Asymmetric International Risk Sharing and the Business Cycle*

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Abstract

The degree of consumption risk sharing among OECD countries changes over the business cycle. We find that negative local shocks are smoothed internationally to a lesser extent by lower risk sharing, whereas negative global shocks are spread more across countries through greater risk sharing. Such patterns are not apparent in positive shocks. In the absence of the business cycle fluctuations in risk sharing, consumption would be more stable and larger by about 30% in recessions. Financial integration, financial development, and corporate disclosure, however, help mitigating cyclical risk sharing and its adverse impact on consumption.

Keywords: Consumption Risk Sharing, Business Cycle, Financial Friction, Asymmetry

1 Introduction

A degree of international risk sharing that depends on the state of the macroeconomy can lead to more fluctuating consumption than the level achievable in the absence of the cyclicality. Generally, credit condition deteriorates during recessions, making economic agents with financial frictions more constrained. They may have to pay more significant risk premia to investors or may be unable to borrow enough from credit markets. Such factors would hinder countries from smoothening negative shocks effectively through international

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markets, weakening the role of international risk sharing during recessions when it is most needed and intensifying the ultimate impact on consumption. In this paper, we examine the possibility of business cycle variation in risk sharing and attempt to understand the association of financial frictions with it.

International (or inter-state) risk sharing has been analyzed for a long time. Theoretically, countries can insure fully against their risk in the Arrow-Debreu framework of complete international markets (Obstfeld and Rogoff, 1996). Thus, under this full risk sharing, consumption growth should be independent of individual output growth conditional on world aggregate growth. Some initial studies, including Obstfeld (1994) and Crucini (1999), have tested the null hypothesis of full risk sharing and examined the extent of international risk sharing. Other studies, including Asdrubali et al. (1996) and Sørensen and Yosha (1998), have analyzed the channels of risk sharing. These initial studies assume that the degree of risk sharing does not depend on the state of the macroeconomy.

By relaxing the traditional assumption of the time-invariant degree of risk sharing and employing additional cyclical parameters separately for local and global shocks, our analysis provides a more comprehensive picture of business cycle variation in international risk sharing. First, we show empirical evidence of the asymmetry between local and global shocks and between negative and positive shocks. Using data from 21 OECD countries from 1970 to 2018, we measure the extent of international risk sharing and test for the presence of cyclicality. In normal times, it is recorded as 0.45, indicating that 45% of one unit of idiosyncratic output shock is absorbed internationally and that only 55% of it is translated to as a decrease in consumption. However, the risk sharing degree becomes smaller during domestic recessions (22%) and larger during world recessions (58%).[1] In both cases, domestic consumption becomes more negatively affected as a result. Without the cyclical fluctuations in international risk sharing, consumption would be more stable and larger by approximately 30%. On the contrary, such patterns are not apparent during expansion periods.

Second, we identify that the cyclicality of international risk sharing is transmitted

[1] In the case of world recessions when world output falls and the deviation of domestic output from the world aggregate increases relatively, greater risk sharing means that domestic consumption also decreases in response to the world shock. In the case of domestic recessions when domestic output falls and the deviation of domestic output from the world aggregate decreases relatively, lower risk sharing means that the impact of the domestic output shock on domestic consumption is greater.

mainly through the foreign income channel during domestic recessions and through the credit market channel during world recessions. We extend the variance decomposition method of Asdrubali et al. (1996) to account for cyclical components in each risk sharing channel. The foreign income channel, through which countries can buffer their consumption against output shocks with income flows from investments in international markets, turns out to be dis-smoothing during domestic recessions, playing a major role in lowering the degree of risk sharing. Countries may face higher risk premia and exchange rate with the outbreak of negative local shocks and thus increase interest payments to foreign investors, resulting in net income outflows and reversing the effect of the foreign income channel. During world recessions, the credit market channel has a greater smoothing effect, which acts as a medium of spreading a global shock across countries. Countries may find rolling over their foreign debt amid world recessions challenging, and increased expected repayments would result in more savings and lower consumption.

Third, we reveal that financial frictions amplify the cyclicality of international risk sharing and improvement in corporate disclosure as well as financial integration and development mitigates its adverse impact on consumption. Previous studies have documented that credit availability is constrained by financial frictions more in recessions than in expansions (e.g., Gertler and Bernanke, 1989; Gertler and Gilchrist, 1994). Therefore, the observed asymmetric behavior in risk sharing suggests financial frictions as the potential driving factor behind its cyclicality. In addition, cyclical changes in the risk sharing channels related to rollover risk further support the association. By testing the hypothesis, we find that countries with more integrated and developed financial markets and lower information asymmetry between firms and investors experience international risk sharing less dependent on the business cycle. The results imply that policies that mitigate financial frictions can also help reduce risk sharing cyclicality and improve stability in consumption.

Our analysis reconciles the mixed findings in the literature. A few recent studies have also shown that the degree of risk sharing depends on the stages of business cycles. However, they suggest that it can be either procyclical (e.g., Hoffmann and Shcherbakova-Stewen, 2011; Kalemli-Ozcan et al., 2014) or countercyclical (e.g., Rangvid et al., 2016). By employing both domestic and world recession indicators, we find that the degree of risk sharing is procyclical in terms of domestic business cycles and countercyclical in terms

of world business cycles. Previous studies have used different types of shocks (the U.S. business cycle in Hoffmann and Shcherbakova-Stewen (2011), the European debt crisis in Kalemli-Ozcan et al. (2014), and global crises in Rangvid et al. (2016)), which seems to be the main reason that they have reached different results. Furthermore, we discover the asymmetry between recessions and expansions by separating shocks into negative and positive ones. Most importantly, we analyze that cyclical patterns of international risk sharing in local and global shocks increase domestic consumption instability.

Furthermore, our analysis broadens the understanding of the nature of financial frictions in cyclical risk sharing. Hoffmann and Shcherbakova-Stewen (2011) show that the business cycle variation in the degree of risk sharing is associated with credit market access for small firms. In this paper, by directly employing measures of financial frictions each of which reflect different aspects including financial market integration and development, corporate information disclosure, and cross-border capital flow, we confirm that cyclicality of risk sharing is closely related to financial frictions. We further find that financial frictions amplify the asymmetry between domestic and world recessions in addition to the cyclicality itself. Among the measures, financial market integration is the most effective way to mitigate the cyclicality of risk sharing in domestic and world recessions. Some studies argue that shocks are amplified through integrated financial markets (e.g., Krugman, 2008). However, our results imply that financial integration reduces the shock propagation of cyclical risk sharing by improving credit availability and alleviating possible rollover risk from negative shocks, at least among the OECD countries.

The remainder of the paper is structured as follows. Section 2 explains the data and empirical framework. Section 3 presents the empirical results on asymmetric risk sharing over the business cycle, and Section 4 discusses various extended analyses. Section 5 concludes.

2 Data and Empirical Approach

In this section, we provide an empirical framework to study if and how consumption risk sharing varies over the business cycle. We extend the existing approach widely used in the literature on international risk sharing (e.g., Asdrubali et al., 1996; Sørensen and Yosha, 1998; Crucini, 1999) by explicitly allowing for cyclical components in the degree of risk

sharing. Our data are taken from the Annual National Accounts of the OECD Statistics database. The main sample consists of 892 country-year observations for 21 traditional OECD countries and 49 years from 1970 to 2018. The set of countries includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the U.K., and the U.S..[2]

Our approach takes three steps: (1) testing for the presence of cyclicality in risk sharing and measuring the extent to which risk sharing depends on the business cycle, (2) identifying channels that contribute cyclical components of risk sharing, and (3) understanding the nature of financial frictions in generating cyclical risk sharing.

2.1 Testing and Measuring for Cyclicality in Risk Sharing

The benchmark model specification for the first step is given by:

$$\begin{aligned}(c_{it} - c^*_{it}) =& \beta_0 + \beta_1 Recession_{it} + \beta_2 WorldRecession_t + \beta_3 (y_{it} - y^*_{it}) \\ &+ \beta_4 Recession_{it} \times (y_{it} - y^*_{it}) + \beta_5 WorldRecession_t \times (y_{it} - y^*_{it}) \\ &+ \delta_i + \epsilon_{it},\end{aligned} \tag{1}$$

where c and c^* are real per-capita country-specific and world consumption growth rates, y and y^* are real per-capita country-specific and world output (GDP) growth rates, $Recession$ is a country-level recession indicator, $WorldRecession$ is a world recession indicator, and δ captures country fixed effects. The subscripts i and t indicate country i and time t, respectively. Given that our primary focus is to examine whether international risk sharing functions well during recessions when its role to insure against shocks is most needed, we first assess a differential impact of recessions using the benchmark model. After this, we extend the benchmark model to account for fluctuations in expansion periods and analyze the asymmetry between recessions and expansions.rential impact of recessions using the benchmark model. Then, we extend the benchmark model to account for fluctuations in expansion periods and analyze the asymmetry between recessions and expansions.

[2]For easy comparison with past studies, we use the same set of countries widely used in the international risk sharing literature (e.g., Asdrubali et al., 2018).

As in the literature on international risk sharing, idiosyncratic growth rates (or shocks) of consumption and output are defined as deviations from world aggregates, $(c - c^*)$ and $(y - y^*)$, respectively. For world aggregates, we compute cross-country average growth rates using time-varying weights of countries set as relative shares in the total values measured in USD.[3] Following Sørensen and Yosha (1998), we adopt generalized least squares (GLS) estimation to consider for potential heteroskedasticity by weighting observations with the inverse of the country-specific variance of residuals calculated from the first-stage ordinary least squares (OLS) regressions. In addition, we control for country-specific unobservables with country fixed effects and correct for serial correlation with standard errors clustered at country level.

We test for cyclicality in risk sharing by estimating the coefficients on the interaction terms between the output growth deviation and recession indicators, β_4 and β_5 in Equation (1). The conventional model in the risk sharing literature assumes that the degree of risk sharing does not differ with the state of macroeconomy, and thus β_4 and β_5 are set to zero. Under this assumption, previous studies (e.g., Obstfeld, 1994; Asdrubali et al., 1996; Sørensen and Yosha, 1998) have estimated only β_3, which reflects how much of idiosyncratic output shock is on average transmitted to idiosyncratic consumption; thus, $1-\beta_3$ represents the degree of risk sharing (the fraction of idiosyncratic output risks shared internationally and not reflected in idiosyncratic consumption movements). In this study, we generalize the model to allow for cyclical patterns. If we reject the null hypotheses, $\beta_4 = 0$ and $\beta_5 = 0$, we can confirm the presence of cyclicality in risk sharing.

The signs and magnitudes of the cyclical parameters, β_4 and β_5, determine how the degree of risk sharing would change in recession periods. In our model, the degree of risk sharing becomes $1 - \beta_3 - \beta_4$ during domestic recessions and $1 - \beta_3 - \beta_5$ during world recessions. The cyclical parameters can be either positive or negative depending on the direction of fluctuations around the business cycle and the types of recessions. Positive (negative) cyclical parameters imply that the degree of risk sharing decreases (increases) in recession periods.

[3]The weights are calculated using country-wide figures instead of per-capita terms for large countries (e.g., United States) to take a greater share in the world GDP aggregates than small countries with high per-capita GDP (e.g., Luxembourg).

2.2 Recession Indicators

We consider two types of recession indicators, one for domestic and another for world recessions. The recession indicators are dummy variables indicating whether a country or the world experiences a recession in a particular year.

To identify domestic recessions, we follow the conventional peak-to-trough criterion. Thereby, for each country, we define a domestic recession as the period from a peak of economic activity to its subsequent trough. We take cyclical GDP as a proxy for the overall state of the economy, computed as the difference between the logarithm of real GDP in local currency and its trend level. As in Braun and Larrain (2005), troughs are identified as years when cyclical GDP falls by more than one standard deviation below zero.[4] For each trough, we go back in time to find a local peak, which is identified as the closest preceding year with a positive cyclical GDP higher than during the previous and posterior years. As a result, a domestic recession indicator equals one for the years after the local peak and to the trough.

For worldwide recessions, we use four distinct episodes of 1975, 1982, 1991, and 2009 following Kose et al. (2020), who identify them by a contraction in global real pre-capita GDP accompanied with a broad decline in other measures of global economic activity including industrial production, trade, capital flows, oil consumption, and employment. The world recession periods represent negative global shocks related to the oil crisis, the early 1980s recession, the early 1990s recession, and the recent global financial crisis, respectively.

2.3 Identifying Channels

Based on the method of Asdrubali et al. (1996), we identify three channels of risk sharing: (1) the foreign income channel, (2) the international transfer channel, and (3) the credit market channel. Idiosyncratic output growth can be rewritten as

$$\Delta y = (\Delta y - \Delta gni) + (\Delta gni - \Delta gdi) + (\Delta gdi - \Delta c) + \Delta c, \tag{2}$$

where Δ indicates the deviation from cross-country aggregates (i.e., idiosyncratic part), y is real per-capita output (GDP) growth, gni is real per-capita gross national income (GNI)

[4] We calculate trend values using the Hodrick-Prescott filter with a smoothing parameter of 6.25 (Ravn and Uhlig, 2002).

growth, gdi is real per-capita gross disposable income (GDI) growth, and c is real per-capita consumption growth. According to the national account definitions, the difference between GDP and GNI is net factor income (NFI), and the difference between GNI and GDI is net international transfers (NIT).[5]

Multiplying both sides of Equation (2) by the output growth deviation and taking expectations, we obtain the following variance decomposition:

$$\begin{aligned} Var(\Delta y) =& Cov(\Delta y, (\Delta y - \Delta gni)) + Cov(\Delta y, (\Delta gni - \Delta gdi)) \\ &+ Cov(\Delta y, (\Delta gdi - \Delta c)) + Cov(\Delta y, \Delta c), \end{aligned}$$

which can be rearranged as

$$\beta_I + \beta_T + \beta_C = 1 - \beta_U, \tag{3}$$

where $\beta_I (= \frac{Cov(\Delta y, (\Delta y - \Delta gni))}{V(\Delta y)})$ is the income channel parameter, β_T $(= \frac{Cov(\Delta y, (\Delta gni - \Delta gdi))}{V(\Delta y)})$ is the transfer channel parameter, β_C $(= \frac{Cov(\Delta y, (\Delta gdi - \Delta c))}{V(\Delta y)})$ is the credit channel parameter, and β_U $(= \frac{Cov(\Delta y, (\Delta y - \Delta c))}{V(\Delta y)})$ the amount of unshared risk.

Equation (3) provides a breakdown into the contribution of the three different channels concerning the degree of risk sharing $(1 - \beta_U)$. The foreign income channel (β_I) captures the extent to which net factor income flows from the abroad buffer domestic income and consumption against output shocks. The international transfer channel (β_T) reflects the additional smoothing achieved by international current transfers, and the credit market channel (β_C) shows how much of output shocks are smoothed with borrowings and savings via domestic and international credit markets.

The three channel parameters $(\beta_I, \beta_T, \beta_C)$ can be estimated from the following set of regressions, which also account for cyclical fluctuations:

[5] $GNI = GDP + NFI$ where NFI is the difference between income inflows and outflows accruing to the residents in a country because of their international net asset holdings (interest and dividend payments and foreign direct investments) and cross-border labor compensation. $GDI = GNI + NIT$, where NIT corresponds to the net flows of money accruing to residents in a country as a consequence of cross-border financial transfers without an economic counterpart. $C = GDI - S$, where national savings include private savings by households and firms and public savings by the government.

$$
\begin{aligned}
\Delta y_{it} - \Delta gni_{it} =& \beta_0^I + \beta_1^I Recession_{it} + \beta_2^I WorldRecession_t + \beta_3^I \Delta y_{it} \\
& \beta_4^I (Recession_{it} \times \Delta y_{it}) + \beta_5^I (WorldRecession_t \times \Delta y_{it}) + \delta_i^I + \varepsilon_{it}^I, \\
\Delta gni_{it} - \Delta gdi_{it} =& \beta_0^T + \beta_1^T Recession_{it} + \beta_2^T WorldRecession_t + \beta_3^T \Delta y_{it} \\
& + \beta_4^T (Recession_{it} \times \Delta y_{it}) + \beta_5^T (WorldRecession_t \times \Delta y_{it}) + \delta_i^T + \varepsilon_{it}^T, \\
\Delta gdi_{it} - \Delta c_{it} =& \beta_0^C + \beta_1^C Recession_{it} + \beta_2^C WorldRecession_t + \beta_3^C \Delta y_{it} \\
& + \beta_4^C (Recession_{it} \times \Delta y_{it}) + \beta_5^C (WorldRecession_t \times \Delta y_{it}) + \delta_i^C + \varepsilon_{it}^C,
\end{aligned} \tag{4}
$$

where coefficients on interaction terms between recession indicators and the output growth deviation characterize cyclical patterns in the three channels of risk sharing. Therefore, the percentage of risk smoothed via the foreign income channel (β_I) is $\beta_3^I + \beta_4^I Recession + \beta_5^I WorldRecession$, and that of the international transfer channel (β_T) is $\beta_3^T + \beta_4^T Recession + \beta_5^T WorldRecession$. Similarly, the degree of risk smoothing through the credit market channel (β_C) is $\beta_3^C + \beta_4^C Recession + \beta_5^C WorldRecession$. The amount of unshared risk (β_U) is equal to $\beta_3 + \beta_4 Recession + \beta_5 WorldRecession$ in our benchmark model, which is estimated from the regression model of Equation (1)

2.4 Financial Frictions

Financial frictions are known as obstacles to risk sharing and are also likely to be associated with cyclicality in risk sharing. Deep and well-functioning domestic financial markets allocate capital more efficiently and share risk more optimally among economic agents within a country. Internationally integrated financial markets further insure against country-wide shocks by sharing risk across agents in different countries with cross-border capital flows (Kose et al., 2011). However, information asymmetry and restrictions to capital flows act as financial frictions that hinder efficient capital allocation and full risk sharing. Given the nature of financial frictions in risk sharing, financial frictions may contribute to the cyclicality of risk sharing. For example, credit conditions are tightened during recessions,[6]

[6]Several studies have discussed that credit constraints are more binding during recessions (e.g., Bernanke and Gertler, 1989; Gertler and Gilchrist, 1994; Braun and Larrain, 2015). At the global level, Kose et al. (2020) show that the average annual rate of credit growth during world recessions has been approximately two-fifths of the annual average observed in non-recession years despite accommodative monetary policy that have taken place in some of the recession periods.

and financial frictions would make rolling over existing debt or raising new loans for a cushion against negative shocks difficult for economic agents, which in turn generate more cyclical fluctuations in risk sharing.

To examine whether financial frictions amplify the cyclicality of risk sharing, we augment the benchmark regression model of Equation (1) by including additional interaction terms with financial friction measures:

$$\begin{aligned}(c_{it} - c_{it}^*) =& \beta_0 + \beta_1 Recession_{it} + \beta_2 WorldRecession_t + \beta_3 (y_{it} - y_{it}^*) \\ &+ \beta_4 (Recession_{it} \times (y_{it} - y_{it}^*)) + \beta_5 (WorldRecession_t \times (y_{it} - y_{it}^*)) \\ &+ \beta_6 (Friction_{it} \times Recession_{it} \times (y_{it} - y_{it}^*)) \\ &+ \beta_7 (Friction_{it} \times WorldRecession_t \times (y_{it} - y_{it}^*)) + \delta_i + \varepsilon_{it},\end{aligned} \tag{5}$$

where the friction parameters (β_6 *and* β_7) are interpreted as the extent to which financial frictions drive cyclical patterns in risk sharing. If they are significant with the same signs of the cyclical parameters (β_4 *and* β_5), respectively, we can argue that financial frictions intensify cyclicality in risk sharing and effects on consumption.

We capture different aspects of financial frictions by employing various measures on financial integration, financial development, corporate disclosure, and capital flow restriction. Following the international economics literature (e.g., Demirguc-Kunt and Levine, 2001; Mendoza et al., 2009), we calculate financial integration as the ratio of foreign assets and liabilities to GDP and financial development as the ratio of private credit to GDP. As for corporate disclosure, we use the business extent of disclosure index developed by the World Bank, which annually measures how investors are protected through the disclosure of ownership and financial information. The disclosure index ranges from 0 to 10, with higher values indicating more disclosure, starting from 2005. In addition, we consider frictions to international capital flows using the capital control indicator provided by Fernández et al. (2016). The capital control indicator measures the prevalence of restrictions for inflows and outflows for ten different asset categories, including money market instruments, bonds, and equities, annually since 1997. In this study, we use the overall restriction index for inflow and outflow, which ranges from 0 to 1, with higher values indicating more capital controls. For compatibility, we take negative values of financial integration, financial development,

and corporate disclosure.

3 Results

3.1 Risk Sharing in Recessions

Table 2 shows the results from our benchmark regression of Equation (1). The coefficients on domestic output growth relative to its world aggregate ($y - y^*$) range of approximately 54%, which reveals that, in normal times, 54% per unit idiosyncratic risk is not shared internationally and leads to a decline in idiosyncratic consumption ($c - c^*$). Therefore, the degree of risk sharing for the 21 OECD countries is approximately 46% in normal times. To examine how risk sharing changes during recessions, we consider cyclical components for domestic recessions in Column (1), world recessions in Columns (3), and further recession dummy variables in Columns (2) and (4), respectively.

Compared with normal times, we find that the degree of risk sharing decreases during domestic recessions and increases during world recessions. The coefficients on the interaction terms between the output deviation and the domestic recession indicator are significantly positive. They show that the portion of unshared idiosyncratic risk becomes larger by approximately 20%. On the contrary, the coefficients on the interaction terms with the world recession indicator are significantly negative, suggesting that the unshared risk portion becomes smaller by 12%. Therefore, we reject the null hypotheses, $\beta_4 = 0$ and $\beta_5 = 0$ in Equation (1), and verify the presence of cyclicality in risk sharing. One may think that the level of consumption is different in recessions and unobservable factors in the periods create spurious additional movements between output and consumption. However, the following results on recession-specific components in risk sharing are consistent even with recession-specific fixed effects.

The results suggest that, first, international risk sharing does not play a sufficient role particularly in domestic recessions when it is most needed. In t he case of domestic recessions, country-specific GDP growth (y) decreases, and thus idiosyncratic output growth ($y - y^*$) drops, given that global GDP growth (y^*) remains constant. If it were normal times, only 54% of the idiosyncratic output shock is translated into consumption. However, the regression results show that international risk sharing smoothens a local shock

to a lesser extent and that the amount of unshared idiosyncratic risk becomes 74% in domestic recessions. This weakened role of risk sharing causes a more significant impact on consumption. This result is the opposite of what a country would expect to be helpful when faced with an economic downturn.

Second, the results imply that cyclical international risk sharing acts as a medium of propagating a global shock during world recessions. In the case of world recessions, world GDP growth (y^*) decreases and idiosyncratic output growth ($y - y^*$) tends to rise relatively with country-specific GDP growth (y) unaffected. In the absence of the additional cyclical components, local consumption also falls by 46% through international risk sharing. However, the regression results indicate that the degree of risk sharing is greater in world recessions, and the negative impact on domestic consumption increases to 58%. This larger response in consumption to a negative global shock makes an individual country worse off. As an example in our sample, New Zealand had a positive idiosyncratic GDP growth but experienced a negative idiosyncratic consumption growth during the 2009 world recession.

Our findings on stark contrast in risk sharing between domestic and world recessions reconcile conflicting empirical evidence in the literature. Previous studies show that risk sharing can be either procyclical (Hoffmann and Shcherbakova-Stewen, 2011) or counter-cyclical (Rangvid et al., 2016). We find that the direction of cyclical patterns in risk sharing depends on the type of shocks. International risk sharing is procyclical in terms of a local shock and counter-cyclical in terms of a global shock. Therefore, the degree of risk sharing in our sample is lower in domestic recessions and greater in world recessions. Thus, the difference in shock definitions employed in previous studies explains why they reach different results: Hoffmann and Shcherbakova-Stewen (2011) investigate U.S. domestic shocks whereas Rangvid et al. (2016) consider global shocks

3.2 Asymmetry of Recessions and Expansions

We analyze the asymmetry of recessions and expansions in risk sharing by additionally adopting an economic expansion indicator. In Section 3.1, we observe that the degree of risk sharing changes during recessions in a way that buffers a domestic economy against a negative shock to a lesser extent. For an expansion cycle, the degree of risk sharing may move oppositely or may not respond to a positive shock. The former means that although

risk sharing itself improves consumption smoothing, its fluctuations in different directions over expansions and recessions make the smoothing role even less effective. The latter helps in further identifying a driving factor or condition behind the cyclicality, pointing to the possibility that it would have a characteristic that is stronger in recessions than in expansions and thus generate asymmetric fluctuations in risk sharing.

We add to our benchmark model of Equation (1) variables that capture the occurrence of expansions and its interaction with idiosyncratic output growth. Thereby, we divide years into recessions, expansions, and normal times. To define expansion periods at the country level, we use an indicator variable that equals one for the years between a trough and a peak and zero otherwise. Following Braun and Larrain (2005), peaks are identified when the current GDP is more than one standard deviation above its trend level. By the same procedure employed to define recessions, we go back in time to find a local trough for each peak, which is the closest preceding year with a negative cyclical GDP lower than during the previous and posterior years.

Table 3 presents the results that the changes in the degree of risk sharing during expansion periods are not significant. The coefficients on the interaction terms between the expansion indicator and idiosyncratic output growth ranges from 2% to 5%. These coefficients are not economically sizable compared to those cyclical fluctuations around recessions. Moreover, we cannot reject the hypothesis that the changes are statistically different from zero even at the 10% significance level. This more detailed division in business cycles does not change our main findings that the degree of risk sharing is lower in domestic recessions and higher in world recessions. The coefficients on the interaction terms with domestic and world recessions continue to be statistically and economically significant, and the magnitudes remain at similar levels.

To the best of our knowledge, the asymmetry of recessions and expansions in risk sharing is new findings in the international risk sharing literature. Previous studies have not distinguished between recessions and expansions clearly. Most of them consider negative shocks only (e.g., European debt crisis (Kalemli-Ozcan et al., 2014) and global crises (Rangvid et al., 2016)). Hoffmann and Shcherbakova-Stewen (2011) are among a few that looks at both recessions and expansions. However, they argue that risk sharing increases in expansions by using GDP growth rates or peak dates as proxy variables for expansions

instead of formally defining them. Along with the difference in the sample data (the U.S. state-level data in Hoffmann and Shcherbakova-Stewen (2011) and international data in our study), the difference in business cycle definitions may have led to diverging results on cyclicality in risk sharing during expansion periods.

3.3 Alternative Measures of Recessions

To check the robustness of our main findings on cyclical risk sharing in Section 3.1, we employ alternative measures of recessions. First, similar to Hoffmann and Shcherbakova-Stewen (2011), we use country-level real per-capita GDP growth rates and their weighted average values as proxy variables for domestic and world business cycles, respectively. Second, we define domestic and world recessions within the data by applying the following rule. Domestic recessions are identified as the years when a country-level real per-capita GDP growth rate falls below its average level ($y < \bar{y}$) and the output deviation relative to its world aggregate ($y - y^* < 0$) is negative. World recessions are identified as the years when a world real per-capita GDP growth ($y^* < \bar{y}^*$) falls below its average level and the output deviation becomes positive ($y - y^* > 0$).

Table 4 presents the results using alternative measures of recessions, which is qualitatively consistent with those in Section 3.1. In Panel A of Table 4, the coefficient on the interaction term with country-level GDP growth rates is significantly negative, indicating that the degree of risk sharing lowers during domestic recessions when a domestic output growth is negative. Similarly, the coefficient on the interaction term with world GDP growth rates is significantly positive, and thus the degree of risk sharing rises during world recessions when a world output growth turns negative.

Panel B of Table 4 further confirms our main findings. The coefficient on the interaction term with the alternative domestic recession indicator is approximately 19% significant at the 1% level. The interaction term with the alternative world recession indicator is approximately 13% significant at the 10% level. Consistent with our main findings in Section 3.1, the results suggest lower risk sharing in domestic recessions and greater risk sharing in world recessions. However, loss in magnitude and significance for the alternative world recession indicator in Column (3) may direct to the possibility of a country experiencing both domestic and world recessions. Thus, we account for this case in the additional

analysis in Section 4.1.

4 Additional Analysis

4.1 Cyclical Risk Sharing in Sub-Sample Periods

To see how cyclical patterns of risk sharing have evolved, we divide the sample period into three subperiods: (1) 1970 to 1989, (2) 1990 to 2006, and (3) 2007 to 2018. The first subperiod covers the 1970s and the 1980s, including the world recession episodes of 1975 and 1982. The second subperiod ranges from the 1990s to the period before the global financial crisis, which includes the world recession of 1991. The third subperiod is the years post the global financial crisis and contains the world recession of 2009. We re-run our benchmark regression of Equation (1) for each of the subperiods. In addition, we distinguish the case that a domestic recession does not occur during a world recession from the case that both domestic and world recessions happen concurrently by employing an additional interaction term between domestic and world recession indicators.

We find that cyclicality of risk sharing exhibits slightly different patterns across sub-sample periods, with most fluctuations around the global financial crisis and the European debt crisis in the late 2000s and the early 2010s. Panel A of Table 5 presents the basic results for the subperiods. The cyclical component for domestic recessions is influential throughout all the subperiods, which is estimated to be approximately 21% in the period of 1970 to 1989, moderately down to 18% in the period of 1990 to 2006, and significantly up to 44% in the period of 2007 to 2018. On the contrary, the cyclical component for world recessions has not played a significant role before the global financial crisis. but has become prominent in the episode of 2009 with a record of -40%. In the last subperiod, risk is shared by 57% in normal times but only by 13% in domestic recessions and almost entirely by 98% in world recessions. Therefore, we observe that risk sharing fluctuates more severely around the business cycle in recent years, with an extreme asymmetry between domestic and world recessions.

The results are consistent after we account for the case that a country suffers from both domestic and world recessions in Panel B of Table 5. The cyclical component for domestic recessions continues to be statistically significant and economically sizable, decreasing the

degree of risk sharing by 15% to 38%. The patterns across the subperiods are also qualitatively similar in that cyclicality has been mitigated in the 1990s and the early 2000s but has intensified along with the global financial crisis and the European debt crisis. In addition, the cyclical component for world recessions is significant only for the episode of 2009, increasing the degree of risk sharing by 33%. Given the insignificance of the coefficient on the interaction term with both domestic and world recession indicators, we verify our initial interpretation in Section 3.1. that countries without domestic economic trouble are affected by a negative global shock via international risk sharing and in turn have lower consumption.

4.2 Channels of Cyclical Risk Sharing

Using the method explained in Section 2.3, we identify three channels of cyclical risk sharing: the foreign income channel, the international transfer channel, and the credit market channel. Table 6 provides the results from the regressions of Equation (4) on the channel decomposition. In normal times, 45% of an idiosyncratic output shock is shared mainly through the credit market channel (31%). In response to a negative output shock, economic agents can reduce savings or borrow from domestic and international credit markets to maintain their consumption levels. The rest of risk sharing is carried out by the foreign income channel (11%) and the international transfer channel (3%), which help further cushion income and consumption with net factor income flows from the abroad and fiscal transfers from other governments and international organizations, respectively.

We find that cyclical patterns of risk sharing are driven mainly by the foreign income channel during domestic recessions and by the credit market channel during world recessions. In the case of domestic recessions, the foreign income channel no longer plays a smoothing role but rather amplifies the adverse impact of a local output shock on consumption by 6%. This dis-smoothing effect of the foreign income channel seems to be associated with increased interest payments to foreign investors. Global markets recognize a local shock as an additional risk factor that raises the possibility of a financial distress and alters the perception of a domestic risk itself. Accordingly, interest rates, exchange rates, and risk premia increase, leading to higher payments for foreign ownership of domestic assets. The credit market channel continues to play a smoothing role, which is,

however, weakened by 7%. In recessions, financial institutions become reluctant to rollover debts, and economic agents in turn face more significant financial constraints. Under this unstable state, economic agents cannot decrease savings or gain borrowings to counteract consumption reduction.

In world recessions, a smoothing role of the credit market channel becomes expanded, acting as a medium of spreading a global shock across countries. As discussed in Section 3.1, more international risk sharing during world recessions is not benign in the perspective of a domestic economy. The amount of risk smoothed by the credit market channel is 39% during world recessions, which implies that domestic consumption drops more in response to a global shock even without an occurrence of domestic recessions. Economic agents may have more savings motive following heightened global risk and uncertainty and could not rollover existing liabilities because of a shortage of funds in global credit markets. A smoothing role of the international transfer channel is reversed during world recessions, partially mitigating cyclicality of risk sharing despite the small size of economic magnitude. Given that domestic consumption decreases to a greater extent in world recessions, a country would be less incapable of transferring aids to the world.

Our findings from the channel decomposition of cyclical risk sharing are further illustrated in Figure 2. Panel (a) of Figure 2 shows the case of a domestic recession given no change in the world economy under the assumption of a domestic output growth rate (y) of -1 and a world output growth rate (y^*) of 0. Consequently, the output deviation ($y - y^*$) is -1. According to the estimates of Table 5, 45% of the local shock is shared via the three channels in the absence of cyclicality in risk sharing, limiting its impact on consumption. Idiosyncratic consumption ($c - c^*$) is reduced only to -0.55 in response to a local shock of -1. However, in the presence of cyclicality in risk sharing, a negative influence of a domestic output shock on consumption is larger. Given the dis-smoothing effect of the foreign income channel and the weakened smoothing role of the credit market channel, idiosyncratic consumption drops to -0.78 for a local shock of -1.

Panel (b) of Figure (2) depicts the case of a world recession given no occurrence of a domestic recession. We assume that a world output growth rate (y^*) is -1 while a domestic output growth rate (y) remains constant at 0, thereby resulting in the output deviation ($y - y^*$) of 1. In the absence of cyclicality in risk sharing, idiosyncratic consumption

$(c - c^*)$ is recorded at 0.55. For simplicity, if we further assume that world consumption falls by -1 along with the global shock of -1, this means that domestic consumption also drops by 0.45. However, in the presence of cyclicality in risk sharing, idiosyncratic consumption becomes 0.42. Given the increased smoothing role of the credit market channel, domestic consumption decreases more by 0.58 in response to a global shock. Therefore, domestic consumption becomes more volatile.

4.3 Financial Friction and Cyclical Risk Sharing

We analyze whether financial frictions are related to cyclical risk sharing. Credit conditions worsen in downturns. If economic agents are subject to financial frictions, they would be more financially constrained. The mechanism is more potent in recessions than in expansions, and this asymmetric behavior has been documented in several studies (e.g., Gertler and Bernanke, 1989; Gertler and Gilchrist, 1994). Given the asymmetry between recessions and expansions as well as cyclical changes in the foreign income and credit market channels, cyclicality in risk sharing is likely to be associated with credit conditions. Furthermore, countries with more financial frictions would face more severe cyclical fluctuations in risk sharing. To test this hypothesis, we use the extended model of Equation (5) and employ alternative measures that reflect different aspects of financial frictions, including financial integration, financial development, corporate disclosure, and capital flow restriction.

Overall, financial frictions amplify cyclical patterns in risk sharing. Table 7 presents the results on the effects of financial integration on cyclical risk sharing in Column (1), those of financial development in Column (2), those of corporate disclosure in Column (3), and those of capital flow restriction in Column (4). We find that countries with more internationally integrated financial markets have benefited from risk sharing less dependent on the business cycle. An increase from the second quartile to the median (i.e., from 1.38 to 2.78) reduces cyclicality by 2.6% in domestic recessions and 22.9% in world recessions. Corporate disclosure and financial development also help mitigate the cyclicality in domestic recessions and world recessions, respectively. On the contrary, capital control restriction seems to intensify cyclicality with coefficients estimated in expected signs; however, the results are statistically insignificant possibly due to the lack of variations in the capital control index.

Our findings emphasize the macroeconomic implications of financial frictions for a more stable consumption. Economic agents use credit markets to insure against a negative shock. During domestic recessions with tightened credit conditions, they are likely to have difficulty raising funds and pay extra risk premium, which leads to increased interest payments and limited cushioning from savings and borrowings. Similarly, economic agents could not rollover their existing debts from international credit markets because of world recessions. These outcomes, leading to a dis-smoothing effect of the foreign income channel and a weakened smoothing role of the credit market channel during domestic recessions and a stronger smoothing role of the credit market channel during world recessions as observed in Section 4.2, would be more apparent if a country is not equipped with well-functioning developed and integrated financial markets. Information asymmetry between firms and investors as well as restrictions to capital flows across countries further generate a burden to a country in need of credits. Therefore, financial frictions worsen already tightened credit conditions during recessions and contribute to the cyclicality of risk sharing and consumption volatility.

In addition, our findings expand the literature on financial frictions and the business cycle by shedding more light on the nature of financial frictions in the cyclicality of international risk sharing. The literature considers that a propagation of negative shocks damages balance sheets of economic agents (Gertler and Bernanke, 1989; Kiyotaki and Moore, 1997) and lending ability of banks (Bernanke and Blinder, 1988; Stein, 1998). The presence of financial frictions in the mechanism makes external funding more costly and results in spending reduction. Previous studies have shown the impact of financial frictions on fluctuations in employment (Sharpe, 1994), investments (Oliner and Rudebusch, 1996), and borrowings (Bernanke et al., 1996; Gertler and Gilchrist, 1994) around recessions. In terms of risk sharing, Hoffmann and Shcherbakova-Stewen (2011) discuss that banking deregulation mitigates cyclicality in interstate risk sharing as it is likely to improve access to credit markets for small businesses. By focusing on cyclicality in risk sharing at the international level and distinguishing between local and global shocks, we provide evidence that financial frictions amplify fluctuations in risk sharing and thus domestic consumption around the business cycle.

5 Conclusion

In this paper, we provide evidence that international risk sharing in the OECD countries is highly dependent on the business cycle, making consumption more volatile. The extent of risk sharing becomes lower during domestic recessions and greater during world recessions. It remains almost constant during expansion periods. Therefore, local shocks are smoothed internationally to a lesser degree, and global shocks are spread more across countries. The asymmetric cyclical patterns have become more intense since the 2008 financial crisis. In the absence of the cyclicality, domestic consumption would become larger by approximately 30% during recessions, thus relying less on states of the macroeconomy.

We identify that financial frictions amplify the cyclicality of international risk sharing. Countries with more integrated and developed financial markets and more corporate information disclosure have more stable international risk sharing around the business cycle. Such factors improve credit availability particularly during recessions, mitigating possible dis-smoothing effects from the foreign income and credit market channels of risk sharing. The results imply that alleviating financial frictions could broaden the extent of international risk sharing and strengthen its role of consumption smoothing around the business cycle.

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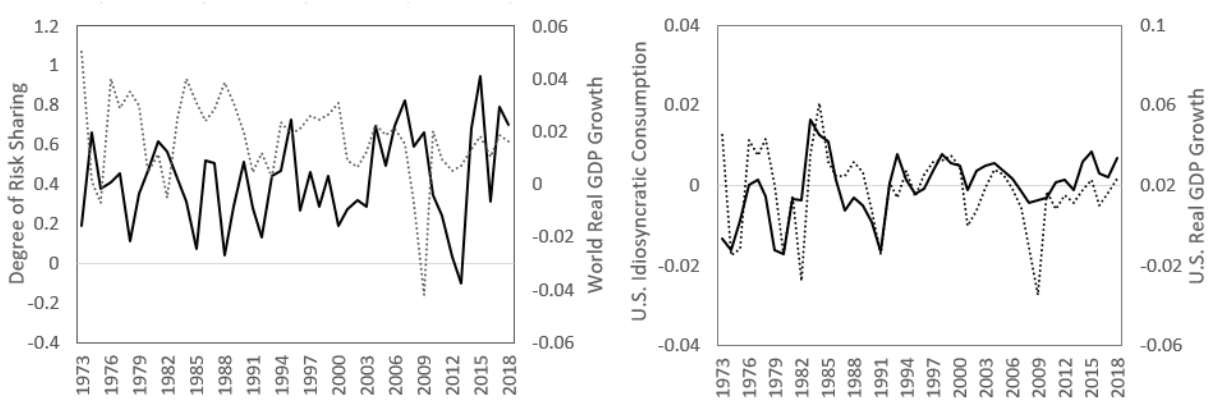
Tables

Table 1: Descriptive Statstics

Number of Countries	GDP Growth	Consumption Growth	Unshared Risk
21	0.0170 (0.0239)	0.0159 (0.0185)	0.6514*** (0.0427)

Notes: This table reports the means and standard deviations (in parentheses) of real per capita GDP growths and consumption growths. The OECD countries in our sample include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

Figure 1: Degree of Risk Sharing and the Business Cycle



Notes: This figure displays idiosyncratic GDP and consumption growths along with smoothing portions via income, transfer, and credit channels in the absence and presence of cyclical patterns of risk sharing. Panel (a) assumes a local shock of -1 given unchanged world aggregate GDP (i.e., $Y = -1$, $Y^* = 0$, $(Y - Y^*) = -1$). Panel (b) assumes a global shock of -1 given unchanged local GDP (i.e., $Y = 0$, $Y^* = -1$, $(Y - Y^*) = 1$). The estimates used in this illustration are from Table 8.

Table 2: Rish Sharing in Recessions

	$(C - C^*)$			
	(1)	(2)	(3)	(4)
$(Y - Y^*)$	0.5346***	0.5372***	0.5483***	0.5466***
	(0.0449)	(0.0450)	(0.0464)	(0.0468)
Recession		0.0008		0.0005
		(0.0009)		(0.0009)
Recession $\times$ $(Y - Y^*)$	0.1947***	0.2104***	0.2130***	0.2298***
	(0.0546)	(0.0546)	(0.0554)	(0.0525)
World recession				0.0015
				(0.0016)
World recession $\times$ $(Y - Y^*)$			-0.1227*	-0.1238**
			(0.0652)	(0.0610)
Country FE	Yes	Yes	Yes	Yes
Observations	892	892	892	892
Adj. R-squared	0.4947	0.4954	0.5143	0.5157

Notes: This table shows the results from panel GLS regressions of idiosyncratic consumption growth ($C - C^*$, i.e., deviation from real per-capita world aggregate consumption growth) on idiosyncratic GDP growth ($Y - Y^*$, i.e., deviation from real per-capita world aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with a country-specific recession indicators ($Recession$) and a world recession indicator ($World\,Recession$). Each regression includes an intercept, and standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.

Table 3: Asymmetry of Recessions and Booms

	$(C - C^*)$			
	(1)	(2)	(3)	(4)
$(Y - Y^*)$	0.5032***	0.5024***	0.5230***	0.5145***
	(0.0359)	(0.0348)	(0.0313)	(0.0356)
Recession		0.0014		0.0010
		(0.0009)		(0.0009)
Recession × $(Y - Y^*)$	0.2246***	0.2470***	0.2347***	0.2584***
	(0.0493)	(0.0492)	(0.0512)	(0.0490)
World recession				0.0016
				(0.0016)
World recession × $(Y - Y^*)$			-0.1124*	-0.1090*
			(0.0612)	(0.0575)
Boom		0.0016		0.0016
		(0.0010)		(0.0010)
Boom × $(Y - Y^*)$	0.0536	0.0310	0.0390	0.0211
	(0.0861)	(0.0950)	(0.0832)	(0.0944)
Country FE	Yes	Yes	Yes	Yes
Observations	892	892	892	892
Adj. R-squared	0.5082	0.5140	0.5121	0.5189

Notes: This table shows the results from panel GLS regressions of idiosyncratic consumption growth ($C - C^*$, i.e., deviation from real per-capita world aggregate consumption growth) on idiosyncratic GDP growth ($Y - Y^*$, i.e., deviation from real per-capita world aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with a country-specific recession/boom indicators (*Recession*, *Boom*) and a world recession indicator ($World\,Recession$). Each regression includes an intercept, and standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.

Table 4: Cyclical Risk Sharing: Alternative Measures of Recessions

	$(C - C^*)$		
	(1)	(2)	(3)
Panel A.			
$(Y - Y^*)$	0.6389***	0.5735***	0.5762***
	(0.0323)	(0.0400)	(0.0364)
GDP growth $\times$ $(Y - Y^*)$	-2.0319***		-2.4162***
	(0.5120)		(0.4037)
World GDP growth $\times$ $(Y - Y^*)$		2.6098*	4.7103***
		(1.3667)	(1.4410)
Country FE	Yes	Yes	Yes
Observations	892	892	892
Adj. R-squared	0.5138	0.4950	0.5190
Panel B.			
$(Y - Y^*)$	0.5437***	0.5569***	0.5372***
	(0.0629)	(0.1001)	(0.0879)
$1_{(Y-Y^*)<0, Y<\bar{Y}}$	0.0012		0.0015
	(0.0011)		(0.0011)
$1_{(Y-Y^*)<0, Y<\bar{Y}} \times (Y - Y^*)$	0.1927***		0.1984**
	(0.0713)		(0.0893)
$1_{(Y-Y^*)>0, Y^*<\bar{Y^*}}$		0.0027*	0.0012
		(0.0015)	(0.0009)
$1_{(Y-Y^*)>0, Y^*<\bar{Y^*}} \times (Y - Y^*)$		-0.1376*	-0.0263
		(0.0714)	(0.0784)
Country FE	Yes	Yes	Yes
Observations	892	892	892
Adj. R-squared	0.5086	0.4399	0.5098

Notes: This table shows the results from panel GLS regressions of idiosyncratic consumption growth ($C - C^*$, i.e., deviation from real per-capita world aggregate consumption growth) on idiosyncratic GDP growth ($Y - Y^*$, i.e., deviation from real per-capita world aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with alternative measures of recessions. Each regression includes an intercept, and standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.

Table 5: Cyclical Risk Sharing in Sub-Sample Periods

	$(C - C^*)$			
	(1) Full	(2) 1970–1989	(3) 1990–2006	(4) 2007–2018
Panel A.				
$(Y - Y^*)$	0.5466***	0.5985***	0.4258***	0.4251***
	(0.0468)	(0.0517)	(0.0490)	(0.0643)
Recession $\times$ $(Y - Y^*)$	0.2298***	0.2084*	0.1848**	0.4437***
	(0.0525)	(0.1090)	(0.0858)	(0.0761)
World recession $\times$ $(Y - Y^*)$	-0.1238**	-0.1477	0.1382	-0.4005***
	(0.0610)	(0.1342)	(0.1120)	(0.0870)
Country FE	Yes	Yes	Yes	Yes
Observations	892	300	339	252
Adj. R-squared	0.5157	0.5635	0.4914	0.5671
Panel B.				
$(Y - Y^*)$	0.5422***	0.5903***	0.4617***	0.4179***
	(0.0452)	(0.0500)	(0.0425)	(0.0666)
Recession $\times$ $(Y - Y^*)$	0.2289***	0.2101**	0.1543**	0.3852***
	(0.0546)	(0.0964)	(0.0722)	(0.0638)
World recession $\times$ $(Y - Y^*)$	-0.0712	-0.1519	0.1909	-0.3336**
	(0.0806)	(0.1524)	(0.1288)	(0.1374)
Recession	-0.0916	-0.0098	-0.0402	-0.1354
$\times$ World recession $\times$ $(Y - Y^*)$	(0.1340)	(0.1777)	(0.2046)	(0.1532)
Country FE	Yes	Yes	Yes	Yes
Observations	892	300	339	252
Adj. R-squared	0.5143	0.5671	0.4990	0.5896

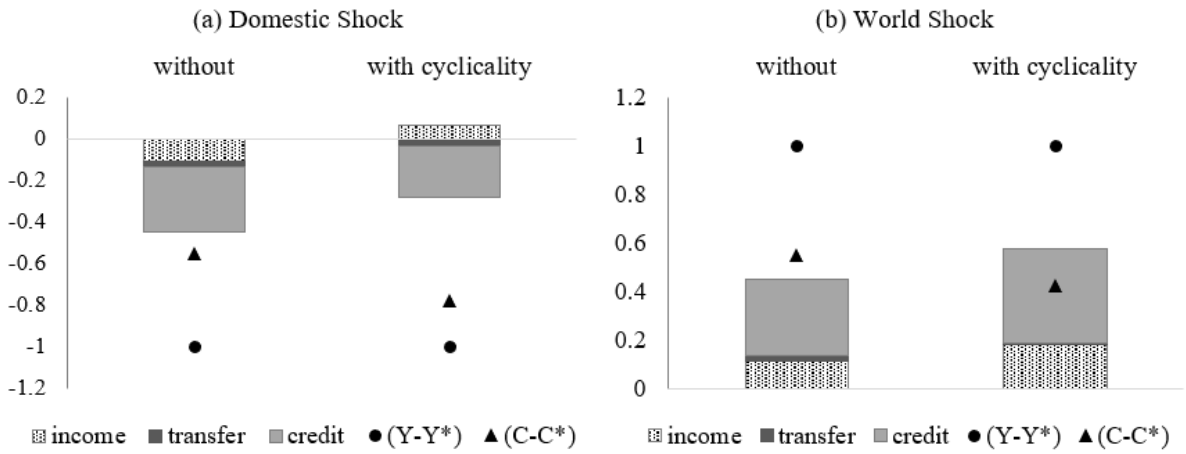
Notes: This table shows the results from panel GLS regressions of idiosyncratic consumption growth ($C - C^*$, i.e., deviation from real per-capita world aggregate consumption growth) on idiosyncratic GDP growth ($Y - Y^*$, i.e., deviation from real per-capita world aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with alternative measures of recessions. Each regression includes an intercept, and standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.

Table 6: Channels of Cyclical Risk Sharing

	$(C - C^*)$			
	(1) Unshared	(2) Income	(3) Transfer	(4) Credit
$(Y - Y^*)$	0.5466***	0.1096*	0.0253***	0.3145***
	(0.0468)	(0.0620)	(0.0075)	(0.0370)
Recession $\times$ $(Y - Y^*)$	0.2298***	-0.1718**	0.0072	-0.0658***
	(0.0525)	(0.0497)	(0.0101)	(0.0003)
World recession $\times$ $(Y - Y^*)$	-0.1238**	0.0737	-0.0226*	0.0744***
	(0.0610)	(0.0007)	(0.0123)	(0.0004)
Country FE	Yes	Yes	Yes	Yes
Observations	892	892	892	892
Adj. R-squared	0.5157	0.0418	0.0341	0.1582

Notes: This table shows the results from panel GLS regressions of (1) $(C - C^*)$, (2) $(Y - Y^*)(GNI - GNI^*)$, (3) $(GNI - GNI^*)(GDI - GDI^*)$, and (4) $(GDI - GDI^*)(C - C^*)$ on idiosyncratic GDP growth $(Y - Y^*$, i.e., deviation from real per-capita cross-sectional aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with a country-specific recession indicators (*Recession*) in each column, respectively. *Controls* are all other business cycle related explanatory variables used in Column (4) of Table 4. Each regression includes an intercept, standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.

Figure 2: Illustration of Cyclical Risk Sharing



Notes: This figure displays idiosyncratic GDP and consumption growths along with smoothing portions via income, transfer, and credit channels in the absence and presence of cyclical patterns of risk sharing. Panel (a) assumes a local shock of -1 given unchanged world aggregate GDP (i.e., $Y = -1$, $Y^* = 0$, $(Y - Y^*) = -1$). Panel (b) assumes a global shock of -1 given unchanged local GDP (i.e., $Y = 0$, $Y^* = -1$, $(Y - Y^*) = 1$). The estimates used in this illustration are from Table 8.

Table 7: Financial Friction and Cyclical Risk Sharing

	$(C - C^*)$			
	(1) -Integration	(2) -Development	(3) -Disclosure	(4) Restriction
$(Y - Y^*)$	0.3645***	0.3284**	0.2534*	0.3219***
	(0.1337)	(0.1389)	(0.1385)	(0.1013)
Recession $\times$ $(Y - Y^*)$	0.4755***	0.3953**	0.6405***	0.2142***
	(0.1213)	(0.1969)	(0.1542)	(0.0803)
Financial friction	0.0153***	0.0005	0.0425*	1.4247
$\times$ Recession $\times$ $(Y - Y^*)$	(0.0014)	(0.0013)	(0.0227)	(1.0754)
World recession $\times$ $(Y - Y^*)$	-0.2922***	-0.4489***	-0.7820	-0.1239
	(0.0753)	(0.1246)	(0.6736)	(0.2795)
Financial friction $\times$ World	-0.0446***	-0.0038**	-0.0776	-0.7965
recession $\times$ $(Y - Y^*)$	(0.0154)	(0.0018)	(0.1060)	(1.1271)
Country FE	Yes	Yes	Yes	Yes
Observations	626	537	292	471
Adj. R-squared	0.4849	0.4444	0.4677	0.4399

Notes: This table shows the results from regressions of (1) $(C - C^*)$, (2) $(Y - Y^*)(GNI - GNI^*)$, (3) $(GNI - GNI^*)(GDI - GDI^*)$, and (4) $(GDI - GDI^*)(C - C^*)$ on idiosyncratic GDP growth ($Y - Y^*$, i.e., deviation from real per-capita cross-sectional aggregate GDP growth) and interaction terms of idiosyncratic GDP growth with a country-specific recession indicators (*Recession*) in each column, respectively. *Controls* are all other business cycle related explanatory variables used in Column (4) of Table 4. Each regression includes an intercept, standard errors (in parentheses) are clustered by country. ***, ** and * denote coefficients that are statistically significant at 1%, 5%, and 10%, respectively.