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Determinants of International Consumption Risk Sharing in Developing Countries

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Abstract

Complete financial markets allow countries to share their consumption risks internationally, thereby creating welfare gains through lower volatility of aggregate consumption. This paper empirically looks at international consumption risk sharing and its determinants in a panel of 120 countries from 1970 to 2014. Contrary to some previous studies, I show that financial liberalization and financial integration has a significantly positive impact on international consumption risk sharing in poorer developing countries, whereas in emerging market countries only capital account openness has an impact. Moreover, there is some evidence that high income inequality or a high share of low income individuals reduces consumption smoothing in less developed countries. Lack of financial reforms, a lower degree of financial integration and higher inequality can thus partly explain why the degree of risk sharing is lower in developing countries than in advanced economies.

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1 Introduction

If markets are complete, economic agents, or countries, can pool their resources and thereby eliminate any differences in consumption growth between themselves according to conventional macroeconomic theory. International consumption risk sharing thus enables consumption smoothing, which creates welfare

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gains through lower volatility of aggregate consumption. Although theory predicts full risk sharing, in reality, aggregate consumption is highly sensitive to domestic income shocks and the empirical evidence shows fairly limited international consumption risk sharing among countries, see e.g. Canova and Ravn (1996), Lewis (1996) and Bai and Zhang (2012). Common explanations to this include financial market incompleteness, frictions and high financial transaction costs, although there is quite some disagreement regarding the empirical relationship between financial globalization, integration and risk sharing.[1]

There is a broad literature on international consumption risk sharing starting from Backus et al. (1992), Obstfeld (1993), Stockman and Tesar (1995), Sorensen and Yosha (1998), however most studies focus only on advanced economies. Exceptions such as Kose et al. (2009), Flood et al. (2012), Bai and Zhang (2012) and Fuleky et al. (2015), found that international consumption risk sharing is generally lower in developing countries, but the main constraints on international risk sharing in these countries have so far not been identified. Some studies, such as Corcoran (2007) and Ventura (2008), point to the importance of financial integration for improving international risk sharing in developing countries. However, while Kose et al. (2009) and Flood et al. (2012) show that financial globalization and integration improve international risk sharing in advanced economies, they found that emerging markets and developing countries seem unable to benefit from this. Kose et al. (2009) note that the capital flows to emerging markets tend to be concentrated in typically procyclical portfolio debt, as compared to the more stable FDI and portfolio equity flows, which could prevent emerging market economies from benefiting from financial openness in terms of risk sharing.

This paper aims to identify determinants of international consumption risk sharing with a focus on developing countries. As consumption growth in developing countries is generally volatile, and much more so than in advanced economies, there are high potential welfare gains from increased consumption smoothing especially in less developed countries. To this end, I study international consumption risk sharing in a panel of 120 advanced and developing countries over the time period 1970-2014.

[1]Financial globalization and integration should increase the set of available financial contracts, reducing the problem of market incompleteness. Studies like Artis and Hoffmann (2008) and Bai and Zhang (2012), that compare international consumption risk sharing during periods of different degrees of financial globalization, find that international risk sharing was not significantly higher during periods of higher financial integration. However, other studies like Imbs (2006), Corcoran (2007) and Hevia and Serven (2013) found that financial linkages increase consumption correlations.

My first finding is that, in contrast to the findings of some previous studies, conventional risk sharing determinants such as capital account openness and total external liabilities to GDP do have a significant impact on also developing countries' risk sharing capacities. Secondly, I show that this conclusion holds also for a broad measure of financial liberalization, namely an index of financial reform. In addition to looking at the capital account, the financial reform index includes six further dimensions of financial sector policy, which are credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets and banking regulations. As the financial market restrictions are generally more stringent and extend to a broader number of sectors in developing than advanced economies, this index is more suitable as a proxy for financial openness in poorer developing countries than a measure looking solely at the capital account. Once this broader financial liberalization measure is used, the estimated degree of international consumption risk sharing in less developed countries rises from around 27 % to between 35-50 %. The effect of financial liberalization in emerging markets is however much less distinct, and the results reveal that only capital account openness seems to have a positive impact on international consumption risk sharing in these countries.

Further, I add to the risk sharing literature by showing that a larger share of low income households and higher domestic income inequality can explain a part of the difference in risk sharing between developing and advanced countries. High poverty rates and inequality may exclude a large share of the population from participating in international financial markets, thus reducing domestic financial access, which reduces international consumption risk sharing in the aggregate and causes a risk sharing gap between the country groups. My study also confirms the findings of Hadzi-Vaskov (2006) and Balli and Rana (2014), that the size of migrant remittances (money transfers by migrant workers to their home country) improve risk sharing in developing countries. Finally, I find that official development assistance and foreign aid do not significantly impact consumption risk sharing in developing countries.

My main conclusion is thus that financial market restrictions, lower financial integration and a higher share of hand to mouth consumers in the less developed countries can partly explain why developing countries share substantially less consumption risk internationally than advanced economies.

The second aim of this paper is to exploit the cross-sectional dependence when estimating the degree of international consumption risk sharing between individual countries and country groups. Most economies are very likely influenced by unobserved common factors such as global business cycles or financial

globalization, and Chudik and Pesaran (2013) even claim that some form of cross-sectional correlation of errors in panel data applications in economics is likely to be the rule rather than the exception. I therefore allow for a common unobserved factor in the data, which is allowed to have a differential impact on the different countries in the sample. Cross-sectional dependence has, despite its recurrence, so far been largely overlooked in the risk sharing literature, with the exception of Fuleky et al. (2015). This paper thereby contributes to the risk sharing literature by using a more appropriate approach when examining the effect of financial integration and inequality on degree of consumption risk sharing than previously. When I recover the unobserved component and assume that there is only one, I find that global economic and financial uncertainty and US monetary policy can explain around a quarter of the variation of this unobserved component. It thus seems like the unobserved common factor picks up short-term or business cycle factors that have a heterogeneous impact on risk sharing in the different countries.

The rest of the paper is structured as follows: Section 2 presents the basic theoretical framework underlying the idea of international risk sharing. Section 3 outlines the empirical implementation strategy and discusses some estimation issues. Section 4 presents the data. The results are presented and discussed in section 5 and Section 6 concludes.

2 International Risk Sharing

This section provides a theoretical discussion of international risk sharing and its determinants. The first subsection lays out a model of complete financial markets and full risk sharing, whereas the second subsection looks at the determinants of partial risk sharing (especially in developing countries), elaborating on the discussion already given in the introduction. Particular attention is given to the degree of financial integration, the prevalence of poverty and income inequality in the respective countries. The third subsection gives an overview of the current literature.

2.1 Full risk sharing

The empirical consumption risk sharing specification was originally developed by among others Mace (1991) for the study of domestic consumption risk sharing, and was later extended by Lewis (1996) to an international setting. The underlying theoretical framework of full consumption risk sharing can be derived from the Arrow-Debreu equilibrium as outlined in Mace (1991). Consider

a social planner's problem[2] of maximizing utility over I countries with representative agents with state contingent utility functions $U_i(c_{it}(s^t), s^t)$ where $i = 1, \ldots, I$ is the country index, $c_{it}(s^t)$ is the country i consumption at time t given the state of nature s^t. The state of nature affects both consumption and the utility function, for instance through a preference change.

Utility is maximized subject to the representative agents' resource constraints. By combining the first order conditions for two distinct countries i, j we have that for all dates t and all states s^t

$$\frac{U_i^c(c_{it+1}(s^{t+1}))}{U_i^c(c_{it}(s^t))} = \frac{U_j^c(c_{jt+1}(s^{t+1}))}{U_j^c(c_{jt}(s^t))} = \frac{\lambda_{t+1}(s^{t+1})}{\lambda_t(s^t)} = \lambda(s) \quad \forall\ i, j, t \tag{1}$$

where $U_i^c(.)$ denotes the derivative of $U_i(.)$ w.r.t. consumption and is the marginal utility of consumption, and $\lambda_t(s^t)$ is the Lagrange multiplier on the resource constraint. Equation (1) implies that if markets are complete, then marginal utility growth should be the same for all agents and countries at all times t. In an international setting, this implies that relative shocks to home or foreign output should not affect the relative consumption growth rates in the different countries. All shocks should be equally shared across countries, only global shocks should matter for consumption growth. Hence the consumption allocation is said to satisfy full consumption risk sharing if the ratio of marginal utilities of consumption between any two countries is constant across all times t and states of nature s^t.

If we assume that preferences are of a constant relative risk aversion (CRRA) form and allow the utility function of the representative consumer to also feature a country and time specific preference shock $b_{it}(s^t)$, we can write the utility function as

$$U_i(c_{it}(s^t), s^t) = exp\ (b_{it}(s^t)) \frac{c_{it}(s^t)^{1-\sigma} - 1}{1 - \sigma} \tag{2}$$

After some algebra and rearrangement[3], we can write the full risk sharing condition for the preferences specified above as

$$\Delta \ln(c_{it}) = \Delta \ln(C_t) + \frac{1}{\sigma}\big(\Delta b_{it} - \Delta B_t\big) \tag{3}$$

where the capital letters C_t and B_t represent the population averages of consumption and the preference shocks and Δ denote changes such as $\Delta \ln(c_{it}) =$

[2] Although the existence of a global social planner can be questioned, if markets are complete and competitive and there are no externalities, the competitive equilibrium allocation is the same as the one chosen by the social planner.

[3] Appendix A provides a full derivation of the empirical international risk sharing equation.

$\ln(c_{it}(s^t)) - \ln(c_{it-1}(s^{t-1}))$. The full consumption risk sharing equation thus states that if markets are complete, country-specific consumption growth should only be dependent on the global consumption growth and on the idiosyncratic and global changes in preferences.

2.2 Partial risk sharing

The previous section assumed complete financial markets and full capital mobility. However in reality, state contingent securities for each and every possible state of nature do not exist, although financial innovation has expanded the set of available and tradable assets during the past 30 years (Lane and Milesi-Ferretti, 2007). Limited contract enforceability furthermore provides an impediment to risk sharing, and capital mobility is often also restricted by capital controls. Financial markets in especially developing countries are not fully liberalized but also subject to further restrictions on the banking sector, interest rates and credit and securities markets. As Moser et al. (2005) pointed out, differences in investor protection, financial regulation and accounting standards affect transaction and information costs, which in turn increase the attractiveness of domestic investments relative to foreign ones. Also, even though the financial sector is in theory fully open, it might be that there are other (potentially unobserved) factors preventing the country from being fully integrated into the international financial markets. If individuals over-weigh domestic assets in their investment portfolios, they will not share consumption risks optimally with foreigners, which in turn prevents the convergence of marginal rates of substitution between countries (Lewis, 1996). Instead, domestic output changes might have (potentially large) influences on the growth rate of consumption.

There is a substantial literature that has rejected the hypothesis of full international risk sharing,[4] and the estimates for the degree of risk being shared internationally range between 10-60 % in the literature. The empirical results regarding the effect of financial globalization on risk sharing are however inconclusive. Bai and Zhang (2012) and Fuleky et al. (2015) compared the degree of international consumption risk sharing during periods of financial globalization (between the 1980's and today) to periods of lower financial integration, and found no difference in the two time samples. Artis and Hoffmann (2012) however reached the opposite conclusion and found that international consumption risk sharing has increased due to financial integration since the 1990's, and Imbs (2006), Hevia and Serven (2013) and Corcoran (2007) also concluded that

[4] see among others Mace (1991), Backus et al. (1992), Obstfeld (1993), Lewis (1996), Kose et al. (2009), Artis and Hoffmann (2012) and Fuleky et al. (2015).

financial linkages increase consumption correlations in samples including both advanced and developing countries. Flood et al. (2012) and Kose et al. (2009) found some evidence that financial integration improve international risk sharing in developed countries, however in developing countries it seems like financial globalization has not helped the countries smooth consumption. The channel through which the increase in international consumption risk sharing has occurred is according to Artis and Hoffmann (2012) through the increase in international capital income flows. Relatedly Volosovych (2013) points to income risk sharing via portfolio diversification as one of the main channels through which international income (but also consumption) risk sharing occurs. Both Becker and Hoffmann (2006) and Artis and Hoffmann (2012) distinguish between permanent (or long term) and transitory shocks short term shocks, and posit that the permanent shocks are generally smoothed on the international financial market, whereas short-term shocks are smoothened through savings and dissavings.

The standard macroeconomic model assumes that all individuals can afford to participate in the international financial markets, ignoring individuals living hand-to-mouth. Poverty or income inequality might prevent some individuals from saving or participating in international financial markets. Consequently, a large share of poor individuals or inequality could increase the share of hand-to-mouth consumers within that country. As the consumption growth of individuals with binding budget constraints is largely dependent on the change in these individuals' disposable income, a large share of hand-to-mouth consumers in the population implies that there are fewer individuals that are able to pool their consumption risks through international financial markets. This is consistent with the findings of Antonakakis and Scharler (2012), who find that international risk sharing is lower in countries where credit constraints are more binding. Even though the relative contribution of poor and low income households' to aggregate consumption tends to be smaller than for wealthier households, if a very large share of the population falls into this low income category, which is often the case in developing countries, these households' contribution to aggregate consumption is non-negligible. Especially as the marginal propensity to consume is generally higher for poor households than rich ones, a high share of hand-to-mouth consumers could have a decreasing effect on risk sharing in the aggregate.

High inequality is also associated with higher risks of social unrest and political instability (Barro, 2000), which affects the types of capital flowing into the country. As the risk of social unrest or political instability is typically higher

during economic downturns, high inequality and thereby higher political risks might amplify the typical procyclicality of capital flows to emerging market and developing countries. Higher procyclicality reduces the "hedging" benefit of international financial market participation, and might even increase the correlation between capital flows and domestic output, thus affecting international risk sharing negatively. However, foreign aid and remittance flows from migrant workers abroad, which typically are countercyclical, can insulate the consumption in the receiver economy from domestic output shocks, thus improving risk sharing. On the other hand, if the remittance flows are procyclical, they might even aggravate the impact of an adverse domestic shocks (Balli and Rana, 2014).

3 Method

3.1 Empirical specification

Baseline regression

Equation (3) can be used for testing the international consumption risk sharing relationship using the following empirical specification

$$\Delta \ln(c_{it}) - \Delta \ln(C_t) = \alpha_i + \beta_i \big(\Delta \ln(y_{it}) - \Delta \ln(Y_t)\big) + \epsilon_{it} \tag{4}$$

where c_{it} and y_{it} denotes per capita consumption and GDP of country i in year t and C_t and Y_t denotes global per capita consumption and GDP in year t. Individual country effects that capture time-invariant heterogeneity are represented by α_i, and ϵ_{it} is an error term which is a time-varying component that captures both idiosyncratic and global preference shocks as well as potential measurement errors in the consumption and income data. To allow for partial risk sharing, changes in GDP are also included in the model. Moreover, as it is not possible to insure against global shocks, the global fluctuations in consumption and GDP are subtracted from the country specific growth rates.

For notational simplicity I let $\Delta \tilde{c}_{it} = \Delta ln\ (c_{it}) - \Delta ln\ (C_t)$ and $\Delta \tilde{y}_{it} = \Delta ln\ (y_{it}) - \Delta ln(Y_t)$. Using this simplification the standard international consumption risk sharing model can be rewritten as

$$\Delta \tilde{c}_{it} = \alpha_i + \beta_i \Delta \tilde{y}_{it} + \epsilon_{it} \tag{5}$$

Full risk sharing, according to the standard complete markets model, implies that the change in domestic consumption should be uncorrelated with changes in domestic output growth. This implies testing the hypothesis $\beta_i = 0$. As argued by Asdrubali et al. (1996), even if the null hypothesis of full risk sharing

is rejected, β_i can still be interpreted as a measure of market incompleteness and represent the share of consumption risk not shared internationally. As the estimate for β_i is typically between 0 and 1, $1 - \beta_i$ can be seen as a measure of international consumption risk sharing, where a measure of 0 indicates no risk sharing and 1 denotes perfect risk sharing.

Determinants of international risk sharing

In order to characterize the effect of financial openness, hand-to-mouth consumers, remittances and foreign aid on the degree of international consumption risk sharing, equation (5) is extended. This is done by parametrizing β as a linear function of the country- and time-varying parameters of interest so that $\beta_{it} = \beta_i + \mu_i x'_{it}$ where μ_i is a $1 \times K$ coefficient matrix and x_{it} is a $1 \times K$ matrix containing K of the time-varying and country-specific characteristics of interest; a measure of financial liberalization or integration, an inequality index or a measure of the share of low income households, remittance flows and foreign aid. When plugging in the augmented specification of β_i into the panel regression in (5), it is possible to directly determine the impact of financial liberalization and other parameters of interest on the degree of international risk sharing. The extended risk sharing panel regression model can be written as

$$\Delta \tilde{c}_{it} = \alpha_i + \beta_i \Delta \tilde{y}_{it} + \mu_i x'_{it} \Delta \tilde{y}_{it} + \epsilon_{it} \tag{6}$$

Within this framework, the degree of risk sharing is now equal to $(1 - \beta_i - \mu_i x'_{it})$. Estimates of $\mu_i x'_{it}$ capture the extent to which risk sharing is affected by the financial integration, inequality or headcount poverty rates. If the sign on μ_i is positive, this indicates that the higher the value of x_{it}, the lower is the degree of risk sharing. The coefficient on inequality and headcount poverty is expected to be positive, as a higher share of hand-to-mouth consumers are expected to reduce risk sharing. As financially open economies are expected to share more risk internationally, the coefficient on financial liberalization and integration should be negative. As foreign aid and remittance flows are predicted to increase risk sharing, their coefficients are also expected to be negative.

3.2 Estimators

Basic estimators

The most basic panel estimator used is the within group (WG) estimator, also called the fixed effects (FE) estimator, that assumes slope homogeneity but allows for country fixed effects. As the countries included in the study differ significantly from each other in terms of economic and political structures, there

might be some cross-country heterogeneity in the impact of output growth on consumption growth as well. In order to avoid potentially biased and inconsistent estimators by forcing the regression slope parameters to be identical across countries, the mean group (MG) estimator is also computed. The consistent MG estimator is the cross-sectional average of the OLS estimators resulting from running the model separately for each country included in the panel.

Cross-sectional dependence and Common Correlated Effects (CCE) estimators

An issue generally overlooked in the risk sharing literature is the observation that many countries are subject to common factors, such as globalization or financial innovation contributing towards making financial markets more complete. If there is some unobserved common factor casting a potentially heterogeneous influence on output and consumption growth in several countries, this will appear in the residual and cause error cross-sectional dependence.

To correct for the cross-sectional dependence, the conventional consumption risk sharing relationship is augmented by a common factor loading in the panel regression error. The error term ϵ_{it} therefore consists of an unobserved common factor f_t with the factor loading γ_i, and ε_{it} which is i.i.d. in both time and space. As I allow for heterogeneous cross-sectional dependence, γ_i can differ between countries. Hence

$$\epsilon_{it} = \varepsilon_{it} + \gamma_i f_t \tag{7}$$

Using (7), the international risk sharing model can be written as

$$\Delta\tilde{c}_{it} = \alpha_i + \beta_i \Delta\tilde{y}_{it} + \gamma_i f_t + \varepsilon_{it} \tag{8}$$

If the unobserved common factor is ignored, but correlated with the regressor, the orthogonality condition is violated as $\text{plim}\big(\frac{1}{n}\Delta\tilde{y}_{it}e_{it}\big) = \text{plim}\big(\frac{1}{n}\Delta\tilde{y}_{it}(\gamma_i \text{f}_t + \varepsilon_{it})\big) \neq 0$. This prevents the explanatory variables from becoming asymptotically uncorrelated with the disturbances, in addition to causing higher estimator variance. In that case the estimated coefficients will be inconsistent and suffer from omitted variable bias. (Pesaran, 2006)

To exploit the cross-sectional dependence in the data, the Common Correlated Effect (CCE) estimator, developed by Pesaran (2006), is used. The CCE estimator filters the country-specific regressors by the common cross-sectional averages, such that asymptotically, as N tends to infinity, the differential effects

of the unobserved common factors are eliminated.[5] Pesaran (2006) shows that the unobserved component f_t can be approximated by

$$f_t = \frac{1}{\bar{\gamma}}\left[\bar{y}_t - \beta\bar{x}_t - \bar{\eta} - \bar{\varepsilon}_t\right] \tag{9}$$

where y and x are the dependent and independent variables, the bar denotes cross-sectional averages of the series, $\bar{\gamma}$ is the cross-sectional average of the factor loading on the unobserved component and $\bar{\eta}$ is the average fixed effect. In practice this means that the time-varying unobserved common factor can be approximated by the cross-sectional averages of the dependent variable and the individual specific regressors. The CCE estimator for the baseline regression can thus be estimated from the following regression:

$$\Delta\tilde{c}_{it} = \alpha_i + \beta_i\Delta\tilde{y}_{it} + \theta_i^1\overline{\Delta c_t} + \theta_i^2\overline{\Delta y_t} + \varepsilon_{it} \tag{10}$$

where the bar denotes cross-sectional averages of the series. The CCE estimator is thus the model (5) augmented with the cross-sectional averages of the regressors and the dependent variable, which can be estimated with OLS. For the extended model, the regression equation for the CCE estimator is:

$$\Delta\tilde{c}_{it} = \alpha_i + \beta_i\Delta\tilde{y}_{it} + \mu_i x'_{it}\Delta\tilde{y}_{it} + \theta_i^1\overline{\Delta c_t} + \theta_i^2\overline{\Delta y_t} + \theta_i^3\overline{x'_t\Delta y_t} + \varepsilon_{it} \tag{11}$$

In case the individual slope coefficients are identical, the observations can be pooled over the cross-sectional units. Pesaran (2006) denotes this pooled version of the CCE estimator as CCEP. Even though the slope coefficients on the estimated parameters are the same for all cross sections in the panel, the slope coefficient of the common unobserved factor is allowed to differ across countries. The Common Correlated Effects Mean Group (CCEMG) estimator for the heterogeneous panel is obtained by taking the simple average of the individual CCE estimators.

In the international consumption risk sharing specification in equation (5), the cross-sectional averages of both consumption and output growth are already included in the model. However, the cross-sectional dependence correction in (5) is homogeneous, as it imposes that the common unobserved factor has the same effect on all countries. As the countries included in the sample are arguably heterogeneous with respect to economic and political structure, it is very likely that if there is some unobserved common factor affecting the risk sharing relation-

[5] Pesaran (2006) shows that the estimates are unbiased for as samples as small as N=30 and T=20, as long as the number of unobserved factors do not exceed the number of individual specific regressors and a constant.

ship, the common factor will have a differential effect on the different countries. Thus, even though the equation for international risk sharing by construction corrects for homogeneous cross-sectional dependence, there might still be *heterogeneous* error cross-sectional dependence in the panel, which warrants the use of the CCE estimator.

4 Data

The full data sample consists of an unbalanced panel of 120 countries over the time period 1970-2014. The sample, listed in Appendix B, contains 30 advanced economies and 90 developing countries. The developing countries are in turn divided into two groups, one for emerging markets (41 countries) and one for less developed countries (49 countries).[6] The countries included in the sample together accounted for 97.5 % of world GDP in 2011. Summary statistics for all the subsamples are presented in Table 10 in Appendix B.

Annual country level PPP-adjusted real consumption, real output (GDP) and population data were collected from Penn World Table 9.0 (Feenstra et al., 2015). Global per capita GDP and consumption growth rates are defined as the respective aggregated growth rates. The varying quality of international consumption data is however a major drawback. Deaton and Heston (2010) note that 'the international accounts are no better than the national accounts of the participating countries', indicating that caution is warranted especially with the national accounts data provided by countries whose statistical capacity is weak. To avoid potential problems relating to measurement error, the sample only contains countries with an average statistical capacity above 50.[7]

There are several indices of financial liberalization and integration available for the extended analysis, and in this study we use three different measures. Financial liberalization is proxied by Abiad et al.'s (2010) Index of Financial Reform. The index, covering the 86 of the countries in the study over the period 1973-2005, looks at seven different dimensions of financial sector policy, namely credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, banking regulations and restrictions on the capital account. Liberalization scores for each category are then combined in a graded index that is normalized from zero to one.

[6] Advanced countries are the countries classified as High income countries by the World Bank since 1990. The emerging market sample consists of countries that are commonly listed as emerging markets.

[7] The World Bank Statistical Capacity Index ranges between 0-100, where 100 denotes very high statistical capacity. In 2004 the average score was 64.

An alternative measure of financial liberalization is the Chinn and Ito (2006) index that measures a country's degree of capital account openness. The index is available for 115 of the included countries and covers 1970-2014. It is based on the binary variables that codify the index of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), and ranges between zero and one. It is used to test the robustness of the results to the financial openness specification and the time dimension.

Finally, we also use a de facto measure of financial integration. In the previous literature, the ratio of foreign liabilities or assets to GDP, has been used heavily. This financial integration measure can on the one hand be seen as a measure of the internationalization and depth of the financial market, but on the other hand as a reflection of the financial globalization. The data on external asset holdings by Lane and Milesi-Ferretti (2007) are collected from the External Wealth of Nations database, and covers the full sample. As the correlation between the series of total foreign liabilities to GDP and total foreign assets to GDP is very high, 0.99, I only use the series of total foreign liabilities to GDP in the study.

Data on income inequality, measured by the Gini coefficient, are collected from the Standardized World Income Inequality Database, SWIID 6.2 (Solt, 2016). The SWIID uses data from several reliable sources to make an net income (post-tax, post-transfer) inequality measure which is comparable across countries and over time. These data are available from 1970 onward for the full sample. The Gini index ranges between zero and 100, where a higher coefficient implies higher income inequality. To facilitate the interpretation and the comparison of the estimated coefficients in the models, the Gini coefficient is divided by 100 so as to range from zero to one.

The share of individuals with low income in the population is represented by threshold adjusted headcount poverty rates, which denote the percentage of the population living on less than $100 per month in 2011 PPP. The data are collected from the World Bank's database Povcalnet (2017).[8] The threshold-adjusted headcount poverty data are available for 111 countries from 1981 onward. As the data are not collected every year (but typically every 3-4 years) and the low income population shares can be assumed to be fairly stable in the short run, the data are linearly intrapolated into a time series.

[8]For Argentina and Uruguay the headcount poverty data is only available for the urban population. As the rural population accounted for only 6 % of the population in Uruguay and 9 % in Argentina in 2010 (WDI, 2017), the aggregate number is not expected to differ substantially from the urban one.

Migrant workers' remittances to developing countries are defined as received personal remittances to GDP. These data are available for 89 of the developing countries in the study from 1970 onwards, and are collected from the World Development Indicator WDI (2017) database provided by the World Bank.

Foreign aid is defined as net official development assistance and official aid received as a fraction of GDP. The data, available for all the 78 developing countries that have received any official development aid since 1970, are also collected from the WDI (2017) database.

For the analysis of the unobserved common component, global output growth volatility, the Global Economic Policy Uncertainty Index (EPU), the Effective Federal Funds rate, US real M2 growth and Global Stock price volatility are also used. The Global EPU index that measures policy-related economic uncertainty, constructed by Baker et al. (2018), is based on newspaper coverage of policy-related economic uncertainty, disagreement among economic forecasters and expiring tax agreements in a large number of different countries. The Fed Funds rate, US real M2 growth (%) and the stock price volatility index are all collected from the Federal Reserve Bank of St. Louis (FRED, 2018). Global output growth volatility is defined as the standard deviation of Δy across countries.

5 Results

5.1 The baseline risk sharing regression

The baseline risk sharing regression equation (5) is first estimated on an unbalanced panel containing the full set of countries over the time period 1970-2014. The results for the different estimators, the within group (WG), mean group (MG) and pooled and mean group CCE estimators CCEP and CCEMG are all presented in Table 1.

The coefficient on idiosyncratic output growth, $\Delta\tilde{y}_{it}$, is clearly significant in all cases and positive, as expected. If one uses $1-\hat{\beta}$ as a measure for international risk sharing (IRS), where $\hat{\beta}$ denotes the estimated coefficient on idiosyncratic output growth, the countries included in the study are suggested to share on average 31-33 % of consumption risk internationally, depending on the estimator.

In order to decide which estimator is the preferred one, diagnostic tests are conducted.[9] As can be seen from Table 1, Pesaran's 2004 test for cross-sectional

[9]Panel unit root tests have been conducted to confirm that all the time series ($\Delta\tilde{c}$, $\Delta\tilde{y}$ and the interaction term series) are stationary.

	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.677^{***}	0.687^{***}	0.670^{***}	0.676^{***}
	(0.024)	(0.023)	(0.025)	(0.025)
IRS	0.323^{***}	0.313^{***}	0.330^{***}	0.324^{***}
R^2	0.55	0.55	0.60	0.61
DW	1.99	1.85	2.00	1.86
CD	25.2^{***}	24.5^{***}		
N	120	120	120	120
Obs.	4,370	4,370	4,370	4,370
Years	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014

Note: White standard errors for the WG and CCEP estimators and nonparametric ones for the MG and CCEMG estimators are in parentheses. Symbols ***, ** and * denote significance at respective 1%, 5% and 10 % levels. For MG and CCEMG the R^2 and DW test statistics are the average statistics over the cross sections. IRS=1-$\hat{\beta}$.

Table 1: Consumption risk sharing estimates for the full sample

dependence[10] (CD) rejects the null hypothesis of no cross-sectional dependence for both the WG and MG estimator. Despite the correction for homogeneous cross-sectional dependence induced by the risk sharing specification, the basic estimators thus still seem to suffer from cross-sectional dependence. This implies that the CCE estimators are preferred. Here the different estimators produce quite similar coefficients, but in general the results from the non-CCE estimators should be interpreted with caution. In the extended model the estimated coefficients for the CCE models and non-CCE models are however in some cases significantly different.[11] As the panel Durbin-Watson (DW) tests for the WG and CCEP estimator and the cross-sectional averages of the individual DW statistics for the MG and CCEMG estimator are reasonably close to 2, one can conclude that none of the models seem to suffer from autocorrelation. According to the CCE estimators, countries share on average between 32-33 % of their consumption risk internationally. This number is in line with the findings of Fuleky et al. (2015), who control for cross-sectional dependence in a similar manner.

[10]The test statistic is $CD_P = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}$ where ρ_{ij} is the pair-wise country cross-correlation coefficient. Under the null hypothesis of no cross-sectional dependence the statistic asymptotically follows a standard normal distribution.

[11]To assess the hypothesis of slope heterogeneity and determine whether more weight should be given to the pooled or the mean group estimators, a Hausman test is conducted. The Hausman test statistic is however negative, which is a problem as the test statistic is assumed to follow a χ^2 distribution. Therefore no conclusion can be drawn based on the test and the test statistic is not reported in this case.

Risk sharing coefficients for individual countries

To illustrate how the degree of international risk sharing differs for each individual country, the results from the individual CCE risk sharing regressions used to calculate the CCEMG estimator are presented in Table 2. Most of the estimated coefficients are significant, of expected sign and between zero and one. However, there seems to be substantial heterogeneity in the estimated slope coefficients. If 1-$\hat{\beta}_i$ is used as a measure of the degree of consumption risk sharing for each country i, most countries seem to be sharing between 0 to 80 % of their consumption risk internationally.

Risk sharing in the different country groups

As the degree of risk sharing between advanced and developing countries seems to differ substantially, the risk sharing coefficients are estimated separately for the developing and advanced economies. As can be seen from the regression results for the separate country groups in the upper part of Table 3, all the estimated coefficients are again significant and of the expected sign. The degree of risk sharing is now significantly higher in the advanced economies, where between 44-72 % of income risks are shared internationally whereas the corresponding number in the developing countries is only 26-30 %. The finding that developing countries share significantly less risk internationally than advanced countries is in line with earlier findings by e.g. Kose et al. (2009) and Fuleky et al. (2015), although a risk sharing coefficient of 0.72 is at the higher end of the spectrum of previously estimated coefficients for the advanced economies.[12]

The developing country sample is further split into groups containing 41 emerging markets (EM) countries and 49 less developed countries (LDC's). Risk sharing in the emerging markets lies at 26-32% and is thus significantly lower than in the full sample and also somewhat higher (although not significantly so) than in the less developed countries, where the countries share on average between 25-29 % of their consumption risk. This finding of low levels of consumption risk sharing in the developing and emerging market countries is in line with the findings of Kose et al. (2009). They hypothesize that one possible reason to this phenomenon is that capital flows to the emerging markets are generally procyclical. This procyclicality prevents these countries from using the capital flows to smooth their consumption, as capital is leaving the country in times when it might be needed the most. This might instead aggravate the dependence of consumption changes on domestic output fluctuations and suppress international risk sharing.

[12]Fuleky et al. (2015) and Kose et al. (2009) found that advanced countries share 30-50 % of their short run consumption risks internationally, whereas developing countries generally share only 10-30 %. Most related studies have arrived at estimates in the same range.

Country	$\hat{\beta}_i$	se_i	Country	$\hat{\beta}_i$	se_i	Country	$\hat{\beta}_i$	se_i
Albania	**0.691**	(0.12)	Guatemala	**0.400**	(0.11)	Norway	0.012	(0.05)
Argentina	**1.031**	(0.06)	Guinea	**1.105**	(0.06)	Pakistan	**0.999**	(0.11)
Armenia	**0.286**	(0.12)	Honduras	**0.461**	(0.17)	Panama	**0.555**	(0.17)
Australia	**0.330**	(0.10)	Hong Kong	**0.253**	(0.07)	Paraguay	0.219	(0.28)
Austria	**0.821**	(0.09)	Hungary	**0.901**	(0.10)	Peru	**0.914**	(0.06)
Azerbaijan	0.201	(0.10)	Iceland	**0.518**	(0.07)	Philippines	**0.665**	(0.05)
Bangladesh	**0.899**	(0.06)	India	**0.866**	(0.05)	Poland	**0.721**	(0.14)
Belarus	-0.016	(0.20)	Indonesia	**0.637**	(0.05)	Portugal	**0.685**	(0.09)
Belgium	**0.662**	(0.09)	Ireland	**0.571**	(0.09)	Romania	**0.798**	(0.07)
Bhutan	**0.496**	(0.13)	Israel	**0.773**	(0.15)	Russia	**0.429**	(0.09)
Bolivia	**0.367**	(0.13)	Italy	**0.846**	(0.07)	Rwanda	**0.962**	(0.18)
Bosnia & Herzegovina	**0.836**	(0.11)	Jamaica	**0.432**	(0.13)	Senegal	**0.647**	(0.08)
Botswana	**0.367**	(0.12)	Japan	**0.648**	(0.04)	Serbia	**0.419**	(0.13)
Brazil	**1.105**	(0.08)	Jordan	**0.810**	(0.06)	Singapore	0.115	(0.07)
Bulgaria	**1.081**	(0.15)	Kazakhstan	**0.583**	(0.18)	Slovakia	**0.858**	(0.12)
Burkina Faso	**1.080**	(0.21)	Kenya	**0.949**	(0.13)	Slovenia	**0.516**	(0.11)
Cambodia	0.119	(0.06)	Kyrgyzstan	0.210	(0.13)	South Africa	**0.589**	(0.07)
Cameroon	**0.769**	(0.10)	Laos	**0.686**	(0.10)	South Korea	**0.707**	(0.06)
Canada	**0.424**	(0.07)	Latvia	**1.318**	(0.15)	Spain	**0.912**	(0.06)
Chile	**0.839**	(0.09)	Lesotho	**0.705**	(0.11)	Sri Lanka	**1.025**	(0.10)
China	**0.766**	(0.08)	Lithuania	**0.881**	(0.17)	Suriname	**1.712**	(0.41)
Colombia	**0.851**	(0.07)	Luxembourg	**0.171**	(0.07)	Swaziland	0.301	(0.32)
Costa Rica	**0.647**	(0.14)	Macedonia	**0.772**	(0.12)	Sweden	**0.665**	(0.10)
Croatia	**0.699**	(0.08)	Madagascar	**0.998**	(0.04)	Switzerland	**0.644**	(0.09)
Cyprus	**0.508**	(0.07)	Malawi	**0.772**	(0.16)	Syria	**0.776**	(0.07)
Czech Republic	**0.768**	(0.13)	Malaysia	**0.729**	(0.08)	Taiwan	**0.640**	(0.07)
Denmark	**0.882**	(0.11)	Malta	**0.388**	(0.09)	Tajikistan	**0.283**	(0.11)
Dominican Republic	0.226	(0.17)	Mauritius	**0.665**	(0.15)	Tanzania	**0.953**	(0.04)
Ecuador	**0.602**	(0.14)	Mexico	**0.836**	(0.05)	Thailand	**0.679**	(0.17)
Egypt	**0.745**	(0.06)	Moldova	**1.224**	(0.08)	Tunisia	**0.857**	(0.13)
El Salvador	**0.647**	(0.18)	Mongolia	0.325	(0.23)	Turkey	**0.617**	(0.13)
Estonia	**0.870**	(0.14)	Montenegro	**0.714**	(0.15)	Uganda	**0.779**	(0.07)
Ethiopia	**0.665**	(0.09)	Morocco	**0.855**	(0.09)	Ukraine	**0.957**	(0.06)
Fiji	**0.499**	(0.19)	Mozambique	**0.530**	(0.20)	UK	**0.856**	(0.09)
Finland	**0.518**	(0.07)	Namibia	**0.372**	(0.16)	United States	**0.664**	(0.05)
France	**0.886**	(0.05)	Nepal	**0.650**	(0.09)	Uruguay	**0.945**	(0.06)
Georgia	1.205	(0.73)	Netherlands	**0.682**	(0.10)	Uzbekistan	**0.484**	(0.04)
Germany	**0.702**	(0.09)	New Zealand	**0.489**	(0.06)	Venezuela	0.124	(0.22)
Ghana	**0.723**	(0.12)	Niger	**1.011**	(0.22)	Vietnam	0.147	(0.11)
Greece	**0.668**	(0.09)	Nigeria	**1.354**	(0.24)	Zambia	**0.719**	(0.09)

Note: Coefficients significant at 5 % level in bold, standard errors in parentheses. The risk sharing coefficient for each country i is $1 - \hat{\beta}_i$.

Table 2: Estimated β coefficients from the individual CCE regressions for each country

Wald tests evaluating the null hypothesis of identical estimated coefficients for the full sample and the different subsamples reveal that rich, and to some extent also emerging market countries, share significantly different degrees of consumption risk internationally than the rest of the sample. Based on the results from the CD test, the CCE estimators are preferred to the basic ones in all samples, and the CCE estimators now produce significantly different results compared to the basic estimators for the advanced country sample. Ignoring heterogeneous cross-sectional dependence implies that international risk sharing is underestimated by as much as 11 percentage points for those countries.[13]

The common factor

If we assume that there is only one unobserved common component (although there can be several) approximated by $\hat{f}_t$ in equation (9), this factor $\hat{f}_t$ can be identified up to a scaling factor ($\bar{\gamma}$). These common factors for the different samples are presented in Figure 1. From there can be seen that the common component for the subsamples differ somewhat, where the biggest difference is found between the common component for the advanced economies and the rest.

Global business cycle synchronization, global economic uncertainty and monetary policy are common factors that could affect individuals' decisions to share consumption risks internationally, but the aggregate impact could vary between countries. We now regress the common unobserved component $\hat{f}_t$ on potential determinants such as the global output growth volatility, US monetary policy measures like the Fed Funds rate and US real M2 growth (which are generally also perceived as global monetary policy measures), and financial market uncertainty measures like the global stock price volatility and the Global Economic Policy Uncertainty (EPU) Index. As Table 4 shows, these global uncertainty and monetary policy variables explain around 18-28 % of the variation in the common factor. It thus seems like the latent factor to some extent captures the short run effects of the global financial business cycle on risk sharing. Hence, for the advanced economies global uncertainty and monetary policy reduces the positive impact of risk sharing, as the degree of risk sharing in Table 3 is estimated to be much higher once we account for this common effect.

This finding is somewhat related to Artis and Hoffmann (2012) and Becker and Hoffmann (2006), who make a distinction between consumption risk sharing patterns over the long-term through international financial markets, and short-term via savings and dissavings. My result however indicate that the short run variation in advanced economies comes not only from savings and dissavings, but also to some extent from global monetary policy and financial markets.

[13]The Hausman tests yield negative test statistics for most subsamples and are therefore not reported.

	Developing countries				Advanced economies			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.736^{***}	0.728^{***}	0.722^{***}	0.701^{***}	0.395^{***}	0.564^{***}	0.284^{***}	0.480^{***}
	(0.026)	(0.026)	(0.028)	(0.030)	(0.026)	(0.040)	(0.028)	(0.039)
IRS	0.264^{***}	0.272^{***}	0.278^{***}	0.299^{***}	0.605^{***}	0.436^{***}	0.716^{***}	0.520^{***}
R^2	0.59	0.57	0.63	0.64	0.38	0.49	0.55	0.61
DW	2.02	1.92	2.05	1.96	1.65	1.66	1.65	1.68
CD	19.4^{***}	15.8^{***}			25.7^{***}	3.8^{***}		
Wald	-1.71^{*}	-1.17	-1.38	-0.65	7.99^{***}	2.65^{***}	10.33^{***}	4.26^{***}
N	90	90	90	90	30	30	30	30
Obs.	3,051	3,051	3,051	3,051	1,319	1,319	1,319	1,319
Years	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014
	Less developed countries				Emerging market countries			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.749^{***}	0.720^{***}	0.730^{***}	0.708^{***}	0.709^{***}	0.737^{***}	0.684^{***}	0.725^{***}
	(0.032)	(0.040)	(0.034)	(0.049)	(0.039)	(0.033)	(0.033)	(0.035)
IRS	0.251^{***}	0.280^{***}	0.270^{***}	0.292^{***}	0.291^{***}	0.263^{***}	0.316^{***}	0.275^{***}
R^2	0.58	0.51	0.63	0.59	0.61	0.65	0.67	0.71
DW	2.08	1.98	2.09	1.98	1.84	1.84	1.83	1.86
CD	9.2^{***}	4.0^{***}			8.8^{***}	3.1^{***}		
Wald	-1.81^{*}	-0.72	-1.41	-0.59	-0.71	-1.26	-0.33	-1.14^{***}
N	49	49	49	49	41	41	41	41
Obs.	1,657	1,657	1,657	1,657	1,394	1,394	1,394	1,394
Years	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014	1970-2014

Note: Estimation of equation (5) for WG and MG estimator and equation (9) for CCEP and CCEMG. White standard errors for the WG and CCEP estimators and nonparametric ones for the MG and CCEMG estimators are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. For MG and CCEMG the R^2 and DW test statistics are the average statistics over the cross sections. IRS=1-$\hat{\beta}_i$ and denotes the international risk sharing coefficient. Wald test tests whether the estimated risk sharing coefficients for the subsamples are significantly different from the ones for the full sample, with $H_0 : \beta_{All} = \beta_{country\ group}$.

Table 3: Consumption risk sharing estimates for the full sample

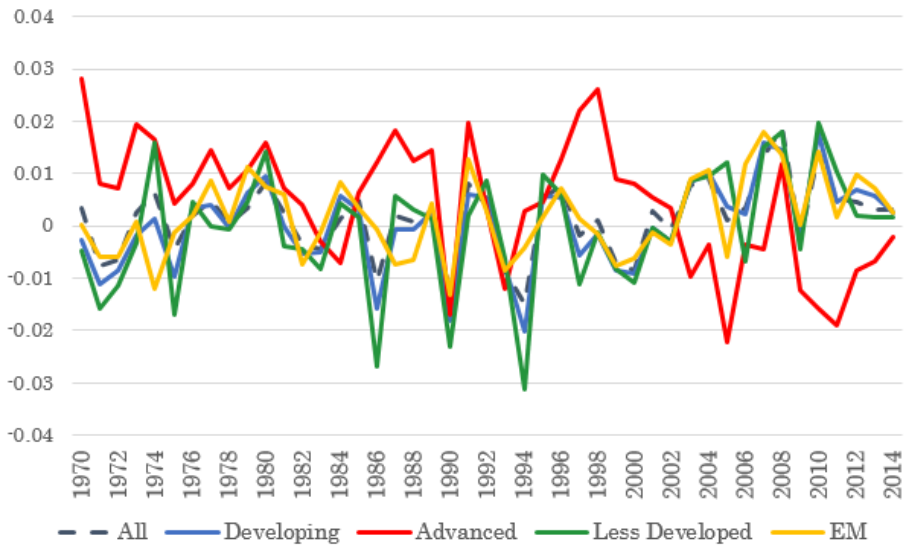


Figure 1: The common factor in the different samples

Sample:	All	Developing	Advanced	EM	Less Developed
St. Dev Δy	-0.111**	-0.130**	0.069	-0.057	-0.174**
	(0.042)	(0.049)	(0.071)	(0.047)	(0.068)
Fed Funds rate	-0.071**	-0.096**	0.174***	-0.072**	-0.109**
	(0.03)	(0.04)	(0.05)	(0.03)	(0.05)
Real M2 growth (%)	-0.084**	-0.095**	0.038	-0.046	-0.150***
	(0.032)	(0.038)	(0.055)	(0.037)	(0.052)
Stock price volatility	-0.030	-0.043	0.036	-0.056**	-0.031
	(0.024)	(0.028)	(0.041)	(0.027)	(0.039)
EPU Index	0.005	0.007*	-0.010*	0.008**	0.007
	(0.003)	(0.004)	(0.006)	(0.004)	(0.005)
Constant	0.015**	0.016**	-0.005	0.011	0.019*
	(0.003)	(0.008)	(0.012)	(0.008)	(0.011)
R^2	0.25	0.27	0.28	0.18	0.25
Obs	40	40	40	40	40

Note: Dependent variable: the common factor. Standard errors in parentheses, symbols ***, ** and * denote significance at the 1%, 5% and 10 % levels, respectively.

Table 4: Determinants of the common factor in the different samples

5.2 Determinants of international risk sharing

The analysis is now extended to regression models (6) and (11), to see how international consumption risk sharing is affected by financial liberalization, as measured either by the Financial reform index ($FinRef$) or the Chinn-Ito capital account openness index ($KaOpen$), financial integration as measured by total external liabilities to GDP ($Liab$), and hand-to-mouth consumers as measured by income inequality ($Gini$) and low income population ratios (LIR). For the developing countries the effects of migrant remittances ($Remit$) and official development assistance and foreign aid (ODA) on international risk sharing are also investigated. The time period under consideration varies with the included variables, with the time period starting between 1970-1981 and ending between 2005 and 2014.

As the time series are relatively short, the CCEMG estimator, which consists of the cross-sectional average of the individual CCE estimators, cannot be accurately estimated for the models including several regressors due to insufficient degrees of freedom.[14] In the baseline risk sharing models the results for the CCEMG estimator were however in most cases fairly similar to the ones obtained by the CCEP estimators. This suggests that using only the pooled version of the CCE estimator might be sufficient despite the fact that it ignores heterogeneity. As the Pesaran CD test moreover indicates that all the models suffer from cross-sectional dependence, only the results for the CCEP estimator are presented.

Full sample

The extended models including interaction terms for the different measures of financial openness and hand-to-mouth consumers are first estimated for the full unbalanced sample.[15]

As can be seen from the results in Table 5, the estimated coefficients on the idiosyncratic output variations are still significant for all models, and the interaction terms including the different measures of financial liberalization and integration are all significant and of the expected negative sign except in column (v). There is thus some evidence that financial liberalization, measured either by the financial reform index or capital account openness, or financial integration, represented by total external liabilities to GDP, significantly enhances interna-

[14] As the CCE estimators include also the cross sectional averages of the regressors and the dependent variable, the extended models involves the estimation of 10 coefficients. As there is not very much variation in the financial openness, inequality and hand-to-mouth indicators on the country level, this leads to severe multicollinearity problems in the MG estimators.

[15] The extended models including all variables of interest are presented in this section. The results of regressions including only one risk sharing determinant at a time are presented in Tables 12 and 13 in Appendix C.

tional consumption risk sharing. The coefficients on $FinRef$ and $KaOpen$ are relatively large, and to allow for the comparison of the estimated coefficients, normalized coefficients are presented in Table 14 in Appendix C. From there can be seen that the effects of financial reform and capital account openness (when significant) on risk sharing are quite substantial. On the other hand, de facto financial integration, measured as total external liabilities to GDP, only has a marginal impact on risk sharing as the coefficient on $Liab$ is fairly small.

The share of low income individuals in the population (LIR) and income inequality ($Gini$) both have a significantly negative impact on risk sharing in models (ii), (iii), (v) and (vi), where the sample is longer and $KaOpen$ and $Liab$ are used as measures of financial integration, but not in models (i) and (iv) including $FinRef$. The coefficients are large (see the normalized coefficients in Table 14, Appendix C) and positive when significant, indicating that a higher share of low income individuals and higher inequality have a large negative impact on international risk sharing. The risk sharing coefficient, once financial integration, inequality or the share of low income individuals and cross sectional dependence is controlled for, increases from around 0.33 to between 0.34-0.40, depending on the model used.

Subsamples

In this section, the models are re-estimated for the sub-samples of 90 developing countries and 30 advanced countries. The sample of developing countries is furthermore split into a group of 49 less developed countries and a group of 41 emerging market countries.[16]

Developing countries

The results for the developing country sample are presented in Table 6. The analysis has been extended to include also the impact of migrant remittances ($Remit$) and official development assistance and foreign aid per GDP (ODA).

Just like in the full sample, the estimated β's are all significant and the different measures of financial openness have a positive and significant impact on risk sharing in all models except for the one in column (vii). Contrary to some of the previous findings in the literature, this result implies that financial liberalization, but also financial integration, enhance international risk sharing in developing countries. As can be seen from Table 14 with the normalized coefficients in Appendix C, also financial integration, $Liab$, seems to have a substantial economic impact on risk sharing in developing countries.

[16]The extended models including all variables of interest are presented in this section. The results of regressions including only one risk sharing determinant at a time are presented in Tables 12 and 13 in Appendix C.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
$\Delta\tilde{y}$	0.695***	0.453***	0.303***	0.907***	0.596***	0.584***	0.790***	0.791***	0.672***
	(0.133)	(0.092)	(0.076)	(0.068)	(0.049)	(0.030)	(0.036)	(0.035)	(0.028)
$FinRef * \Delta\tilde{y}$	-0.377***			-0.505***			-0.350***		
	(0.079)			(0.102)			(0.071)		
$KaOpen * \Delta\tilde{y}$		-0.348***			-0.075			-0.335***	
		(0.063)			(0.070)			(0.059)	
$Liab * \Delta\tilde{y}$			-0.006***			-0.005***			-0.006***
			(0.001)			(0.001)			(0.001)
$Gini * \Delta\tilde{y}$	0.273	0.899***	0.912***						
	(0.302)	(0.211)	(0.198)						
$LIR * \Delta\tilde{y}$				-0.010	0.305***	0.280***			
				(0.074)	(0.072)	(0.066)			
$FinRef$	0.056***			0.050***			0.031***		
	(0.010)			(0.010)			(0.008)		
$KaOpen$		0.009**			0.005			0.005	
		(0.004)			(0.007)			(0.004)	
$Liab$			-0.001**			-0.001***			-0.001*
			(0.001)			(0.000)			(0.000)
$Gini$	-0.059	-0.017	-0.009						
	(0.048)	(0.028)	(0.025)						
LIR				-0.124***	-0.060***	-0.076***			
				(0.036)	(0.020)	(0.015)			
IRS	0.400***	0.378***	0.361***	0.387***	0.349***	0.339***	0.390***	0.371***	0.338***
	(0.024)	(0.028)	(0.026)	(0.033)	(0.023)	(0.021)	(0.025)	(0.028)	(0.028)
R^2	0.73	0.72	0.70	0.80	0.75	0.73	0.71	0.65	0.64
DW	2.04	2.05	2.10	2.20	2.13	2.14	1.95	1.97	2.09
N	83	114	118	79	110	113	86	114	118
Obs.	2,226	3,739	3,825	1,696	3,072	3,140	2,309	4,039	4,161
Years	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014

Note: Estimation of model (10) using CCEP, White standard errors are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\tilde{x}}$, where $\bar{\tilde{x}}$ denotes the cross-sectional and time average of x_{it}. As not all series are available for all countries or for the full sample period, the N and T between the different models vary.

Table 5: Consumption risk sharing CCEP estimates for the full sample

There is some evidence that hand-to-mouth households, as proxied either by low income ratios or income inequality, have a negative impact on international risk sharing, as the interaction terms including LIR and $Gini$ are positive and significant in the models in columns (iii), (v) and (vii)-(ix). The previous finding by Hadzi-Vaskov (2006) that remittances have a significantly positive impact on risk sharing holds also once financial liberalization, income inequality and cross-sectional dependence are controlled for, as the coefficient is both negative and significant in two thirds of the models. Finally, we look at whether official development assistance and foreign aid to GDP (ODA) has an effect on risk sharing in the developing countries. It appears that ODA has no significant impact on international consumption risk sharing. For convenience, only the model including only the effect of foreign aid on risk sharing is presented in Table 6, column (x), but the same conclusions are reached once the other determinants of consumption risk sharing are included in the model.

When controlling for financial liberalization and integration, inequality and remittances the risk sharing coefficient increases from the baseline case of around 0.26-0.30 to between 0.27-0.39, depending on the model used. The models adjusting for $FinRef$ show a much higher upward adjustment in the estimated international consumption risk sharing coefficient IRS than the ones using $KaOpen$ or $Liab$. This result indicates that it is not only the degree of capital account openness and capital flows that matter for risk sharing in developing countries, but also other dimensions of financial sector policy. Thus when adjusting for a broader dimension of financial liberalization, the gap in risk sharing between developing and advanced countries is much smaller.[17]

Ignoring any general equilibrium effects, if the financial systems in the less developed countries were as integrated into the international financial markets as the ones in the advanced economies, and low income ratios (or income inequality) were at the same levels as in the advanced economies, the developing countries would *ceteris paribus* share approximately as much risk internationally as the advanced economies. It thus seems like the level of financial openness and hand-to-mouth consumers can at least partly explain the gap in international risk sharing between developing and advanced economies. These results thus suggest that there are potential welfare gains through improved consumption risk sharing from increased financial liberalization, integration and reduced inequality in developing countries.

[17]This result does not seem to be driven by the difference in the sample length, as when the models are re-estimated to end in 2006 the IRS for the models using $KaOpen$ and LIR are in the same range as they are in the full sample.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
$\Delta\tilde{y}$	1.160***	0.625***	0.523***	0.701***	0.522***	0.836***	0.605***	0.668***	0.670***	0.674***
	(0.225)	(0.158)	(0.125)	(0.137)	(0.123)	(0.098)	(0.057)	(0.048)	(0.041)	(0.038)
$FinRef * \Delta\tilde{y}$	-0.384***					-0.311**				
	(0.124)					(0.151)				
$KaOpen * \Delta\tilde{y}$		-0.247***	-0.252***				-0.089			
		(0.087)	(0.081)				(0.094)			
$Liab * \Delta\tilde{y}$				-0.103***	-0.068**			-0.066*	-0.078**	
				(0.037)	(0.033)			(0.037)	(0.034)	
$Remit * \Delta\tilde{y}$	-0.012**	-0.008***		-0.004		-0.015**	-0.006*	-0.004		
	(0.005)	(0.003)		(0.003)		(0.008)	(0.003)	(0.003)		
$Gini * \Delta\tilde{y}$	-0.683	0.538	0.714***	0.254	0.629**					
	(0.482)	(0.356)	(0.276)	(0.306)	(0.264)					
$LIR * \Delta\tilde{y}$						-0.066	0.274***	0.153*	0.185***	
						(0.104)	(0.099)	(0.084)	(0.072)	
$ODA * \Delta\tilde{y}$										0.005
										(0.004)
$FinRef$	0.054***					0.027				
	(0.019)					(0.020)				
$KaOpen$		0.008	0.011*				0.002			
		(0.008)	(0.006)				(0.009)			
$Liab$				-0.006*	0.000			-0.011***	-0.004**	
				(0.003)	(0.002)			(0.003)	(0.002)	
$Remit$	0.001	0.000		-0.001		0.001	0.000	-0.001		
	(0.001)	(0.001)		(0.001)		(0.002)	(0.001)	(0.001)		
$Gini$	0.015	0.045	-0.012	-0.036	-0.011					
	(0.095)	(0.043)	(0.036)	(0.043)	(0.034)					
LIR						-0.095**	-0.080***	-0.076***	-0.062***	
						(0.043)	(0.024)	(0.025)	(0.016)	
ODA										0.000
										(0.000)
IRS	0.342***	0.283***	0.274***	0.297***	0.269***	0.391***	0.352***	0.347***	0.324***	0.302***
	(0.033)	(0.041)	(0.033)	(0.030)	(0.026)	(0.038)	(0.029)	(0.025)	(0.023)	(0.031)
R^2	0.80	0.78	0.75	0.79	0.73	0.81	0.80	0.80	0.75	0.65
DW	2.42	2.21	2.06	2.37	2.22	2.44	2.23	2.29	2.35	2.18
N	44	82	86	82	88	44	83	83	88	78
Obs.	1,057	2,131	2,616	2,102	2,611	949	2,045	2,041	2,319	2,613
Years	1973-2005	1970-2014	1970-2014	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1981-2014	1970-2014

Note: Estimation of model (10) using CCEP, White standard errors are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ denotes the cross-sectional and time average of x_{it}. As not all series are available for all countries or for the full sample period, the N and T between the different models vary.

Table 6: CCEP Consumption risk sharing estimates for the Developing countries

Less Developed Countries

Next, the models are re-estimated for the less developed countries. As can be seen from Table 7, financial reforms ($FinRef$) and integration ($Liab$) have a significantly positive impact on international risk sharing also in the less developed countries. The normalized coefficients (in Table 15) on the interaction terms including $FinRef$ are more than twice as large as the interaction terms including $Liab$, suggesting that financial reforms have a much larger impact on risk sharing than financial integration. Capital account openness ($KaOpen$) does however not have any significant impact, suggesting that de facto financial openness is more important for risk sharing than de jure. Only using capital account openness as a measure for financial openness might thereby be misleading, as there are other important financial market restrictions that affect risk sharing. Thus, in less developed countries there are welfare gains from financial reforms related to entry barriers, state ownership, interest rates controls, securities and credit markets through better consumption smoothing opportunities.

Another take-away is that a high share of low income individuals reduce risk sharing, as the interaction term including LIR is positive and significant. There is also some evidence that income inequality ($Gini$) reduces it, although the negative coefficients in columns (i) and (ii) weaken this finding somewhat.

The impact of remittances on international risk sharing is somewhat ambiguous, as the coefficient on the interaction term including remittances is insignificant in most specifications except in column (iii). When remittances are included in the models, although insignificant, they still heighten the total risk sharing coefficient (IRS) substantially. Even though foreign aid and development assistance on average accounted for 7.5 % of GDP in these countries, there seem to be no significant effects of it on risk sharing (column (x)).[18]

The degree of international risk sharing once hand-to-mouth consumers and financial integration are taken into account now range between 0.27 and 0.51. Note that this range is slightly higher than for the sample including all developing countries. Noteworthy is also that the degree of risk sharing is substantially higher when the measure for financial reform is used as the measure for financial openness, and that the effect of $FinRef$ is much larger in the less developing countries than in the sub-sample for all developing countries, again highlighting the relevance of using the broader index of financial integration that looks at several dimensions of financial sector policy in the less developed countries. The potential welfare gains through risk sharing from further financial liberalization and integration and the reduction of inequality thus seem to be larger in the less developed countries than in the richer developing countries.

[18] ODA is also insignificant in models where other risk sharing determinants are included.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
$\Delta\tilde{y}$	1.385***	1.089***	0.243	0.435**	0.552***	0.422**	0.383***	0.482***	0.549***	0.673***
	(0.239)	(0.240)	(0.233)	(0.216)	(0.158)	(0.165)	(0.082)	(0.076)	(0.073)	(0.054)
$FinRef * \Delta\tilde{y}$	-0.792***	-0.553***				-0.589**				
	(0.254)	(0.202)				(0.265)				
$KaOpen * \Delta\tilde{y}$			-0.256				-0.106			
			(0.202)				(0.168)			
$Liab * \Delta\tilde{y}$				-0.172**	-0.120**			-0.126**	-0.108**	
				(0.072)	(0.050)			(0.050)	(0.045)	
$Remit * \Delta\tilde{y}$	-0.012		-0.009**	-0.007		0.029	-0.003	0.000		
	(0.013)		(0.004)	(0.004)		(0.019)	(0.003)	(0.003)		
$Gini * \Delta\tilde{y}$	-1.167**	-0.651	1.396**	0.954**	0.657*					
	(0.524)	(0.544)	(0.549)	(0.476)	(0.363)					
$LIR * \Delta\tilde{y}$						0.546**	0.535***	0.402***	0.353***	
						(0.231)	(0.124)	(0.110)	(0.096)	
$ODA * \Delta\tilde{y}$										0.004
										(0.005)
$FinRef$	0.043	0.068***				0.058				
	(0.027)	(0.025)				(0.036)				
$KaOpen$			0.017				0.003			
			(0.013)				(0.013)			
$Liab$				-0.007	-0.001			-0.014***	-0.002	
				(0.006)	(0.002)			(0.005)	(0.001)	
$Remit$	-0.005**		0.001	0.001		-0.005***	0.000	0.000		
	(0.002)		(0.001)	(0.001)		(0.002)	(0.001)	(0.001)		
$Gini$	-0.086	-0.115	0.038	-0.018	-0.007					
	(0.108)	(0.087)	(0.076)	(0.071)	(0.049)					
LIR						-0.079*	-0.030	-0.048*	-0.052***	
						(0.042)	(0.029)	(0.028)	(0.018)	
ODA										-0.001
										(0.001)
IRS	0.507***	0.409***	0.300***	0.347***	0.271***	0.447***	0.404***	0.426***	0.358***	0.296***
	(0.049)	(0.052)	(0.059)	(0.050)	(0.033)	(0.059)	(0.040)	(0.032)	(0.031)	(0.041)
R^2	0.81	0.80	0.78	0.81	0.74	0.79	0.81	0.80	0.74	0.65
DW	2.32	2.15	2.28	2.38	2.37	2.21	2.19	2.40	2.43	2.28
N	20	26	42	44	49	20	43	45	49	47
Obs.	437	566	1,012	1,047	1,326	416	1,030	1,086	1,281	1,448
Years	1973-2005	1973-2005	1970-2014	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1981-2014	1970-2014

Note: Estimation of model (10) using CCEP, White standard errors are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ denotes the cross-sectional and time average of x_{it}. As not all series are available for all countries or for the full sample period, the N and T between the different models vary.

Table 7: Consumption risk sharing CCEP estimates for the Less developed countries

Emerging markets

The risk sharing estimates for the Emerging Markets, presented in Table 8, paint a somewhat different picture. Contrary to previous findings by among others Kose et al. (2009) and to the results for the less developed country sample, capital account openness ($KaOpen$) and to some extent financial reforms ($FinRef$) do seem to have a positive impact on risk sharing in emerging markets, although the impact of financial reforms ($FinRef$) is not robust to all model specifications. De facto financial integration ($Liab$) does however not have a significant impact on international risk sharing. Unlike for the full developing country sample and the less developed countries, neither income inequality, low income ratios nor remittances seem to have any significant impact on risk sharing, as all these interaction terms are insignificant. The same applies to foreign aid (ODA), which does not have a significant effect either.

The international consumption risk sharing coefficient increases slightly to around 0.34 once capital account openness is accounted for. Even when accounting for other (but insignificant) potential determinants of dollarization, is the total implied international risk sharing in the emerging market economies lower than in the less developed countries. The suggestion that the emerging markets do not seem to have benefited substantially from financial globalization in terms of risk sharing is in line with the results found by Kose et al. (2009). The previous conclusion that there are potential welfare gains through improved risk sharing from further financial reform and reductions in inequality thus does not seem to apply to the same extent to the emerging markets, and low financial integration does not explain why the degree of risk sharing is so much lower in the emerging market countries than in the advanced economies.

Figure 4 plots the evolution of the average risk sharing coefficients for the less developed countries and emerging markets over time for models including different financial integration and hand-to-mouth measures. The average degree of risk sharing has increased in both the less developed economies and the emerging markets, and most of the increase has occurred after the 1990's. Although the level of risk sharing in the less developed countries was very low in the 70's, the increase in risk sharing in the less developed countries has been much larger than in the emerging markets.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
$\Delta\tilde{y}$	0.539**	0.850***	0.798***	0.942***	0.781***	0.687***	0.739***	0.809***	0.638***
	(0.231)	(0.189)	(0.165)	(0.101)	(0.060)	(0.064)	(0.054)	(0.036)	(0.040)
$FinRef * \Delta\tilde{y}$	-0.300***			-0.376***			-0.091		
	(0.116)			(0.137)			(0.098)		
$KaOpen * \Delta\tilde{y}$		-0.182**			-0.146*			-0.310***	
		(0.093)			(0.087)			(0.076)	
$Liab * \Delta\tilde{y}$			0.020			-0.011			
			(0.044)			(0.049)			
$Remit * \Delta\tilde{y}$	-0.001	0.000	0.001	-0.012	-0.009	-0.005			
	(0.006)	(0.005)	(0.006)	(0.008)	(0.006)	(0.006)			
$Gini * \Delta\tilde{y}$	0.788	-0.210	-0.309						
	(0.485)	(0.392)	(0.368)						
$LIR * \Delta\tilde{y}$				-0.082	-0.088	-0.071			
				(0.123)	(0.103)	(0.111)			
$ODA * \Delta\tilde{y}$									0.005
									(0.005)
$FinRef$	0.026			0.005			0.025*		
	(0.018)			(0.018)			(0.014)		
$KaOpen$		0.004			-0.006			0.003	
		(0.010)			(0.011)			(0.006)	
$Liab$			0.001			-0.013			
			(0.006)			(0.008)			
$Remit$	0.001	0.001	0.001	0.002	0.002	0.002			
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)			
$Gini$	0.080	-0.093	-0.087*						
	(0.107)	(0.058)	(0.049)						
LIR				-0.159***	-0.111***	-0.082***			
				(0.043)	(0.029)	(0.029)			
ODA									0.000
									(0.001)
IRS	0.267***	0.318***	0.310***	0.310***	0.335***	0.355***	0.302***	0.328***	0.354***
	(0.029)	(0.028)	(0.026)	(0.032)	(0.028)	(0.029)	(0.034)	(0.034)	(0.036)
R^2	0.85	0.80	0.80	0.88	0.82	0.82	0.74	0.72	0.68
DW	2.33	2.14	2.21	2.43	2.17	2.21	1.92	1.92	1.89
N	24	40	38	24	40	38	34	40	31
Obs.	620	1,119	1,055	533	1,015	955	845	1,357	1,165
Years	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014

Note: Estimation of model (10) using CCEP, White standard errors are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\tilde{x}}$, where $\bar{\tilde{x}}$ denotes the cross-sectional and time average of x_{it}. As not all series are available for all countries or for the full sample period, the N and T between the different models vary.

Table 8: Consumption risk sharing CCEP estimates for the Emerging Markets

Figure 2: Less Developed Countries

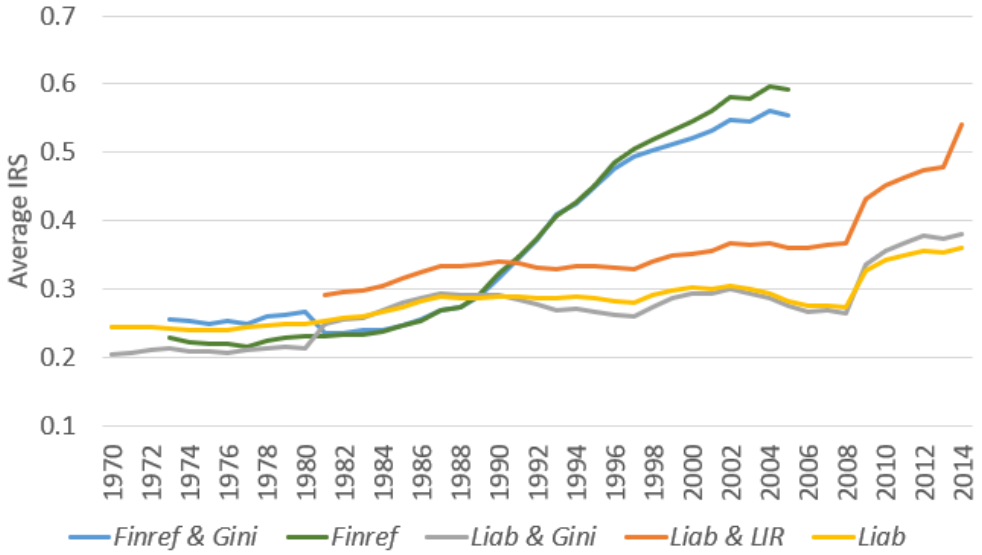
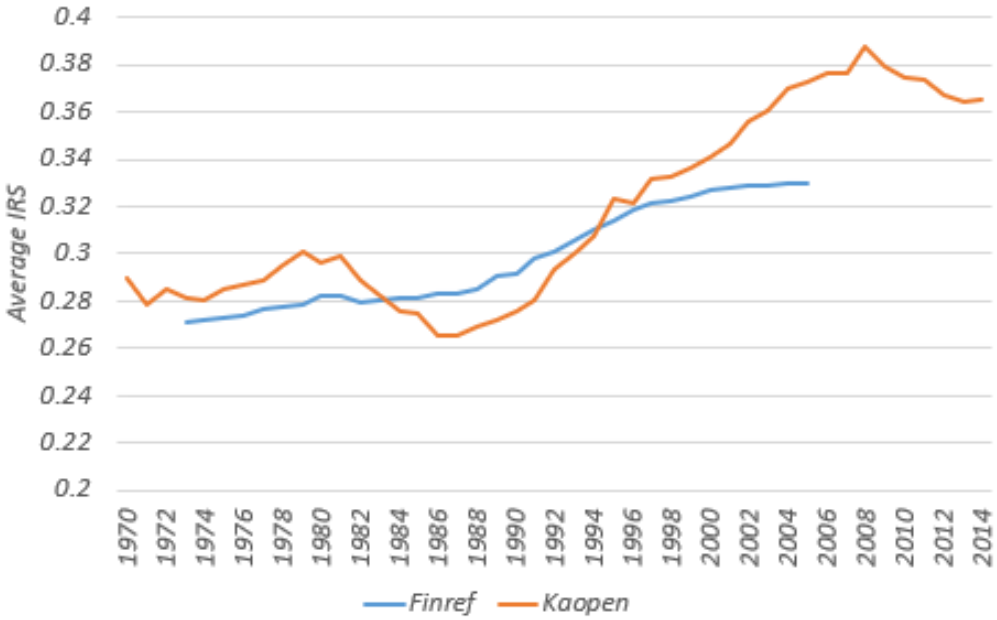


Figure 3: Emerging Markets



Note: Plots of the average IRS coefficient for a number of models including financial reforms $Finref$, capital account openness $KaOpen$, foreign liabilities $Liab$, Gini and the low income ratio LIR.

Figure 4: The evolution of the IRS coefficient for some of the models

Advanced economies

Finally, we turn to the subgroup of advanced economies. As remittances to GDP ratios are very low in the advanced economies, the models are estimated without remittances. As can be seen from Table 9, de facto financial integration, as measured by total external liabilities to GDP ($Liab$), seems to have a significant positive impact on international risk sharing in all model specifications. This result is in line with the ones obtained by Kose et al. (2009), who found that (only) de facto measures of financial openness has a significant impact on risk sharing. The size of the coefficient is however very small, pointing to a very limited although statistically significant economic impact of financial openness on risk sharing. There is some evidence that financial reforms and capital account openness support risk sharing as well, but especially the results for $KaOpen$ are not very robust to different model specifications.

In the advanced economies, the results imply that a lower share of low income households in the economy leads to higher international risk sharing as the interaction term including LIR is positive in all specifications and significant in columns (v) and (vi). Thus it seems like that also in the advanced economies does higher incomes and less hand-to-mouth consumers lead to more risk sharing internationally. Once this and financial openness is taken into account, the degree of risk sharing ranges between 65 % and 74 %. Nevertheless, the results in column (iii) implies that income inequality increases international risk sharing, as the estimated coefficient on the interaction term including $Gini$ is negative. This raises questions on whether income inequality is a good proxy for the hand-to-mouth households in the economy.

5.3 Robustness

Next, some robustness checks of the results presented in the previous section are conducted. All the tables for the robustness tests can be found in Appendix C. First, the sample is reduced and ended in 2006 to avoid having the results driven by the 2007-2008 Financial Crisis. As can be seen from the results presented in Appendix C, Tables 16 and 17, the previous conclusions are largely unaffected by the change in the sample. This can also be seen as an indication that the difference in results between the models using $FinRef$ and $KaOpen$ and $Liab$ is not driven by the difference in sample length. Also, to confirm that the difference in results between the models that contain $Gini$ and LIR are not mainly driven by the difference in the sample length (as the LIR series starts only in 1981), the models are estimated with LIR backwards interpolated to 1970. These results are not presented for the sake of space, but the same conclusions still hold.

One potential explanation to the negative and/or insignificant coefficients

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
$\Delta\tilde{y}$	0.716***	0.515***	0.570***	0.434*	0.257**	0.263***	0.515***	0.396***	0.287***
	(0.178)	(0.127)	(0.122)	(0.257)	(0.111)	(0.053)	(0.089)	(0.059)	(0.029)
$FinRef * \Delta\tilde{y}$	-0.272**			-0.207			-0.313**		
	(0.131)			(0.277)			(0.126)		
$KaOpen * \Delta\tilde{y}$		-0.103			-0.054			-0.188**	
		(0.094)			(0.113)			(0.077)	
$Liab * \Delta\tilde{y}$			-0.003***			-0.003***			-0.003***
			(0.001)			(0.001)			(0.001)
$Gini * \Delta\tilde{y}$	-0.770	-0.638	-1.008***						
	(0.588)	(0.419)	(0.373)						
$LIR * \Delta\tilde{y}$				11.39	19.04***	17.43***			
				(8.43)	(4.75)	(4.26)			
$FinRef$	0.001			0.005			-0.009		
	(0.015)			(0.014)			(0.011)		
$KaOpen$		0.015*			0.030***			0.012**	
		(0.008)			(0.012)			(0.006)	
$Liab$			0.000			-0.002*			0.000
			(0.001)			(0.001)			(0.001)
$Gini$	-0.117	-0.120*	0.012						
	(0.090)	(0.065)	(0.056)						
LIR				-1.083	-0.492	-0.469			
				(0.897)	(0.498)	(0.449)			
IRS	0.693***	0.751***	0.733***	0.651***	0.665***	0.646***	0.699***	0.743***	0.722***
	(0.035)	(0.029)	(0.029)	(0.050)	(0.036)	(0.038)	(0.036)	(0.028)	(0.028)
R^2	0.65	0.61	0.64	0.78	0.71	0.71	0.62	0.59	0.61
DW	1.72	1.82	1.77	1.97	1.88	1.91	1.66	1.80	1.79
N	25	28	30	21	24	25	25	28	30
Obs.	825	1,123	1,214	525	779	821	825	1,188	1,281
Years	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014

Note: Estimation of model (10) using CCEP, White standard errors are in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ denotes the cross-sectional and time average of x_{it}. As not all series are available for all countries or for the full sample period, the N and T between the different models vary.

Table 9: Consumption risk sharing CCEP estimates for the Advanced economies

on the interaction terms for $Gini$ and LIR for some of the subsamples is that inequality and poverty are endogenously affected by financial liberalization or international consumption risk sharing. If international financial market participation takes place at the expense of the poorer individuals or if the gains from financial liberalization are concentrated mostly among the higher income individuals in the country, this could worsen poverty or inequality. However when lagged values of $Gini$ and LIR are used for the interaction terms, presented in Tables 18 and 19, similar results are obtained, thus implying that the endogeneity concern is unfounded. The conclusion is also robust to using two or three year lags of the variables.

Third, the models are re-estimated with a sample split where Hong Kong, Singapore, Slovenia and Taiwan are classified as emerging market countries instead of advanced ones. Tables for the modified advanced country, developing country and emerging market sample are presented in Table 20. Generally, the previous conclusions remain and now income inequality also has a significantly negative impact on international consumption risk sharing in advanced economies in all three models where included. This thus reinforces the finding that hand to mouth consumers reduce risk sharing in advanced economies. The results are also robust to additional modifications and to the exclusion of China, but these are not reported for the sake of space.

Another concern is that I have not correctly identified the set of countries that pool their consumption risks. I therefore estimate the degree of risk shared only between the countries within the different subsamples, presented in Tables 21 and 22. The degree of risk shared only among the rich countries, the developing countries, the emerging market countries and the less developed countries does not differ significantly from the amounts of risk shared with the rest of the world. OECD countries share between 37-48 % of their consumption risks between each other, and emerging market and advanced economies share roughly 31 % of their consumption risks together. Furthermore, Table 22 reveals that although the degree of risk shared between different geographical regions differs somewhat, the results are still in line with the results for the different country groups. Africa, with mostly less developed countries, share the least consumption risks among themselves (around 20 %), where the European countries are the ones to share most risks among themselves (around 50 %). The recent Euro crisis is a good example of how the negative output shocks were "shared" by the other EMU and European countries, and from the results can also be seen that the smaller group of EMU countries share more consumption risks among themselves than the more extended group of EU countries. Finally, Ramsey's RESET test for model misspecification indicates that in with the exception of a few cases, the models used for all subsamples are correctly specified.

5.4 Discussion

My analysis shows that financial openness matters for international consumption risk sharing in the different subsamples. At the same time, the dimensions and the economic impact of financial liberalization and integration on risk sharing seems to vary significantly between the different country groups. Financial reforms and a wider range of financial sector policies have an influence on risk sharing in less developed countries, where the financial markets are generally more regulated and less developed. For emerging market economies, which are generally more financially open, the only financial market restriction that seems to matter is the degree of capital account openness. As total liabilities to GDP has a significant and economically meaningful impact on risk sharing in less developed countries but not in emerging market economies, this raises questions about the usefulness of de facto financial integration for consumption smoothing in developing countries. These results suggest that the benefits of financial reforms and liberalization for risk sharing in developing countries might be gradually receding with the level of financial development. Nevertheless, it could be that there is no significant (positive) relationship between financial integration and risk sharing in emerging markets due to the procyclicality of international capital flows, which was the explanation put forward by Kose et al. (2009). In advanced economies de facto financial integration seems to have the most robust and significant impact. However, as the capital accounts in most advanced economies are close to fully open and the additional financial restrictions are rather modest (the median score for capital account openness and financial reforms is as high as 0.94 and 0.77 respectively, where 1 is the maximum in both cases), it is not very surprising that the effects financial liberalization on international risk sharing are less relevant. Financial reforms seem to matter in countries with more closed financial systems, but when the financial market is already fairly open, the impact of further reforms or liberalization is not substantial.

Overall, a wider range of financial sector policies thus seem to impact risk sharing in less developing countries than in emerging markets. These findings are in contrast to the ones by Kose et al. (2011), who suggested that only once a country's financial sector and institutions are sufficiently developed, financial sector integration will have a significant impact on risk sharing. The earlier studies such as Flood et al. (2012), Kose et al. (2009) and Corcoran (2007) that concluded that financial integration has not enhanced risk sharing in developing countries mostly looked at the effect of financial openness as measured by total foreign assets, liabilities, portfolio equity and FDI to GDP, or compared risk

sharing during time periods of higher and lower financial globalization. My results however indicate that financial liberalization, measured by capital account openness and financial reforms, are important for risk sharing also in developing countries, which might explain the difference in the conclusion compared to some earlier studies. Moreover, the global financial business cycle (as proxied by the unobserved component) does seem to have different short run effects on risk sharing in advanced and developing countries, which could also lead to different risk sharing outcomes and conclusions.

The impact on risk sharing of financial access, or hand-to-mouth consumers, if these can be approximated by low income population shares or income inequality, also show a variable pattern with regards to the level of development of the country. In less developed countries, where the level of income inequality and the fraction of low income individuals are high, risk sharing is lower as a large fraction of the population cannot afford to take part in it. The importance of these non-participants for risk sharing seems to vary with the degree of national income and level of development, as the effect is large and significant for the advanced and less developed countries, but not the emerging ones. It is nevertheless somewhat surprising that the effect of low income population ratios is negative but the impact of income inequality is positive in the advanced economies, which raises questions regarding the appropriateness of using income inequality as a proxy for hand-to-mouth consumers. Also, the appropriateness and cross-country comparability of the threshold adjusted headcount poverty rates (where the threshold was set at $100 in 2011 PPP per month) is not the optimal measure for low income population ratios. Low income population ratios using national poverty definitions would in this case be a more appropriate measure than the one currently used, but historical time series for this measure are not available for the majority of countries included in the study.

The effect of financial openness and domestic financial access thus seems to partly explain why risk sharing is lower in developing countries than in advanced ones. Nonetheless, the observation that risk sharing in emerging markets is not supported by financial reforms and lower than in less developed and less financially integrated countries raises some doubts whether financial liberalization, financial integration and lower inequality are sufficient for improving risk sharing. This furthermore has an impact on the potential welfare gains from financial reforms and deeper financial openness.

6 Conclusions

This paper provides an empirical examination of international consumption risk sharing and its determinants for a panel of 120 countries from 1970 to 2014. If one uses 1-$\hat{\beta}$ as a measure for international risk sharing, where $\hat{\beta}$ is the estimated coefficient on the deviation of domestic output growth from the global output growth rate, about 33 % of the consumption risks are shared internationally according to the basic risk sharing model. Advanced economies share on average between 44-72 % of their consumption risks internationally, whereas the same number for developing countries is much lower, only around 26-32 % for emerging markets and between 25-29 % for less developed countries.

Contrary to what has been reported in some previous studies, I show that financial liberalization, as measured either by an index of financial reforms, or financial integration as represented by total external liabilities to GDP, has a positive effect on international consumption risk sharing in less developed countries. In emerging markets, the impact of financial liberalization is smaller and only capital account openness is suggested to significantly enhance risk sharing. In advanced economies, financial reforms, capital account openness but in particular financial integration has a significant but small impact on risk sharing. Financial openness thus seems to matter for international consumption risk sharing. However, the importance and the dimensions of it seems to vary significantly between the different country groups. Moreover, I find evidence that part of the difference in risk sharing between the less developed countries and advanced economies can be attributed to a low domestic financial access through a high share of hand-to-mouth consumers, as approximated by either income inequality or the share of low income individuals. In emerging markets, this does however not seem to be the case. In line with the previous literature, I find some weak evidence that remittances from migrant workers provide consumption insurance in developing countries, but not so much so in emerging market countries. Foreign aid and official development assistance does however not facilitate consumption smoothing in any of the developing country groups.

Once financial openness, hand-to-mouth households and remittances are controlled for, the estimated international consumption risk sharing coefficient in less developed countries increases to 0.30-0.51. The corresponding estimate in emerging markets increases to around 0.33 once capital account openness is taken into consideration. Even though financial openness and inequality can explain a large part of the difference in risk sharing between developing and advanced economies, this explanation does not apply to emerging markets. The results are robust to a reduced sample size that excludes the 2007-2008 financial crisis, modifications of the country groups and further robustness checks.

According to my results, there are potential welfare gains in less developed countries from continuing financial liberalization, deepening financial integration and reductions in poverty and inequality through improved risk sharing. The result that financial reforms have a smaller impact on risk sharing in emerging markets however raises some questions whether the benefits of financial openness on risk sharing will gradually level off as the countries continue to develop and/or become more integrated into the global financial markets. Further research is thus needed to identify the factors that affect risk sharing in emerging market countries. It is also of importance to establish how and why the impact of financial sector reforms and inequality becomes smaller once the less developed countries progress.

Finally, despite the fact that the risk sharing relationship by construction corrects for *homogeneous* cross-sectional dependence, the international risk sharing relationship is still subject to *heterogeneous* cross-sectional dependence. If heterogeneous cross-sectional dependence is ignored, the basic risk sharing relationship in advanced economies is according to my calculations underestimated by almost 11 percentage points. According to my estimations, around a quarter of this common component which is allowed to have a heterogeneous impact on the different countries can be explained by global economic uncertainty and US monetary policy. In order to obtain unbiased estimators when studying international consumption risk sharing, cross-sectional dependence should hence be taken into account.

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Appendix

Appendix A. Derivation of the IRS equation

The underlying theoretical framework of full consumption risk sharing can be derived from the Arrow-Debreu equilibrium as outlined in Mace (1991) and Krueger (2004): Consider a social planner's problem of maximizing utility over I countries with representative agents with state contingent utility functions $U_i(c_{it}(s^t), s^t)$, where $i = 1, \ldots, I$ is the country index, $c_{it}(s^t)$ is the consumption in country i at time t given the state of nature s^t. The state of nature affects both consumption as well as the utility function, for instance through a change of preferences. The social planner's objective is to maximize

$$\sum_i \sum_t \sum_{s^t} \alpha_i \beta^t \pi_t(s^t) U_i(c_{it}(s^t), s^t) \tag{12}$$

subject to the resource constraints

$$\sum_i c_{it}(s^t) \leq \sum_i y_{it}(s^t) \quad \forall \ s^t \tag{13}$$

where α^i is the social planner's weight on country i utility, β is the discount rate, $\pi_t(s^t)$ is the probability of state s^t occurring in time t and $y_{it}(s^t)$ is the output level of country i at time t in state s^t.

The first order condition for any country i is

$$\alpha_i \beta^t \pi_t(s^t) U_i^c(c_{it}(s^t), s^t) = \lambda_t(s^t) \tag{14}$$

where $U_i^c(.)$ denotes the derivative of $U_i(.)$ w.r.t. consumption and $\lambda_t(s^t)$ is the Lagrange multiplier on the resource constraint.

If we assume that preferences are of a Constant Relative Risk Aversion (CRRA) form and allow the utility function of the representative consumer to also feature a country and time specific preference shock $b_{it}(s^t)$, we can write the utility function as

$$U_i(c_{it}(s^t), s^t) = exp\ (b_{it}(s^t)) \frac{c_{it}(s^t)^{1-\sigma} - 1}{1 - \sigma} \tag{15}$$

The first order condition for any country i at any time t can now be written as

$$\alpha_i \beta^t \pi_t(s^t) exp\ (b_{it}(s^t)) c_{it}(s^t)^{-\sigma} = \lambda_t(s^t) \tag{16}$$

Taking logs of equation (14) yields

$$\ln(c_{it}(s^t)) = \frac{1}{\sigma}\ln(\alpha_i) - \frac{1}{\sigma}\ln\left(\frac{\lambda_t(s^t)}{\beta^t \pi_t(s^t)}\right) + \frac{1}{\sigma} b_{it}(s^t) \tag{17}$$

In order to simplify the expression above, first note that the cross country average of (17) can be written as

$$\frac{1}{N}\sum_i \ln(c_{it}(s^t)) = \frac{1}{\sigma N}\sum_i b_{it}(s^t) + \frac{1}{\sigma N}\sum_i \ln(\alpha_i) - \frac{1}{\sigma}\ln\left(\frac{\lambda_t(s^t)}{\beta^t \pi_t(s^t)}\right) \tag{18}$$

This relationship in equation (18) can in turn be used to substitute out $\frac{1}{\sigma}\ln\big(\frac{\lambda_t(s^t)}{\beta^t \pi_t(s^t)}\big)$ from equation (17). Moreover, by denoting the population averages as[19] $\frac{1}{N}\sum_i b_{it}(s^t) = B_t(s^t)$, $\frac{1}{N}\sum_i \ln(c_{it}(s^t)) = \ln(C_t(s^t))$ and $\frac{1}{N}\sum_i \ln(\alpha_i) = \ln(\alpha)$ equation (17) can be rewritten as

$$\ln(c_{it}(s^t)) = \frac{1}{\sigma}\big(b_{it}(s^t) - B_t(s^t)\big) + \frac{1}{\sigma}\big(\ln(\alpha_i) - \ln(\alpha)\big) + \ln(C_t(s^t)) \tag{19}$$

When taking first differences of equation (19) the term $\frac{1}{\sigma}\big(\ln(\alpha_i) - \ln(\alpha)\big)$ disappears. By suppressing the dependence on s^t and denoting $\Delta\ln(c_{it}) = \ln(c_{it}(s^t)) - \ln(c_{it-1}(s^{t-1}))$, the equation can be written as the full risk sharing condition for the preferences specified above

$$\Delta\ln(c_{it}) = \Delta\ln(C_t) + \frac{1}{\sigma}\big(\Delta b_{it} - \Delta B_t\big) \tag{20}$$

[19] This derivation involves some abuse of notation, as the last two expressions are sums of logs instead of logs of sums.

Appendix B. Data

	$\Delta\tilde{c}$	$\Delta\tilde{y}$	*Finref*	*Kaopen*	*Liab*	*Gini*	*Assets*	*LIC*	*Remit*	*ODA*
Full sample										
Mean	0.003	0.004	0.511	0.474	1.643	0.368	1.348	0.291	-	-
Median	0.006	0.006	0.524	0.415	0.698	0.356	0.306	0.153	-	-
Std. Dev	0.066	0.072	0.301	0.363	7.322	0.098	7.436	0.316	-	-
Obs.	4,625	4,625	2,394	4,242	4,316	4,333	4,303	3,601	-	-
Countries	120	120	86	115	118	120	118	115	-	-
Start	1970	1970	1973	1970	1970	1970	1970	1981	1970	1970
End	2014	2014	2005	2014	2014	2014	2014	2014	2014	2014
Advanced Economies										
Mean	0.005	0.004	0.682	0.738	3.484	0.291	3.449	0.006	-	-
Median	0.005	0.003	0.774	1.000	0.949	0.286	0.843	0.004	-	-
Std. Dev	0.032	0.046	0.270	0.320	13.025	0.048	13.067	0.006	-	-
Obs.	1,323	1,323	825	1,194	1,284	1,259	1,284	843	-	-
Countries	30	30	25	28	30	30	30	25	-	-
Developing Countries										
Mean	0.003	0.003	0.422	0.371	0.863	0.400	0.455	0.378	0.045	0.050
Median	0.006	0.007	0.429	0.166	0.654	0.403	0.241	0.306	0.015	0.023
Std. Dev	0.076	0.080	0.278	0.325	1.570	0.095	1.889	0.313	0.092	0.065
Obs.	3,302	3,302	1,569	3,048	3,032	3,074	3,019	2,758	2,436	2,721
Countries	90	90	61	87	88	90	88	90	89	78
Less Developed Countries										
Mean	-0.003	-0.003	0.375	0.312	0.895	0.407	0.442	0.520	0.061	0.075
Median	0.001	0.000	0.333	0.166	0.635	0.405	0.203	0.549	0.022	0.055
Std. Dev	0.083	0.085	0.253	0.282	2.052	0.092	2.540	0.299	0.118	0.070
Obs.	1,703	1,703	665	1,551	1,606	1,468	1,599	1,427	1,234	1,521
Countries	49	49	27	47	49	49	49	49	48	47
Emerging Markets										
Mean	0.009	0.010	0.456	0.431	0.827	0.395	0.470	0.226	0.030	0.019
Median	0.012	0.012	0.476	0.415	0.666	0.401	0.316	0.129	0.012	0.006
Std. Dev	0.067	0.074	0.290	0.353	0.706	0.097	0.568	0.251	0.048	0.039
Obs.	1,599	1,599	904	1,497	1,426	1,606	1,420	1,331	1,202	1,200
Countries	41	41	34	40	39	41	39	41	41	31

Note: $\Delta\tilde{c}$ and $\Delta\tilde{y}$ are the deviation of log consumption and output growth from their global averages. *Finref* is a Financial Reform index, *KaOpen* is a capital account openness index, *Liab* and *Assets* represent total external liabilities and assets to GDP, *Gini* is Gini income inequality (divided by 100), *LIR* is a low income ratio (population share living on less than $100/month in 2011 PPP), *Remit* is received personal remittances to GDP and *ODA* is net official development assistance and official aid received per GDP.

Table 10: Data

	Δc	Δy	*FinRef*	*KaOpen*	*Liab*	*Assets*	*Gini*	*LIR*	*Remit*
Δc	1								
Δy	0.581	1.000							
FinRef	0.067	0.064	1.000						
KaOpen	0.007	0.005	0.682	1.000					
Liab	-0.020	-0.009	0.432	0.303	1.000				
Assets	-0.024	-0.013	0.425	0.282	0.994	1.000			
Gini	0.049	0.049	-0.276	-0.290	-0.118	-0.112	1.000		
LIR	0.024	0.035	-0.569	-0.511	-0.132	-0.118	0.475	1.000	
Remit	0.065	0.078	-0.059	-0.087	-0.025	-0.017	0.146	0.154	1.000
ODA	-0.032	-0.047	-0.090	-0.174	-0.070	0.018	-0.037	0.479	0.149

Table 11: Correlation Matrix for the full sample

List of countries

Advanced economies (30):
Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom and United States.

Developing countries (90):
Of which Emerging Market countries (41):
Argentina, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Egypt, Estonia, Hungary, India, Indonesia, Jordan, Kazakhstan, Latvia, Lithuania, Macedonia, Malaysia, Mexico, Morocco, Pakistan, Panama, Peru, Philippines, Poland, Romania, Russia, Serbia, Slovakia, South Africa, South Korea, Thailand, Tunisia, Turkey, Uruguay, Venezuela and Vietnam.

Less developed countries (49):
Albania, Armenia, Azerbaijan, Bangladesh, Belarus, Bhutan, Bolivia, Burkina Faso, Cambodia, Cameroon, Dominican Republic, Ecuador, El Salvador, Ethiopia, Fiji, Georgia, Ghana, Guatemala, Guinea, Honduras, Jamaica, Kenya, Kyrgyzstan, Laos, Lesotho, Madagascar, Malawi, Mauritius, Moldova, Mongolia, Montenegro, Mozambique, Namibia, Nepal, Niger, Nigeria, Paraguay, Rwanda, Senegal, Sri Lanka, Suriname, Swaziland, Syria, Tajikistan, Tanzania, Uganda, Ukraine, Uzbekistan and Zambia.

Appendix C. Additional results

	Full sample					Developing countries						Advanced economies				
	(i)	(ii)	(iii)	(iv)	(v)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(iv)
$\Delta\tilde{y}$	0.790***	0.791***	0.672***	0.261***	0.560***	0.778***	0.793***	0.763***	0.722***	0.492***	0.584***	0.515***	0.396***	0.287***	0.434***	0.224***
	(0.036)	(0.035)	(0.028)	(0.074)	(0.030)	(0.041)	(0.035)	(0.036)	(0.041)	(0.116)	(0.038)	(0.089)	(0.059)	(0.029)	(0.115)	(0.044)
$FinRef * \Delta\tilde{y}$	-0.350***					-0.245***						-0.313**				
	(0.071)					(0.094)						(0.126)				
$KaOpen * \Delta\tilde{y}$		-0.335***					-0.243***						-0.188**			
		(0.059)					(0.088)						(0.077)			
$Liab * \Delta\tilde{y}$			-0.006***					-0.055**						-0.003***		
			(0.001)					(0.027)						(0.001)		
$Remit * \Delta\tilde{y}$									-0.005**							
									(0.002)							
$Gini * \Delta\tilde{y}$				1.009***						0.571**					-0.659*	
				(0.199)						(0.267)					(0.372)	
$LIR * \Delta\tilde{y}$					0.303***						0.264***					22.255***
					(0.071)						(0.080)					(4.105)
$FinRef$	0.031***					0.046***						-0.009				
	(0.008)					(0.013)						(0.011)				
$KaOpen$		0.005					0.009*						0.012**			
		(0.004)					(0.005)						(0.006)			
$Liab$			-0.001*					-0.001						0.000		
			(0.000)					(0.001)						(0.001)		
$Remit$									0.000							
									(0.000)							
$Gini$				-0.020						-0.004					0.037	
				(0.022)						(0.027)					(0.054)	
LIR					-0.060***						-0.066***					-0.220
					(0.014)						(0.015)					(0.418)
IRS	0.390***	0.371***	0.338***	0.357***	0.346***	0.325***	0.299***	0.283***	0.298***	0.268***	0.307***	0.699***	0.743***	0.722***	0.758***	0.642***
	(0.025)	(0.028)	(0.028)	(0.029)	(0.021)	(0.031)	(0.032)	(0.025)	(0.038)	(0.033)	(0.024)	(0.036)	(0.028)	(0.028)	(0.026)	(0.033)
R^2	0.71	0.65	0.64	0.66	0.69	0.74	0.68	0.68	0.68	0.70	0.71	0.62	0.59	0.61	0.59	0.657
DW	1.95	1.97	2.09	2.05	2.11	2.03	2.01	2.17	2.19	2.13	2.21	1.66	1.80	1.79	1.70	1.75
N	86	114	118	120	115	61	86	88	89	90	90	25	28	30	30	25
Years	1973-2005	1970-2014	1970-2014	1970-2014	1981-2014	1973-2005	1970-2014	1970-2014	1970-2014	1970-2014	1981-2014	1973-2005	1970-2014	1970-2014	1970-2014	1981-2014

Note: White standard errors in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ is the cross-sectional and time average of x_{it}.

Table 12: One-by-One: Consumption risk sharing estimates for the full sample, Developing countries and Advanced economies

	Less developed countries						Emerging Market economies					
	(i)	(ii)	(iii)	(iv)	(v)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	
$\Delta\tilde{y}$	0.854***	0.778***	0.790***	0.712***	0.469***	0.453***	0.739***	0.809***	0.638***	0.681***	0.668***	0.682***
	(0.052)	(0.045)	(0.043)	(0.054)	(0.172)	(0.065)	(0.054)	(0.036)	(0.059)	(0.031)	(0.138)	(0.036)
$FinRef * \Delta\tilde{y}$	-0.652***						-0.091					
	(0.187)						(0.098)					
$KaOpen * \Delta\tilde{y}$		-0.223						-0.310***				
		(0.145)						(0.076)				
$Liab * \Delta\tilde{y}$			-0.093***						0.038			
			(0.035)						(0.050)			
$Remit * \Delta\tilde{y}$				-0.006**						0.002		
				(0.002)						(0.005)		
$Gini * \Delta\tilde{y}$					0.663						0.032	
					(0.405)						(0.319)	
$LIR * \Delta\tilde{y}$						0.395***						0.036
						(0.102)						(0.091)
$FinRef$	0.052**						0.025*					
	(0.025)						(0.014)					
$KaOpen$		0.014*						0.003				
		(0.008)						(0.006)				
$Liab$			-0.001						-0.002			
			(0.001)						(0.003)			
$Remit$				-0.001						0.000		
				(0.001)						(0.001)		
$Gini$					0.022						-0.009	
					(0.042)						(0.035)	
LIR						-0.062***						-0.087***
						(0.018)						(0.022)
IRS	0.396***	0.293***	0.288***	0.321***	0.248***	0.333***	0.302***	0.328***	0.331***	0.313***	0.319***	0.309***
	(0.048)	(0.040)	(0.033)	(0.048)	(0.039)	(0.033)	(0.034)	(0.034)	(0.031)	(0.026)	(0.035)	(0.025)
R^2	0.78	0.68	0.67	0.67	0.70	0.70	0.74	0.72	0.71	0.74	0.70	0.77
DW	2.05	2.06	2.23	2.22	2.20	2.26	1.92	1.92	1.89	1.97	1.91	1.88
N	27	46	49	48	49	49	34	40	39	41	41	41
Obs.	639	1,494	1,581	1,245	1,332	1,315	845	1,357	1,299	1,145	1,375	1,105
Years	1973-2005	1970-2014	1970-2014	1970-2014	1970-2014	1981-2014	1973-2005	1970-2014	1970-2014	1970-2014	1970-2014	1981-2014

Note: White standard errors in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$.

Table 13: One-by-One: Consumption risk sharing estimates for the Less Developed countries and Emerging Market economies

	Full sample						Developing countries						Advanced economies					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\Delta\tilde{y}$	0.774***	0.485***	0.315***	1.014***	0.633***	0.603***	1.251***	0.651***	0.697***	0.927***	0.637***	0.673***	0.945***	0.729***	0.814***	0.537*	0.322**	0.337***
	(0.148)	(0.099)	(0.080)	(0.077)	(0.053)	(0.031)	(0.243)	(0.165)	(0.137)	(0.109)	(0.060)	(0.048)	(0.235)	(0.179)	(0.174)	(0.319)	(0.139)	(0.068)
$FinRef * \Delta\tilde{y}$	-0.233***			-0.320***			-0.219***			-0.189**			-0.275**			-0.207		
	(0.049)			(0.065)			(0.071)			(0.091)			(0.132)			(0.277)		
$KaOpen * \Delta\tilde{y}$		-0.196***			-0.040			-0.123***			-0.044			-0.120			-0.055	
		(0.036)			(0.037)			(0.043)			(0.046)			(0.111)			(0.116)	
$Liab * \Delta\tilde{y}$			-0.060***			-0.055***			-0.116***			-0.075*			-0.087***			-0.138***
			(0.013)			(0.010)			(0.042)			(0.042)			(0.028)			(0.045)
$Remit * \Delta\tilde{y}$							-0.084**	-0.069***	-0.031	-0.112**	-0.056*	-0.034						
							(0.037)	(0.024)	(0.026)	(0.056)	(0.030)	(0.024)						
$Gini * \Delta\tilde{y}$	0.122	0.396***	0.389***				-0.315	0.237	0.107				-0.318	-0.291	-0.457***			
	(0.135)	(0.093)	(0.085)				(0.222)	(0.157)	(0.129)				(0.243)	(0.191)	(0.169)			
$LIR * \Delta\tilde{y}$				-0.005	0.181***	0.165***				-0.036	0.161***	0.089*				0.121	0.213***	0.190***
				(0.042)	(0.043)	(0.039)				(0.057)	(0.058)	(0.049)				(0.090)	(0.053)	(0.046)
$FinRef$	0.360***			0.303***			0.281***			0.136			0.008			0.036		
	(0.066)			(0.062)			(0.098)			(0.103)			(0.134)			(0.111)		
$KaOpen$		0.061**			0.032			0.047			0.011			0.146*			0.286***	
		(0.028)			(0.043)			(0.043)			(0.048)			(0.081)			(0.110)	
$Liab$			-0.140**			-0.175***			-0.156*			-0.285***			-0.222			-0.838*
			(0.070)			(0.066)			(0.083)			(0.092)			(0.355)			(0.428)
$Remit$							0.064	0.027	-0.087	0.064	-0.050	-0.077						
							(0.116)	(0.086)	(0.073)	(0.139)	(0.124)	(0.115)						
$Gini$	-0.118	-0.031	-0.016				0.021	0.066	-0.049				-0.186	-0.198*	0.019			
	(0.096)	(0.050)	(0.043)				(0.138)	(0.062)	(0.058)				(0.143)	(0.107)	(0.089)			
LIR				-0.820***	-0.340***	-0.416***				-0.521**	-0.401***	-0.355***				-0.214	-0.095	-0.090
				(0.238)	(0.114)	(0.082)				(0.237)	(0.122)	(0.115)				(0.177)	(0.096)	(0.086)
IRS	0.400***	0.378***	0.361***	0.387***	0.349***	0.339***	0.342***	0.283***	0.297***	0.391***	0.352***	0.347***	0.693***	0.751***	0.733***	0.651***	0.665***	0.646***
	(0.024)	(0.028)	(0.026)	(0.033)	(0.023)	(0.021)	(0.033)	(0.041)	(0.030)	(0.038)	(0.029)	(0.025)	(0.035)	(0.029)	(0.029)	(0.050)	(0.036)	(0.038)
R^2	0.73	0.72	0.70	0.80	0.75	0.73	0.80	0.78	0.79	0.81	0.80	0.80	0.65	0.61	0.64	0.78	0.71	0.709
DW	2.04	2.05	2.10	2.20	2.13	2.14	2.42	2.21	2.37	2.44	2.23	2.29	1.72	1.82	1.77	1.97	1.88	1.91
N	83	114	118	79	110	113	44	82	82	44	83	83	25	28	30	21	24	25
Obs.	2,226	3,739	3,825	1,696	3,072	3,140	1,057	2,131	2,102	949	2,045	2,041	825	1,123	1,214	525	779	821
Years	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014

Note: White SE in parentheses, ***, ** and * denote significance at 1%, 5% and 10 % levels. The dependent and independent variables are normalized to have a mean of zero and a standard deviation of 1.

Table 14: Normalized consumption risk sharing estimates for the full sample, Developing countries and Advanced economies

	Less developed countries						Emerging Market economies					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\Delta\tilde{y}$	1.457***	0.248	0.416**	0.466**	0.396***	0.470***	0.591**	0.922***	0.861***	1.046***	0.852***	0.747***
	(0.251)	(0.238)	(0.207)	(0.182)	(0.085)	(0.074)	(0.253)	(0.205)	(0.178)	(0.112)	(0.065)	(0.070)
$FinRef * \Delta\tilde{y}$	-0.383***			-0.303**			-0.189***			-0.252***		
	(0.123)			(0.136)			(0.074)			(0.092)		
$KaOpen * \Delta\tilde{y}$		-0.109			-0.043			-0.110**			-0.092*	
		(0.086)			(0.069)			(0.056)			(0.055)	
$Liab * \Delta\tilde{y}$			-0.181**			-0.136**			0.026			-0.015
			(0.075)			(0.054)			(0.056)			(0.063)
$Remit * \Delta\tilde{y}$	-0.078	-0.091**	-0.065	0.241	-0.038	0.002	-0.010	-0.001	0.004	-0.079	-0.054	-0.032
	(0.080)	(0.042)	(0.040)	(0.160)	(0.030)	(0.031)	(0.047)	(0.036)	(0.039)	(0.049)	(0.034)	(0.035)
$Gini * \Delta\tilde{y}$	-0.542**	0.604**	0.388**				0.362	-0.096	-0.140			
	(0.243)	(0.237)	(0.194)				(0.223)	(0.178)	(0.167)			
$LIR * \Delta\tilde{y}$				0.364**	0.356***	0.258***				-0.035	-0.034	-0.026
				(0.154)	(0.083)	(0.071)				(0.052)	(0.040)	(0.041)
$FinRef$	0.196			0.260			0.151			0.027		
	(0.121)			(0.164)			(0.102)			(0.098)		
$KaOpen$		0.075			0.014			0.026			-0.041	
		(0.056)			(0.056)			(0.069)			(0.076)	
$Liab$			-0.203			-0.427***			0.020			-0.179
			(0.168)			(0.154)			(0.095)			(0.111)
$Remit$	-0.345**	0.082	0.116	-0.423***	-0.006	-0.058	0.132	0.089	0.103	0.198	0.169	0.196
	(0.172)	(0.119)	(0.118)	(0.152)	(0.133)	(0.119)	(0.146)	(0.097)	(0.109)	(0.184)	(0.113)	(0.124)
$Gini$	-0.123	0.047	-0.020				0.118	-0.164	-0.153*			
	(0.155)	(0.094)	(0.080)				(0.158)	(0.103)	(0.086)			
LIR				-0.412*	-0.128	-0.185*				-0.824***	-0.575***	-0.404***
				(0.218)	(0.121)	(0.110)				(0.220)	(0.148)	(0.142)
IRS	0.507***	0.300***	0.347***	0.447***	0.404***	0.426***	0.267***	0.318***	0.310***	0.310***	0.335***	0.355***
	(0.049)	(0.059)	(0.050)	(0.059)	(0.040)	(0.032)	(0.029)	(0.028)	(0.026)	(0.032)	(0.028)	(0.029)
R^2	0.81	0.78	0.81	0.79	0.81	0.80	0.85	0.80	0.80	0.88	0.82	0.823
DW	2.32	2.28	2.38	2.21	2.19	2.40	2.33	2.14	2.21	2.43	2.17	2.21
N	20	42	44	20	43	45	24	40	38	24	40	38
Obs.	437	1,012	1,047	416	1,030	1,086	620	1,119	1,055	533	1,015	955
Years	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014	1973-2005	1970-2014	1970-2014	1981-2005	1981-2014	1981-2014

Note: White SE in brackets, ***, ** and * denote significance at 1%, 5% and 10 % levels. The dependent and independent variables are normalized to have a mean of zero and a s.d. of 1.

Table 15: Normalized consumption risk sharing estimates for the Less Developed countries and Emerging Market economies

	All countries				Developing countries				Advanced economies			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
$\Delta\tilde{y}$	0.632***	0.414***	0.656***	0.603***	0.793***	0.847***	0.620***	0.654***	0.735***	0.654***	0.335***	0.259***
	(0.098)	(0.088)	(0.052)	(0.040)	(0.142)	(0.161)	(0.067)	(0.069)	(0.173)	(0.166)	(0.110)	(0.067)
$KaOpen * \Delta\tilde{y}$	-0.472***		-0.169**		-0.426***		-0.250*		-0.100		-0.107	
	(0.073)		(0.083)		(0.108)		(0.145)		(0.099)		(0.126)	
$Liab * \Delta\tilde{y}$		-0.007**		-0.004**		-0.130**		-0.095		-0.003*		0.000
		(0.003)		(0.002)		(0.060)		(0.063)		(0.002)		(0.002)
$Remit * \Delta\tilde{y}$					-0.006***	-0.001	-0.006	-0.003				
					(0.002)	(0.003)	(0.004)	(0.003)				
$Gini * \Delta\tilde{y}$	0.568***	0.660***			0.258	-0.100			-1.287**	-1.252**		
	(0.218)	(0.210)			(0.318)	(0.332)			(0.567)	(0.537)		
$LIR * \Delta\tilde{y}$			0.222***	0.241***			0.349***	0.213**			14.689**	19.111***
			(0.068)	(0.068)			(0.122)	(0.102)			(6.285)	(6.078)
$KaOpen$	0.017***		0.016*		0.014		0.018		0.015*		0.018*	
	(0.005)		(0.008)		(0.010)		(0.012)		(0.009)		(0.009)	
$Liab$		-0.003		-0.008**		-0.020**		-0.027**		-0.001		0.001
		(0.002)		(0.004)		(0.008)		(0.011)		(0.002)		(0.002)
$Remit$					0.000	-0.001	0.000	0.001				
					(0.001)	(0.001)	(0.001)	(0.001)				
$Gini$	-0.010	-0.034			0.055	-0.035			-0.213***	0.018		
	(0.033)	(0.027)			(0.051)	(0.054)			(0.078)	(0.063)		
LIR			-0.083***	-0.093***			-0.141***	-0.128***			-1.966*	-0.080
			(0.030)	(0.022)			(0.041)	(0.035)			(1.061)	(0.787)
IRS	0.372***	0.341***	0.348***	0.321***	0.273***	0.300***	0.343***	0.339***	0.709***	0.714***	0.649***	0.622***
	(0.028)	(0.028)	(0.027)	(0.026)	(0.038)	(0.037)	(0.038)	(0.029)	(0.033)	(0.034)	(0.053)	(0.049)
R^2	0.73	0.71	0.78	0.76	0.80	0.80	0.81	0.81	0.63	0.65	0.75	0.756
DW	2.14	2.08	2.26	2.23	2.40	2.40	2.33	2.37	1.85	1.77	2.08	2.06
N	107	108	105	106	70	69	71	70	28	30	24	25
Obs.	2,894	2,936	2,244	2,282	1,487	1,453	1,377	1,367	902	977	594	628
Years	1970-2006	1970-2006	1981-2006	1981-2006	1970-2006	1970-2006	1981-2006	1981-2006	1970-2006	1970-2006	1981-2006	1981-2006

Note: White SE in parentheses, symbols ***, ** and * denote significance at 1%, 5% and 10 % levels. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ is the cross-sectional and time average of x_{it}.

Table 16: Sample excluding the Financial crisis from 2006 onwards for all countries, Developing countries and Advanced economies

	Less developed countries				Emerging Market economies			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
$\Delta\tilde{y}$	0.919***	0.979***	0.315***	0.413***	0.741***	0.839***	0.876***	0.809***
	(0.275)	(0.211)	(0.097)	(0.111)	(0.242)	(0.267)	(0.075)	(0.080)
$KaOpen * \Delta\tilde{y}$	-0.631**		-0.296		-0.329***		-0.305**	
	(0.279)		(0.214)		(0.127)		(0.131)	
$Liab * \Delta\tilde{y}$		-0.442***		-0.230***		0.028		-0.027
		(0.094)		(0.066)		(0.051)		(0.057)
$Remit * \Delta\tilde{y}$	-0.003	-0.002	-0.003	0.000	-0.007	-0.001	-0.019**	-0.010
	(0.004)	(0.003)	(0.003)	(0.004)	(0.006)	(0.007)	(0.008)	(0.007)
$Gini * \Delta\tilde{y}$	0.103	0.064			0.238	-0.335		
	(0.639)	(0.494)			(0.508)	(0.582)		
$LIR * \Delta\tilde{y}$			0.687***	0.626***			-0.128	-0.325**
			(0.143)	(0.125)			(0.130)	(0.127)
$KaOpen$	0.011		0.012		0.025*		0.018	
	(0.015)		(0.015)		(0.013)		(0.016)	
$Liab$		-0.047***		-0.043***		0.000		-0.022*
		(0.011)		(0.010)		(0.008)		(0.011)
$Remit$	-0.001	0.000	0.001	-0.002	0.001	0.002*	0.002	0.001
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
$Gini$	0.049	0.015			0.013	-0.072		
	(0.093)	(0.073)			(0.077)	(0.062)		
LIR			-0.110**	-0.043			-0.131***	-0.112**
			(0.048)	(0.038)			(0.044)	(0.046)
IRS	0.260***	0.342***	0.419***	0.422***	0.306***	0.283***	0.341***	0.340***
	(0.084)	(0.048)	(0.043)	(0.032)	(0.032)	(0.035)	(0.036)	(0.038)
R^2	0.80	0.82	0.84	0.83	0.82	0.82	0.85	0.851
DW	2.28	2.39	2.17	2.23	2.29	2.24	2.39	2.29
N	36	37	37	38	34	32	34	32
Obs.	703	720	697	733	784	733	680	634
Years	1970-2006	1970-2006	1981-2006	1981-2006	1970-2006	1970-2006	1981-2006	1981-2006

Note: White SE in brackets. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ is the cross-sectional and time average of x_{it}.

Table 17: Sample excluding the financial crisis from 2006 onwards for the Less Developed and Emerging Market sample

	Full sample						Developing countries						Advanced economies					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\Delta\tilde{y}$	0.698***	0.536***	0.348***	0.887***	0.599***	0.571***	1.137***	0.690***	0.782***	0.794***	0.599***	0.651***	0.712***	0.500***	0.573***	0.317	0.225*	0.258***
	(0.136)	(0.093)	(0.076)	(0.072)	(0.050)	(0.032)	(0.221)	(0.139)	(0.129)	(0.132)	(0.061)	(0.048)	(0.179)	(0.127)	(0.125)	(0.283)	(0.117)	(0.052)
$FinRef * \Delta\tilde{y}$	-0.352***			-0.443***			-0.358***			-0.239			-0.275**			-0.086		
	(0.083)			(0.101)			(0.124)			(0.175)			(0.130)			(0.301)		
$KaOpen * \Delta\tilde{y}$		-0.373***			-0.099			-0.229***			-0.138			-0.117			0.014	
		(0.064)			(0.070)			(0.085)			(0.093)			(0.094)			(0.122)	
$Liab * \Delta\tilde{y}$			-0.006***			-0.004***			-0.079**			-0.065**			-0.002***			-0.002**
			(0.001)			(0.001)			(0.033)			(0.032)			(0.001)			(0.001)
$Remit * \Delta\tilde{y}$							-0.011**	-0.007***	-0.006*	-0.013	-0.007**	-0.005*						
							(0.005)	(0.003)	(0.003)	(0.009)	(0.003)	(0.003)						
$Gini_{-1} * \Delta\tilde{y}$	0.207	0.722***	0.819***				-0.707	0.352	0.020				-0.774	-0.564	-1.026***			
	(0.305)	(0.214)	(0.205)				(0.469)	(0.311)	(0.289)				(0.595)	(0.416)	(0.385)			
$LIR_{-1} * \Delta\tilde{y}$				0.012	0.295***	0.289***				-0.016	0.296***	0.171**				14.017	16.791***	16.303***
				(0.078)	(0.074)	(0.073)				(0.147)	(0.098)	(0.084)				(8.565)	(5.072)	(3.953)
$FinRef$	0.056***			0.056***			0.060***			0.026			0.009			-0.020		
	(0.011)			(0.011)			(0.018)			(0.023)			(0.014)			(0.015)		
$KaOpen$		0.009**			0.011			0.013*			0.010			0.015*			0.026**	
		(0.004)			(0.007)			(0.008)			(0.009)			(0.008)			(0.012)	
$Liab$			-0.001			-0.001*			-0.003			-0.011***			-0.001			-0.003*
			(0.001)			(0.001)			(0.003)			(0.003)			(0.001)			(0.001)
$Remit$							0.001	0.000	-0.001	0.000	0.001	0.000						
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)						
$Gini_{-1}$	-0.010	-0.016	-0.008				0.011	0.017	-0.025				-0.117	-0.120*	0.029			
	(0.049)	(0.029)	(0.026)				(0.083)	(0.039)	(0.041)				(0.087)	(0.066)	(0.054)			
LIR_{-1}				0.035	0.024	-0.009				0.067*	0.024	0.037*				-0.223	-0.187	-0.052
				(0.028)	(0.022)	(0.015)				(0.036)	(0.022)	(0.022)				(1.023)	(0.501)	(0.468)
IRS	0.409***	0.376***	0.351***	0.369***	0.359***	0.346***	0.359***	0.287***	0.306***	0.370***	0.372***	0.363***	0.700***	0.755***	0.735***	0.657***	0.657***	0.653***
	(0.025)	(0.028)	(0.028)	(0.035)	(0.023)	(0.022)	(0.032)	(0.043)	(0.029)	(0.041)	(0.029)	(0.026)	(0.036)	(0.030)	(0.029)	(0.053)	(0.040)	(0.038)
R^2	0.73	0.71	0.70	0.80	0.74	0.72	0.82	0.78	0.79	0.81	0.80	0.79	0.65	0.61	0.64	0.77	0.70	0.708
DW	2.04	2.05	2.06	2.21	2.11	2.13	2.43	2.23	2.37	2.45	2.21	2.33	1.72	1.83	1.78	1.87	1.87	1.92
N	83	114	118	79	110	113	44	82	82	44	85	85	25	28	30	21	24	25
Obs.	2,218	3,744	3,826	1,635	3,047	3,113	1,050	2,147	2,116	920	2,064	2,060	825	1,121	1,212	504	764	805
Years	1973-2005	1970-2014	1970-2014	1982-2005	1982-2014	1982-2014	1973-2005	1970-2014	1970-2014	1982-2005	1982-2014	1982-2014	1973-2005	1970-2014	1970-2014	1982-2005	1982-2014	1982-2014

Note: White SE in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ is the cross-sectional and time average of x_{it}.

Table 18: Consumption risk sharing estimates using lagged values for *Gini* and *LIR* for the full, Developing and Advanced economy sample

	Less developed countries						Emerging Market economies					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\Delta\tilde{y}$	1.312***	0.306	0.428**	0.207	0.306***	0.408***	0.692***	0.861***	0.830***	1.008***	0.807***	0.681***
	(0.265)	(0.198)	(0.180)	(0.165)	(0.095)	(0.076)	(0.230)	(0.182)	(0.163)	(0.125)	(0.064)	(0.068)
$FinRef * \Delta\tilde{y}$	-0.770**			-0.496**			-0.281**			-0.452***		
	(0.302)			(0.221)			(0.118)			(0.147)		
$KaOpen * \Delta\tilde{y}$		-0.249			-0.136			-0.199**			-0.271***	
		(0.185)			(0.159)			(0.091)			(0.089)	
$Liab * \Delta\tilde{y}$			-0.137**			-0.118***			0.016			0.000
			(0.054)			(0.040)			(0.044)			(0.051)
$Remit * \Delta\tilde{y}$	-0.015	-0.009**	-0.010**	0.036**	-0.004	-0.002	-0.003	0.000	0.000	-0.009	-0.005	-0.001
	(0.015)	(0.004)	(0.004)	(0.017)	(0.003)	(0.003)	(0.006)	(0.005)	(0.006)	(0.009)	(0.006)	(0.006)
$Gini_{-1} * \Delta\tilde{y}$	-1.044*	1.182**	0.897**				0.412	-0.234	-0.375			
	(0.559)	(0.461)	(0.402)				(0.472)	(0.378)	(0.363)			
$LIR_{-1} * \Delta\tilde{y}$				0.771***	0.650***	0.486***				-0.112	-0.053	-0.128
				(0.228)	(0.127)	(0.109)				(0.139)	(0.106)	(0.115)
$FinRef$	0.036			0.057			0.030*			0.024		
	(0.028)			(0.038)			(0.018)			(0.019)		
$KaOpen$		0.019			-0.001			0.003			0.002	
		(0.012)			(0.013)			(0.009)			(0.011)	
$Liab$			-0.003			-0.015***			0.003			-0.012
			(0.003)			(0.005)			(0.007)			(0.009)
$Remit$	-0.005*	0.001	-0.001	-0.005***	0.001	0.000	0.002	0.001	0.001	0.002	0.002	0.002
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
$Gini_{-1}$	-0.098	-0.018	-0.021				0.062	-0.094*	-0.093*			
	(0.105)	(0.055)	(0.060)				(0.101)	(0.054)	(0.052)			
LIR_{-1}				-0.054	0.026	0.032				-0.034	-0.027	0.009
				(0.040)	(0.031)	(0.031)				(0.041)	(0.028)	(0.026)
IRS	0.528***	0.327***	0.368***	0.472***	0.434***	0.463***	0.269***	0.325***	0.310***	0.289***	0.351***	0.355***
	(0.055)	(0.056)	(0.043)	(0.052)	(0.038)	(0.032)	(0.030)	(0.028)	(0.026)	(0.031)	(0.029)	(0.030)
R^2	0.81	0.78	0.81	0.80	0.81	0.81	0.85	0.80	0.81	0.88	0.82	0.824
DW	2.25	2.34	2.41	2.18	2.19	2.30	2.32	2.15	2.22	2.40	2.29	2.262
N	20	42	44	20	45	47	24	40	38	24	40	38
Obs.	430	1,022	1,056	403	1,054	1,111	620	1,125	1,060	517	1,010	949
Years	1973-2005	1970-2014	1970-2014	1982-2005	1982-2014	1982-2014	1973-2005	1970-2014	1970-2014	1982-2005	1982-2014	1982-2014

Note: White SE in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, where $\bar{\bar{x}}$ is the cross-sectional and time average of x_{it}.

Table 19: Consumption risk sharing estimates using lagged values for *Gini* and *LIR* for the Less Developed and Emerging Market sample

	Advanced economies						Developing countries						Emerging Markets					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\Delta\tilde{y}$	-0.078	-0.259	-0.215	0.434*	0.232**	0.254***	1.160***	0.624***	0.680***	0.836***	0.605***	0.669***	0.539**	0.801***	0.813***	0.942***	0.784***	0.689***
	(0.236)	(0.181)	(0.178)	(0.257)	(0.112)	(0.053)	(0.225)	(0.157)	(0.131)	(0.098)	(0.058)	(0.048)	(0.231)	(0.178)	(0.154)	(0.101)	(0.060)	(0.064)
$FinRef * \Delta\tilde{y}$	-0.209			-0.207			-0.384***			-0.311**			-0.300***			-0.376***		
	(0.142)			(0.277)			(0.124)			(0.151)			(0.116)			(0.137)		
$KaOpen * \Delta\tilde{y}$		-0.065			-0.036			-0.288***			-0.089			-0.214***			-0.158*	
		(0.097)			(0.114)			(0.084)			(0.094)			(0.083)			(0.087)	
$Liab * \Delta\tilde{y}$			-0.003***			-0.003***			-0.074***			-0.066*			-0.023			-0.012
			(0.001)			(0.001)			(0.011)			(0.037)			(0.019)			(0.049)
$Remit * \Delta\tilde{y}$							-0.012**	-0.007***	-0.007**	-0.015**	-0.006*	-0.004	-0.001	0.001	0.004	-0.012	-0.009	-0.005
							(0.005)	(0.003)	(0.003)	(0.008)	(0.003)	(0.003)	(0.006)	(0.005)	(0.005)	(0.008)	(0.005)	(0.006)
$Gini * \Delta\tilde{y}$	2.30***	2.31***	2.10***				-0.683	0.561	0.263				0.788	-0.084	-0.300			
	(0.790)	(0.639)	(0.610)				(0.482)	(0.353)	(0.307)				(0.485)	(0.373)	(0.361)			
$LIR * \Delta\tilde{y}$				11.4	20.3***	18.0***				-0.066	0.279***	0.154*				-0.082	-0.072	-0.068
				(8.43)	(4.75)	(4.30)				(0.104)	(0.099)	(0.083)				(0.123)	(0.102)	(0.109)
$FinRef$	-0.023			0.005			0.054***			0.027			0.026			0.005		
	(0.014)			(0.014)			(0.019)			(0.020)			(0.018)			(0.018)		
$KaOpen$		0.018*			0.031***			0.010			0.002			0.005			-0.004	
		(0.009)			(0.012)			(0.008)			(0.009)			(0.009)			(0.010)	
$Liab$			0.000			-0.002**			-0.005			-0.010***			0.000			-0.012
			(0.001)			(0.001)			(0.003)			(0.003)			(0.006)			(0.008)
$Remit$							0.001	0.000	-0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002
							(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
$Gini$	-0.117	-0.128*	-0.002				0.015	0.044*	-0.033				0.080	-0.094*	-0.130***			
	(0.093)	(0.070)	(0.055)				(0.095)	(0.026)	(0.046)				(0.107)	(0.057)	(0.049)			
LIR				-1.083	-0.305	-0.420				-0.095**	-0.080***	-0.074***				-0.159***	-0.113***	-0.081***
				(0.897)	(0.483)	(0.466)				(0.043)	(0.024)	(0.025)				(0.043)	(0.028)	(0.029)
IRS	0.567***	0.646***	0.626***	0.651***	0.665***	0.649***	0.342***	0.291***	0.306***	0.391***	0.352***	0.347***	0.267***	0.331***	0.321***	0.310***	0.333***	0.352***
	(0.036)	(0.029)	(0.027)	(0.050)	(0.036)	(0.038)	(0.033)	(0.041)	(0.029)	(0.038)	(0.029)	(0.025)	(0.029)	(0.026)	(0.026)	(0.032)	(0.028)	(0.029)
R^2	0.68	0.65	0.65	0.78	0.71	0.71	0.80	0.78	0.79	0.81	0.80	0.80	0.85	0.80	0.80	0.88	0.82	0.824
DW	1.73	1.82	1.79	1.97	1.86	1.91	2.42	2.20	2.34	2.44	2.23	2.29	2.33	2.13	2.21	2.43	2.16	2.229
N	22	25	26	21	23	24	44	84	84	44	84	84	24	42	40	24	41	39
Obs.	726	1,014	1,074	525	760	800	1,057	2,167	2,139	949	2,064	2,061	620	1,155	1,092	533	1,034	975

Note: White standard errors in parentheses. Symbols ***, ** and * denote significance at 1%, 5% and 10 % levels, respectively. IRS=$1 - \hat{\beta} - \hat{\mu}\bar{\bar{x}}$, with $\bar{\bar{x}}$ the cross-sectional and time average of x_{it}.

Table 20: Estimates when Hong Kong, Singapore, Slovenia and Taiwan are classified as Emerging Markets instead of Advanced economies

	Developing countries				Advanced economies				OECD countries			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.752^{***}	0.734^{***}	0.737^{***}	0.723^{***}	0.336^{***}	0.537^{***}	0.292^{***}	0.487^{***}	0.512^{***}	0.619^{***}	0.493^{***}	0.599^{***}
	(0.020)	(0.025)	(0.026)	(0.030)	(0.028)	(0.045)	(0.028)	(0.042)	(0.032)	(0.039)	(0.032)	(0.040)
												0.000
IRS	0.248^{***}	0.266^{***}	0.263^{***}	0.277^{***}	0.664^{***}	0.463^{***}	0.708^{***}	0.513^{***}	0.488^{***}	0.381^{***}	0.507^{***}	0.401^{***}
R^2	0.64	0.62	0.68	0.70	0.32	0.42	0.44	0.51	0.44	0.51	0.53	0.597
DW	2.04	1.96	1.97	1.88	1.63	1.64	1.62	1.64	1.71	1.70	1.72	1.74
CD	33.2^{***}	27.0^{***}			14.7^{***}	2.3^{**}			10.4^{***}	2.6^{**}		
N	90	90	90	90	30	30	30	30	34	34	34	34
Obs.	3,051	3,051	3,051	3,051	1,319	1,319	1,319	1,319	1,371	1,371	1,371	1,371
Years	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014

	Emerging market countries				Less developed countries				Advanced and emerging market economies			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.724^{***}	0.727^{***}	0.692^{***}	0.728^{***}	0.824^{***}	0.814^{***}	0.741^{***}	0.712^{***}	0.580^{***}	0.661^{***}	0.568^{***}	0.650^{***}
	(0.031)	(0.029)	(0.040)	(0.036)	](0.014)	(0.032)	(0.033)	(0.038)	(0.027)	(0.027)	(0.027)	(0.029)
												0.000
IRS	0.276^{***}	0.273^{***}	0.308^{***}	0.272^{***}	0.176^{***}	0.186^{***}	0.259^{***}	0.288^{***}	0.420^{***}	0.339^{***}	0.432^{***}	0.350^{***}
R^2	0.66	0.68	0.72	0.76	0.77	0.69	0.85	0.80	0.52	0.58	0.57	0.641
DW	1.88	1.82	1.83	1.80	2.19	2.25	1.97	1.96	1.79	1.75	1.79	1.76
CD	19.0^{***}	7.2^{***}			56.5^{***}	23.2^{***}			18.8^{***}	10.3^{***}		
N	41	41	41	41	49	49	49	49	71	71	71	71
Obs.	1,394	1,394	1,394	1,394	1,657	1,657	1,657	1,657	2,713	2,713	2,713	2,713
Years	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014

Note: Estimation of equation (5) for WG and MG estimator and equation (9) for CCEP and CCEMG. White standard errors for the WG and CCEP estimators and nonparametric ones for the MG and CCEMG estimators are in parentheses. Symbols ***, ** and * denote significance at the 1%, 5% and 10 % levels, respectively. For MG and CCEMG the R^2 and DW test statistics are the average statistics over the cross sections. IRS = 1-$\hat{\beta}$ denotes the international risk sharing coefficient. Sample: 1970-2014.

Table 21: International consumption risk sharing estimates for risk sharing only within the subsample

	Europe				EU countries				Euro area countries			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.548^{***}	0.677^{***}	0.451^{***}	0.585^{***}	0.516^{***}	0.697^{***}	0.501^{***}	0.635^{***}	0.422^{***}	0.612^{***}	0.456^{***}	0.598^{***}
	(0.031)	(0.035)	(0.032)	(0.050)	(0.035)	(0.045)	(0.032)	(0.051)	(0.040)	(0.071)	(0.037)	(0.062)
												0.000
IRS	0.452^{***}	0.323^{***}	0.549^{***}	0.415^{***}	0.484^{***}	0.303^{***}	0.499^{***}	0.365^{***}	0.578^{***}	0.388^{***}	0.544^{***}	0.402^{***}
R^2	0.47	0.54	0.64	0.69	0.47	0.56	0.63	0.67	0.37	0.44	0.56	0.552
DW	1.75	1.80	1.75	1.85	1.81	1.83	1.78	1.81	1.70	1.78	1.81	1.83
CD	23.4^{***}	9.3^{***}			9.5^{***}	1.3			3.1^{***}	0.3		
N	47	47	47	47	28	28	28	28	18	18	18	18
Obs.	1,402	1,402	1,402	1,402	960	960	960	960	703	703	703	703
Years	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014

	North, Central and South America				Asia & the Pacific				Africa			
	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG	WG	MG	CCEP	CCEMG
$\Delta\tilde{y}$	0.628^{***}	0.679^{***}	0.581^{***}	0.655^{***}	0.629^{***}	0.664^{***}	0.635^{***}	0.663^{***}	0.825^{***}	0.822^{***}	0.806^{***}	0.767^{***}
	(0.059)	(0.069)	(0.063)	(0.075)	(0.033)	(0.040)	(0.033)	(0.040)	(0.028)	(0.036)	(0.039)	(0.035)
												0.000
IRS	0.372^{***}	0.321^{***}	0.419^{***}	0.345^{***}	0.371^{***}	0.336^{***}	0.365^{***}	0.337^{***}	0.175^{***}	0.178^{***}	0.194^{***}	0.233^{***}
R^2	0.45	0.51	0.54	0.60	0.55	0.55	0.60	0.61	0.65	0.62	0.78	0.771
DW	1.91	1.78	1.89	1.80	1.95	1.86	1.93	1.86	2.19	2.30	1.82	1.98
CD	3.9^{***}	0.7			6.4^{***}	1.2			34.3^{***}	6.7^{***}		
N	21	21	21	21	27	27	27	27	25	25	25	25
Obs.	909	909	909	909	1,116	1,116	1,116	1,116	943	943	943	943
Years	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014	1970 - 2014

Note: Estimation of equation (5) for WG and MG estimator and equation (9) for CCEP and CCEMG. White standard errors for the WG and CCEP estimators and nonparametric ones for the MG and CCEMG estimators are in parentheses. Symbols ***, ** and * denote significance at the 1%, 5% and 10 % levels, respectively. For MG and CCEMG the R^2 and DW test statistics are the average statistics over the cross sections. IRS = 1-$\hat{\beta}$ denotes the international risk sharing coefficient. Sample: 1970-2014.

Table 22: International consumption risk sharing estimates for risk sharing only within the subsample