (2017) focus on the role of government bonds' supply on determining bonds' safety. They build up a two-country model, in which a country is a monopoly in issuing the bonds while other demands for the bonds. Based on the advantage of issuing bonds, the former country can devaluate its domestic currency to lower the value of debts. Therefore, the world economy can have multiple long-run equilibrium, i.e, steady-state. Among them, with limited commitment, the government bonds become safe if its supply is large enough for the economy is at stable steady state. But if the supply is too large, the economy falls into the unstable steady state, and the government bonds are not safe, i.e, become risky assets. And according to Krishnamurthy and Vissing-Jorgensen (2012), the government bonds of United States is similar to money, especially by the safety and liquidity. Therefore, a high inflation rate can reduce the assets' safety. Moreover, the trade balance can also affect the safety of bonds. Obstfeld and Rogoff (1995) prove that, for an open economy, the current value of debts is equivalent to the present value of total future trade balance. Therefore, a more trade balance can help the economy to be able to issue more debts, which in turn can ensure the bonds safety.

The safe assets has impact on the macroeconomy, by various aspects, including the economic growth, inflation and exchange rate.

2.2. Safe Assets and Economic Growth.

On the economic growth, Bernanke (2010) claims that the international capital market is characterized by the scarcity of safe assets, since the demand is far more than the supply. On one hand, the supply of safe assets is quite modest, and accounts for a stable share of output for recent decades. This claim is confirmed by Gorton et al (2012). These authors document that, in United States, the percentage of safe assets has remained at about 33 percent since 1952. Over the same period, the ratio of US assets to GDP has increased by a factor of 2.5, raising the quantity of unsafe assets given the constant share of safe assets. On other hand, the demand for safe assets is huge, based on the gross savings by developing economies. Households in these economies tend to seek the financial assets as a store of wealth, beside the motivation of earning high rate of return. Bernanke (2010) also emphasizes that when the excess demand for safe assets is met by the supply of unsafe assets, the asset price surges, building up the bubbles on the financial market. And when the bubbles explore, the financial market falls into crisis, as happened in United States in 2008.

The shortage of safe assets can also affect the physical investment that is required to match the saving needs of society. Caballero et al (2017) argue that if the saving side of economy has a disproportionate desire for safe assets, then the economy only wants to fund a small share of the overall risky investments. Therefore, when the scarcity of safe assets becomes more severe, it will be hard to sustain the levels of physical investment needed to generate economic growth. From this perspective, the publicly funded infrastructure investment becomes particularly attractive, as it can both boost potential growth and does so with maximum issuance of safe assets per unit of installed capital. Moreover, the authors also mention other policy to escape from from the safe assets shortages, including: a valuation rise through the exchange rate appreciation of safe asset producer economies; the issuance of public debts; the production of private safe assets; and changes in regulatory frameworks, global risk sharing.

Recently, Caballero and Farhi (2017) prove the existence of a safety trap, a type of liquidity trap but is based on the scarcity of safe assets. On both liquidity and safety trap, the monetary policy is ineffective, since the bonds and money are perfect substituted. On the safety trap, however, the government can improve the effectiveness of monetary policy by increasing the supply of government bonds, served as safe assets. This action reduces the price of safe assets, then, raises their interest rate to be higher than the interest rate on holding money. The difference on the interest rates, in turn, motives the households to hold the government bonds. Therefore, the monetary policy becomes effective to affect the demand for output.

On the international integration context, Caballero et al (2015) show the mechanism for transmission of secular stagnation across countries, when the world economy suffers the scarcity of safe assets. In particular, when the economies trade with each other, the depression of domestic demand can be offset by the foreign demand through a great trade surplus. But when the trade surplus goes up in one economy, it reduces in other economy. Thus, to offset the reduction on domestic demand in one economy, the others needs to use the monetary policy to raise the money supply, and stimulate the aggregate demand. But if the supply of safe assets is scarce in all countries, the interest rate on holding assets falls to be nearly equal to the interest rate on holding money. This makes the bonds, as one type of safe asset, to be perfect substituted for the money. Then, the monetary policy is ineffective, and can not stimulate the demand for output. Therefore, with the safe assets scarcity, the stagnation in one economy is transmitted to other economy, and the whole world economy falls into the secular stagnation.

2.3. Safe Assets and Inflation.

For the inflation rate, the relationship between the safe assets and price level is referred to the fiscal theory of price level (FTPL). The FTPL stresses the role of money as a store of value and states that the real value of all outstanding government debts, i.e, the nominal debts level divided by the price level, is given by the discounted stream of future primary government surpluses. Primary surpluses are the difference between the government revenue and expenditures excluding interest payments. Then, an increase in the primary deficits leads to an inrease in the price level, i.e, the inflation, by devaluating the outstanding debt.

Brunnermeier et al (2020) employ the FTPL to analyze the impact of safe assets supply on the inflation rate. The government bonds are a type of safe assets, then, allow agents to indirectly share part of their idiosyncratic risk. High idiosyncratic risk makes the government bond more attractive and depresses the interest rate to be below the economic growth rate. By printing the government bonds at a faster rate, the government imposes an inflation tax that reduces the return on the bonds further. Since the government bonds are a bubble, the government in a sense is mining a bubble to generate the seignirage revenue. The resulting seigniorage revenue can be used to finance government expenditure without ever having to raises extra taxes. But the cost of the economy is to suffer a higher inflation rate, compared with the case without the bubble.

The use of safe assets to finance the government budget deficit, with the cost of inflation is also analyzed in Blanchard (2020). The lower interest rate than the economic growth rate is argued by the author as a norm for recent decades, rather than only a temporary phenomena. Within that norm, the finance of government deficit would have a low cost, and even, with no cost. But the author also shows that the overall welfare cost is still positive. Thus, the

employment of safe assets to roll over the existing debts by the future debts should be at an appropriated limit.

Also on this fiscal aspect of safe assets, Taylor (2019) stresses that the U.S government needs to implement a credible fiscal consolidation strategy. Under such a strategy, the government spending still grows, but at a slower rate than GDP at least for a while, thereby reducing both spending as a share of GDP and debt as a share of GDP compared with the current projections of the Congeressional Budget Office. With this strategy, the issuance of government bonds needed to be controlled since the burden of government deficit would be financed by the taxation, divided by the current and future generations. Thus, the case of higher supply of safe assets, i.e, the government bonds, associated with high inflation needs to be implemented with care, since that strategy is unsustainable.

2.4. Safe Assets and Exchange rate.

For the exchange rate, the safe assets supply also determines the fluctuation of exchange rate, between the currency of safe assets issuer and the currency of other economies. Caballero et al (2017) show that the exchange rate adjusts to ensure the equilibrium of macroeconomy in an open economy context. In details, the exchange rate depends on the supply of safe assets. For the issuer of safe assets, a higher supply of safe assets raises the inflows of capital, then, leading to the appreciation of domestic currency against the foreign currency. This appreciation reduces the differential rate of return on the domestic assets compared with the return on the foreign assets. Then, the appreciation is needed to rebalance the inflows of capital. The authors shows that the rate of appreciation is at least equal to the difference of economic growth rate of the assets issuer and the assets buyers.

Another mechanism for the safe assets to affect the exchange rate is uncovered by Gopinath and Stein (2021). The authors embed the determination of safe assets with the choice of trading invoice currency. A currency's role as a unit of account for invoicing decisions is complementary to its role as a safe store of value. And this complementary can lead to the emergence of a single dominant currency in trade invoicing and global banking. This, in turn, raises another type of pricing, which is dominant currency pricing, besides two traditional pricing types which are the local currency pricing and producer currency pricing. The dominant currency pricing also results in a lower expected return on the dominant currency safe assets than the similarly safe assets denominated in other currency. This differential rates of return can also lead to the appreciation of the dominant currency in the world capital market.

The appreciation of safe assets issuer's currency againts the foreign currency is also proved by both theory and evidence in Jiang et al (2021). There exists a convenience yield which measures the wedge between the yield on foreign government bonds and the currency hedged yield on the safe U.S Treasury bonds. When the convenience yield that the foreign investors derive from holding the U.S safe assets increases, the U.S dommar immediately appreciates. This appreciation of USD is necessary to lower the foreign investor's expected future return from owning U.S safe assets. By evidence, the author show that the convenience yield can account for up to 28% of the quarterly variation in the dollar.

In brief, the literature on the safe assets provides various results, from the definition, the determinants to the spill-over effect in macroeconomy through the economic growth, inflation and exchange rate.

3. Inverted-U-Shaped Pattern of Economic Growth.

Based on the literature review on three aspects of safe assets, including the economic growth, inflation and exchange rate, we focus on the impact of safe assets on the economic growth. This section presents the analysis framework, then, the empirical evidence.

3.1. Analysis Framework.

3.1.1. Data.

The data is a cross-section sample of 145 advanced and developing economies. Each variables is averaged over 1990-2019. This 30-year period is long enough to absorb the fluctuation of economic variables. The analysis also shows that the evidence is also similar for the panel data regression.

The economic growth, denoted by *(aGDPpcgrowth),* is measured by the growth rate of real output per capita. The real output is the gross domestic product (GDP) at constant 2011 national price in million USD. This variable is from the Penn World Table 10.0 (PWT, 2020). With the population data from the Worldbank Development Indicators (WDI, 2020), the GDP per capita is the real output divided by the population. Then, we takes the annual growth rate of GDP per capita, which is on percentage.

The sovereign debts are considered as the safe assets, as the concept in Caballero et al (2016). Accordingly, the assets safety can be measured by the sovereign debts rating, denoted by (asovrate), which is from World Bank Cross-Country Database of Fiscal Space. The data, which is constructed by Kose et al. (2017), covers up to 200 countries over the period 1960–2016. The debt rating index is ranged from 1 to 21, and a greater index means safer. It illustrates the market perception on a country's ability to roll over debt, or to issue new debt, and on its market cost of borrowing.

The control variables are taken from various sources. First, the trade openness is the sum of exports and imports per GDP ratio on percentage. The data on exports, imports and nominal GDP are on current USD, and are from the Worldbank Development Indicators, constructed by World Bank (2020). Second, the capital account openness is the Chinn-Ito capital index, which is constructed by Chinn and Ito (2008). And institutional quality covers the effectiveness of government, quality of law and political stability. These indices are from the World Government Index database constructed by World Bank (2020).

Table 1: Descriptive Statistics

Variables	Observations	Mean	Std.Dev	Min	Max
Economic Growth *(aGDPpcgrowth,%)*	179	1.90	1.65	-2.10	7.84
Sovereign Debts Rating *(aSovrate)*	148	11.92	4.92	4.85	21
Trade Openness *(aEopen,%)*	200	86.26	49.18	13.34	388.95
Capital Openness *(aKaopen)*	179	0.02	1.26	-1.87	2.34
Government Effectiveness *(aGovernment)*	203	-0.03	0.97	-2.14	2.15
Quality of Law *(aLaw)*	205	-0.02	0.98	-2.30	1.97
Political Stability *(aPolitical)*	205	-0.00	0.95	-2.68	1.85

Table (1) reports the descriptive statistics of the data sample. The economic growth rate has a mean of 1.90% and standard deviation of 1.65%. And the sovereign debts rating has a mean of 11.92 with standard deviation of 4.92. For the openness, the trade openness has a mean of 86% and standard deviation of 49%, while the capital openness has a mean of 0.02 with standard deviation of 1.26. The institutional quality, including the government effectiveness, the quality of law and political stability, also exhibits a quite large standard deviation. Thus, the data offers a rich variation for exploring the dependence pattern of economic growth on the external debts.

3.1.2. Model.

The model represents the cross-section regression. With this methods, the analysis can focus on the long-run equilibrium on the relationship between the sovereign debts rating and economic growth. This strategy is the traditional method on analyzing the economic growth (Barro and Sala-i-Martin, 1990). As Galor (1996) argue, this method is consistent to the class of models relevant to neoclassical growth model for which there exist an unique stable steady state.

The regression equation with the sample of economy *(j)* is as following:

$$aGDPpcgrowth_j = \propto + \beta^{Sovrate} aSovrate_j + \beta^{Sovrate2} aSovrate_j^2 + \beta^{Eopen} aEopen_j + \beta^{Kaopen} aKaopen_j + \beta^{aGov} aGovernment_j + \beta^{aPol} aPolitical_j + \beta^{aLaw} aLaw_j + u_j \ (1)$$

The focal point is on the coefficients $(\beta^{Sovrate}; \beta^{Sovrate2})$. They present the impact of sovereign debts rating on the economic growth. When they are significantly different to zero, the dependence pattern of economic growth on the sovereign debts rating follows a quadratic function. Then, the impact of sovereign debts rating on the economic growth can be positive or negative, depending on the value of sovereign debts rating.

$$\frac{\partial aGDPpcgrowth}{\partial aSovrate} = \beta^{Sovrate} + \beta^{Sovrate2} aSovrate_j$$

$$\Rightarrow \frac{\partial aGDPpcgrowth}{\partial aSovrate} > 0 \Leftrightarrow aSovrate_j > \frac{-\beta^{Sovrate}}{2.\beta^{Sovrate2}}$$

Other coefficients illustrates the impact of various control variables on the economic growth. First, $(\beta^{Eopen}, \beta^{Kaopen})$ show the role of international integration on the economic growth. As suggested by the evidence by Bussière and Fratzscher (2008), the openness has a positive impact on the economic growth. And $(\beta^{aGov}, \beta^{aPol}, \beta^{aLaw})$ shows the impact of institutional quality on the economic growth. When the institution improves, the economic growth increases. Thus, both the coefficients of openness and institutional quality are expected to be positive: $\beta^{Eopen} > 0; \beta^{Kaopen} > 0; \beta^{aGov} > 0; \beta^{aPol} > 0; \beta^{aLaw} > 0$.

Next, we apply the empirical model on the data to investigate the dependence pattern of economic growth on the sovereign debts rating.

3.2. Empirical Evidence.

Figure 1 presents the correlation between the sovereign debts rating, a proxy for the safety of domestic assets, and the economic growth rate. In Panel A, for the full sample of 150 economies, the impact of assets safety on the economic growth rate follows an inverted-U-shaped curve. For low value of sovereign debts rating, a higher rating is associated with a greater economic growth rate. And for high value of sovereign debts rating, however, a higher rating is associated with a lower economic growth rate. The panel also suggests that the turning point is at the sovereigng debts rating of 12. In Panel A, for the economies with the sovereign

debts rating being less than 12, there exits a positive correlation between the debts rating and economic growth rate. And in Panel B, for the economies with the sovereign debts rating being greater than 12, there exists a positive correlation between the debts rating and economic growth rate. Therefore, the graphical analysis suggests that the impact of sovereign debts rating on the economic growth can follow a non-linear pattern.

Figure 1: Safe Assets and Economic Growth
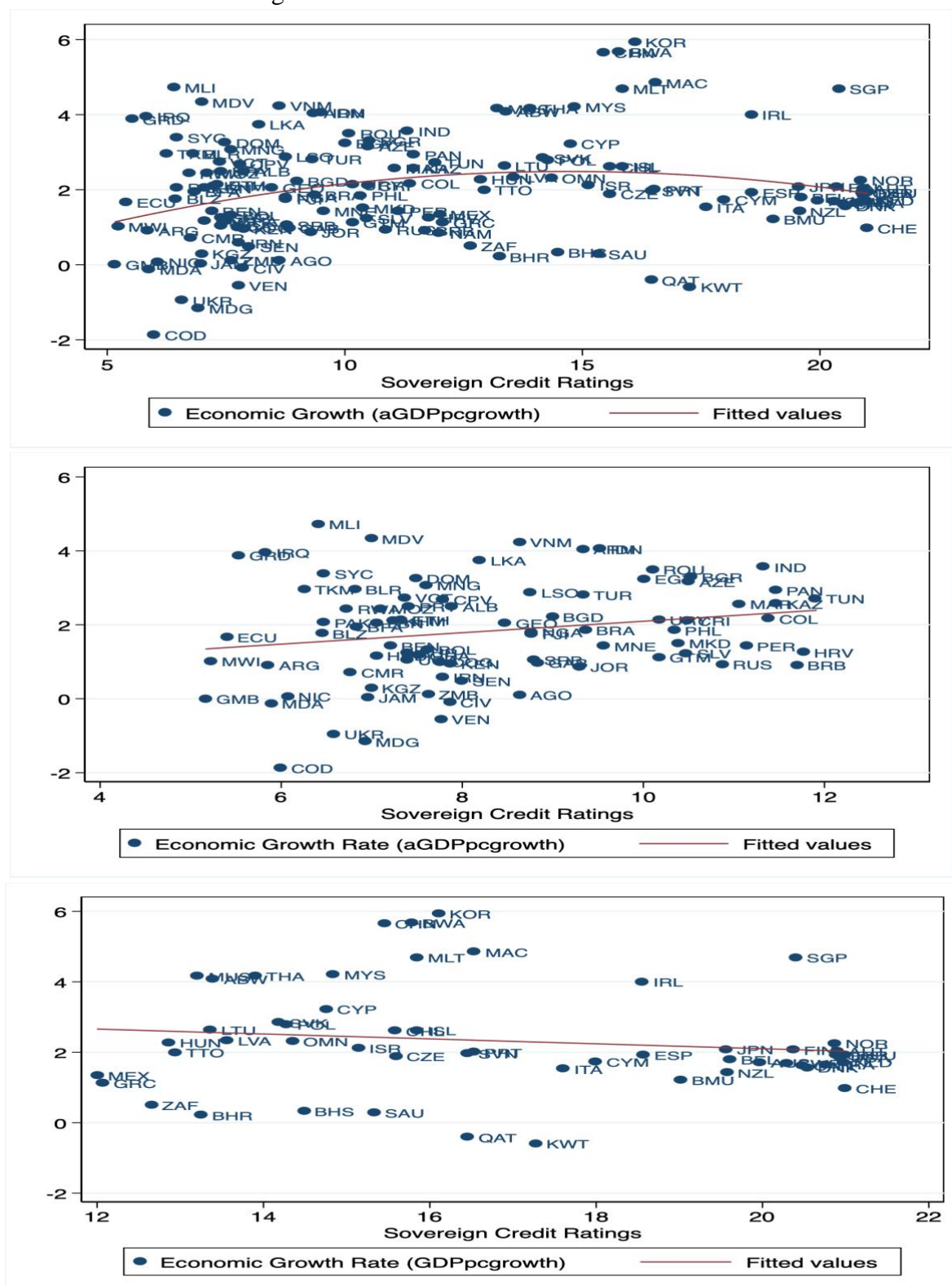
Notes: Safe assets are proxy by the averaged sovereign debts rating, which is from World Bank Fiscal Space Database. Economic growth rate is the averaged growth rate of GDP per capita, which is from World Bank Development Indicators.

Table 2 reports the cross-section regression results of economic growth on the sovereign debts rating, on controlling for other independent variables. In column 1, a higher sovereign debts rating is associated with a greater economic growth rate. With an increase of 1 points, within the range from 1 to 21, the economic growth rate raises by 0,047%. Let's consider two economies, Phillipine and China. On average over 1990-2019, the former has the economic growth rate at 1.84% and sovereign debts rating at 10.31, while the latter has the corresponding parameters at 15.45 and 5.6%. The evidence suggest that if Thailand raises the sovereign debts rating by 5,14 from 10.31 to 15.45, its averaged economic growth rate also raises by additional 0,25%, to attain 2.09%.

In column 2, the impact of sovreign debts rating on the economic growth follows a quadratic funtion. This function is robust on controlling for the institutional quality in column 3 and economic openness in column 4. In the full model with additional 5 independent variables, the result can be written as:

$$aGDPpcgrowth_j = -0.19 + 0.28\ aSovrate_j - 0.011\ aSovrate_j^2$$

Thus, the evidence establishes that the dependence pattern of economic growth on the sovereign debts rating follows an inverted-U-shaped curve. By solving the optimal value, we attain the turning point on the quadratic function as following:

$$\frac{\partial aGDPpcgrowth}{\partial aSovrate} > 0 \Leftrightarrow aSovrate_j < \frac{-0.28}{2*(-0.012)} \approx 12.0$$

Therefore, an increase of sovereign debts rating is associated with a higher economic growth rate for the low sovereign debts rating, but with a lower economic growth rate for the high sovereign debts rating.

Table 2: Cross-Section Regression Results of Economic Growth *(aGDPpcgrowth)* on Sovereign Debts Rating *(aSovrate)* and its Squared Value *(aSovrate2)*, on Controlling for Economic Openness *(aEopen, aKaopen)* and Institutional Quality *(aGovernment, aLaw)*

VARIABLES	(1) aGDPpcgrowth	(2) aGDPpcgrowth	(3) aGDPpcgrowth	(4) aGDPpcgrowth
Sovereign Debts Rating	0.0467*	0.434***	0.359**	0.277*
(aSovrate)	(0.0253)	(0.160)	(0.163)	(0.163)
Squared Value of *(aSovrate)*		-0.0148**	-0.0164***	-0.0115*
(aSovrate2)		(0.00602)	(0.00603)	(0.00627)
Government Effectiveness			0.629	0.314
(aGovernment)			(0.603)	(0.641)
Quality of Law			0.0643	0.0702
(aLaw)			(0.519)	(0.529)
Trade Openness				0.00704**
(aEopen)				(0.00304)

Capital Openness			-0.206
(aKaopen)			(0.127)
Financial Development			0.00444
(aCredit)			(0.00526)
Constant	1.469***	-0.706	0.288	-0.195
	(0.319)	(0.940)	(1.024)	(1.041)
Observations	136	136	136	126
R-squared	0.025	0.067	0.105	0.144

Notes: Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. Economic growth *(aGDPpcgrowth)* is the growth rate of GDP at constant 2011 national price per capita, which is from Penn World Table 10.1. Sovereign debts rating *(aSovrate)* is from World Bank Fiscal Space database, range from 1 (lowest) to 21 (highest). Trade openness *(aEopen)* is the ratio of sum of exports and imports per GDP in percentage. Capital openness *(aKaopen)* is the Chinn-Ito index of capital account openness, with higher point meaning more open. Institutional quality including the effectiveness of government *(aGovernment)* and quality of law *(aLaw)* are from World Bank World Government Indicators. Financial development level *(aCredit)* is the ratio of domestic credit to private sector per GDP in percentage. See the Data subsection for more details.

In order to check the appropriated existence of the turning point, we carry out the regression with one linear function on two sub-samples. The first one covers the economies with low sovereign debts rating, i.e, less than 12.0, and the second one has the the economies with high sovereign debts rating, i.e, greater than 12.0.

Table 3: Cross-Section Regression Results of Economics Growth *(aGDPpcgrowth)* on Sovereign Debts Rating *(aSovrate)* in Two Sub-Samples

	(1)	(2)
VARIABLES	aGDPpcgrowth	aGDPpcgrowth
Sovereign Debts Rating	0.155*	-0.126*
(aSovrate)	(0.0822)	(0.0715)
Constant	0.548	4.603***
	(0.696)	(1.245)
Observations	82	53
R-squared	0.042	0.057

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Economic growth *(aGDPpcgrowth)* is the growth rate of GDP at constant 2011 national price per capita, which is from Penn World Table 10.1. Sovereign debts rating *(aSovrate)* is from World Bank Fiscal Space database, range from 1 (lowest) to 21 (highest). See the Data subsection for more details.

Table 3 records the evidence of sub-sampling cross-section regression. We employ the full model, presented by equation (1). In Column 1, the coefficient of sovereign debts rating is positive: 0.155>0. Accordingly, the impact of sovereign debts rating on the economic growth is positive for the economies with low sovereign debts rating. And in column 2, the coefficient of sovereign debts rating is negative: -0.126<0. Thus, the impact of sovereign debts rating on the economic growth turns to be negative for the economies with high sovereign debts rating. Moreover, the regression result can be depicted as the panel A of Figure 1 for the economies

with low sovereign debts rating and the panel B of Figure 1 for the economies with high sovereign debts rating. In brief, the sub-sample regression confirms the existence of an inverted-U-shaped dependence pattern of economic growth on the sovereign debts rating.

3.3. Robustness Analysis.

Table 4 records the cross-section regression results of economic growth on the sovereign debts rating by different sub-samples. First, we account for the potential time-series change by dividing the full sample into three sub-samples, including the 1990-2000 period in column 1, the 2001-2010 period in column 2, and the 2011-2019 period in column 3. The evidence shows that there exists an inverted-U-shaped curve of economic growth. Next, we also account for the difference between the advanced economies, in column 4, and the emerging and developing economies, in column 5. The evidence illustrates that the inverted-U-shaped curve still applies for both of two groups. We also note that the turning point of the curve is different across group. At the turning point, the sovereign debts rating is 16.17 for the 1990-2000 period; 9.56 for the 2001-2010 period; 11.75 for the 2011-2019 period; 16.62 for the advanced economies; and 14.25 for the emerging and developing economies. In brief, the evidence supports the existence of non-linear dependence pattern of economic growth on the sovereign debts rating.

Table 4: Cross-Section Regression Results of Economic Growth *(aGDPpcgrowth)* on Sovereign Debts Rating *(aSovrate)* and its Squared Value *(aSovrate2)* by Sub-Samples: 1990-2000 in Column 1; 2001-2010 in Column 2; 2011-2019 in Column 3; Advanced Economies in Column 4; Emerging and Developing Economies in Column 5.

VARIABLES	(1) aGDPpc growth	(2) aGDPpc growth	(3) aGDPpc growth	(4) aGDPpc growth	(5) aGDPpc growth
Sovereign Debts Rating	1.516***	0.444*	0.468**	2.560**	0.573*
(aSovrate)	(0.344)	(0.256)	(0.224)	(1.013)	(0.310)
Squared Value of *(aSovrate)*	-0.0470***	-0.0234**	-0.0200**	-0.0768**	-0.0249*
(aSovrate2)	(0.0123)	(0.00954)	(0.00844)	(0.0290)	(0.0138)
Constant	-9.108***	1.602	-0.360	-18.18**	-1.043
	(2.196)	(1.513)	(1.320)	(8.673)	(1.602)
Observations	99	133	135	36	105
R-squared	0.256	0.159	0.058	0.238	0.033

Notes: Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Economic growth *(aGDPpcgrowth)* is the growth rate of GDP at constant 2011 national price per capita, which is from Penn World Table 10.1. Sovereign debts rating *(aSovrate)* is from World Bank Fiscal Space database, range from 1 (lowest) to 21 (highest). See the Data subsection for more details.

Table 5 presents the fixed-effect panel regression results of economic growth rate on the sovereign debts rating, on controlling for the economic openness and institutional quality. The regression starts with the sovereign detbs rating in column 1, then, adds the economic openness in the column 2, and institutional quality in column 3. In column 1, the dependence

of economic growth on the sovereign debts rating follows a quadractic function, with an inverted-U-shaped curve. This result is reserved on controlling for other independent variables in column 2 and 3. Moreover, the analysis also uncovers that the trade openness (column 2) and the political stability (column 3) exerts a positive impact on the economic growth rate. In brief, the inverted-U-shaped pattern of economic growth is robust in both cross-section and panel regression.

Table 5: Fixed-Effect Panel Regression Results of Economic Growth (GDPpcgrowth) on Sovreign Debts Rating (sovrate), on Controlling for Economic Openness (Eopen, Kaopen) and Institutional Quality (Government, Law)

VARIABLES	(1) GDPpcgrowth	(2) GDPpcgrowth	(3) GDPpcgrowth
Sovereign Debts Rating	0.750***	0.776***	0.873***
(Sovrate)	(0.151)	(0.151)	(0.181)
Squared Value of Sovrate	-0.0257***	-0.0268***	-0.0310***
(Sovrate2)	(0.00599)	(0.00599)	(0.00714)
Government Effectiveness			0.409
(Government)			(0.575)
Quality of Law			-1.672***
(Law)			(0.591)
Political Stability			0.669**
(Political)			(0.324)
Trade Openness		0.0186***	
(aEopen)		(0.00432)	
Capital Openness		-0.174	
(aKaopen)		(0.108)	
Constant	-2.307**	-3.923***	-2.613**
	(0.925)	(1.027)	(1.085)
Observations	2,678	2,460	2,133
R-squared	0.010	0.018	0.018
Number of ncode	141	130	141

Notes: Standard errors in parentheses.*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Economic growth *(aGDPpcgrowth)* is the growth rate of GDP at constant 2011 national price per capita, which is from Penn World Table 10.1. Sovereign debts rating *(aSovrate)* is from World Bank Fiscal Space database, range from 1 (lowest) to 21 (highest). Trade openness *(aEopen)* is the ratio of sum of exports and imports per GDP in percentage. Capital openness *(aKaopen)* is the Chinn-Ito index of capital account openness, with higher point meaning more open. Institutional quality including the effectiveness of government *(aGovernment),* quality of law *(aLaw)* and political stability *(aPolitical)* are from World Bank World Government Indicators. Financial development level *(aCredit)* is the ratio of domestic credit to private sector per GDP in percentage. See the Data subsection for more details.

4. Conclusion.

The paper quantifies the international experience on the impact of safe assets on the economic growth rate. The method employs a cross-section and panel data regression on a data sample of 150 economies, both advanced and developing economies, over 1990-2019. The

empirical evidence records that the dependence pattern of economic growth on the assets's safety follows an inverted-U-shaped curve, by first increasing then decreasing pattern. And the negative impact can happens when the safety is high enough. This result is robust on using the panel data regression and different sub-samples.

The results provide some important policy implications. For the economies with low sovereign debts rating, the policy which upgrades the rating can contribute on raising the economic growth rate. Moreover, the policy enhancing the trade openness and political stability are also crucial to make significant contribution on the economic growth rate.

For the future research avenue, the paper can be extended to account for the interaction of assets safety with some other macroeconomic variables on shaping the economic growth. This direction can provide additional evidence and policy discussion on enhancing the economic growth, especially for the developing economies.

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