



No.343 / November 2010

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**IIS Discussion Paper No. 343**

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# International Risk Sharing and the Irish Economy\*

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## Abstract

This paper studies international risk sharing in Ireland focusing on the 1970-2007 period. To this end, we assess how consumption and national income have been affected by idiosyncratic output shocks. The study of the former shows that private consumption was partially insulated from output shocks and that risk sharing was invariant over time. The analysis of national income provides further evidence for international risk sharing. Here, we find that national income fluctuations were not fully affected by output shocks and that income risk sharing improved as Ireland became more integrated with the international financial system.

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\*This paper is part of the IRCHSS-sponsored fellowship “*International Financial Linkages and the Irish Economy*”. Email: benetria@tcd.ie

†I thank Philip Lane, Mathias Hoffmann and Aidan Corcoran for helpful discussions.

# 1 Introduction

Ireland is a country very much integrated with the international financial system. As such, it provides a unique case of study to understand the effects of international financial integration.

Theory suggests that highly integrated economies can benefit along three main dimensions. First, international financial integration opens the possibility for intertemporal borrowing. This is beneficial since it increases welfare levels relative to an autarchy situation. Second, it can increase long-term output growth prospects. Countries more financially integrated are better able to efficiently allocate investments worldwide. Additionally, financial integration grants better access to insurance, therefore facilitating firms to undertake high-mean/high-risk projects.<sup>1</sup> Third, it can help countries to diversify idiosyncratic risk internationally.

Although this paper studies the last dimension in Ireland, its empirical findings are a particularly interesting contribution to the risk sharing literature. The reason is that this country counts with the preconditions needed for the emergence of risk sharing: (1) it is very much integrated with the international financial system and faces low assets market frictions, (2) it is an open economy with low trade costs and, (3) factors that have been identified to deter full international risk sharing, such as enforcement problems or capital market restrictions, are absent in this country (see Lane 2000).<sup>2</sup>

The extensive empirical literature focusing on risk sharing and the role of financial globalization can be separated into three main groups.

The first one studies risk sharing by focusing on international consumption and output correlations. Theory predicts that, under full risk sharing, international consumption correlations will be perfect as a result of agents consuming out of the same internationally diversified portfolio. By contrast, international output correlations may not be high. Since part of the international capital flows follow returns differentials, international output correlations will tend to be low as financial integration becomes stronger.

Several papers following the correlation-based approach find no support for the above predictions. More specifically, international consumption correlations are found to be low and also lower than international output correlations (Backus et al 1992, Obstfeld 1995 and Lewis 1996). This is the so called ‘consumption correlation puzzle’ or ‘quantity puzzle’. Moreover, some papers find that consumption correlations have decreased (see Heathcote and Perri 2004 focusing on the U.S. or Labhard and Sawicki 2006 for a U.K study) giving evidence that consumption may have become more dependent on idiosyncratic factors.

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<sup>1</sup>See Obstfeld (1994), Acemoglu and Zilibotti (1997) and Devereux and Saito (1997).

<sup>2</sup>It could be argued that these financial linkages may not be relevant for risk sharing since they are mainly related to financial centre services. However, these activities concentrate on portfolio investments only. Ireland is also integrated through other types of investments, such as foreign direct investment, bank debt or pension funds. These generate important income flows relevant for risk sharing.

The second group of studies takes a regression analysis strategy. The goal of these papers is to test the hypothesis that fluctuations in idiosyncratic consumption should be independent of idiosyncratic output risk. More specifically, the coefficient associated with output should be equal to zero if full risk diversification is at place (Asdrubali et al 1996, Sørensen and Yosha 1998 and Crucini 1999). As in the correlation-based literature, the common finding is that consumption risk sharing is small or nonexistent.

The surge in international financial integration, documented by Lane and Milesi-Ferretti (2001, 2007), has motivated several researchers to study its effect on risk sharing empirically. One example is the work of Artis and Hoffmann (2008a). This paper finds that risk sharing has increased. However, this was unrelated with international financial markets becoming more integrated. They argue that risk sharing improved because international business cycles became less volatile.<sup>3</sup> Imbs (2006), finds that more financially integrated countries exhibit higher international consumption correlations but also higher output correlations with the latter being of a greater magnitude.

In contrast to the above studies, some papers find evidence of financial globalization having an impact on international risk sharing. One example is Kose et al (2007) studying emerging market economies and advanced countries. That paper finds that international financial integration contributed to risk sharing in the latter group only. Focusing on a similar country group but taking international financial integration in equity and debt, Corcoran (2008) also finds evidence of financial globalization improving consumption risk sharing.

A third approach is to study how cross-border assets ownership help smoothing consumption through their impact on national income. Within this group, we find papers focusing on international income flows and capital gains. While Kose et al (2007) and Sørensen et al (2007) find evidence of foreign asset positions affecting income and consumption smoothing, Lane (2001) finds that positive gross international investment positions are not associated with income-smoothing at business-cycle frequencies. However, the impact of income flows seems to depend on the risk sharing horizon. Using a regression approach but taking the levels of output and consumption differentials, Artis and Hoffmann (2008b) find strong effects for international income flows on long-term risk sharing. For the case of Ireland, the available empirical evidence points in the same direction. Lane (2000) finds that the international

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<sup>3</sup>These authors argue that consumption-based measures of risk sharing (like volatility of consumption conditional on output or international output correlations) have been unable to detect changes in risk sharing because consumption has also been affected by the fall in output volatility. The reason for this is that volatility in output at business cycle frequency fell more than the volatility of permanent output. Since consumption depends more on the latter it appears more volatile in relation to current changes in output. Artis and Hoffmann (2008) argue that this effect may have offset the tendency of financial globalization to lower volatility of consumption. Similarly, Moser et al (2003) are unable to detect evidence of increase in international risk sharing when international financial globalization is accounted for.

equity position contributed to risk sharing with other European countries.

In relation to the role of capital gains, Schmitz (2010) finds that domestic market capital gains are pro-cyclical. This indicates the existence of room for risk sharing. (If foreign investors have claims on local stocks, the pro-cyclical behavior of capital gains in debt and equity liabilities act as risk sharing mechanism.)

In the context of the Irish economy, the sole paper analyzing international risk sharing is Lane (2000). Concentrating mainly on the 1975-98 and 1950-90 subperiods, this study finds evidence supporting partial hedging of domestic production fluctuations. In particular, this article suggests that Ireland is part of rare set of countries exhibiting international consumption correlations being larger than output correlations. Moreover, it shows that the yield paid by Ireland on its net external liability position is significantly pro-cyclical, which is in line with the fact that Ireland has a heavy dependence on FDI.

This paper is similar to the above study in many respects. However, we differentiate along the following dimensions: (1) we extend that analysis and concentrate on the 1970-2007 period, (2) we assess whether risk sharing changed with European integration, (3) we analyze the effect of different rest-of-world benchmarks taking different types of international linkages and, (4) we study Ireland's investment income risk sharing.

As in Lane (2000), we find evidence suggesting that private consumption was partially insulated from output shocks in the 1970-2007 period. In addition, we also find that this did not change over time. The analysis of national income provides further evidence for international risk sharing. Here, we find that national income fluctuations were not fully affected by output shocks and that income risk sharing improved as Ireland became more integrated with the international financial system. These results are immune to the choice of the rest-of-world benchmark to compute idiosyncratic consumption and output.

The rest of the paper is organized as follows. Section 2 studies consumption risk sharing first focusing on international correlations and then taking the regression analysis approach. Section 3 focuses on income risk sharing. Conclusions are presented in Section 4.

## 2 Consumption risk sharing

Most studies focusing on consumption risk sharing base their analysis on a benchmark model that assumes complete markets and frictionless trade in goods. In such model, the following optimal relation holds:

$$\frac{u'(C_{t+1}^i)}{u'(C_t^i)} = \frac{\lambda_{t+1}}{\lambda_t}. \quad (1)$$

More specifically, growth in the marginal utility of consumption in a given country  $i$ , should be equal to the growth in marginal income ( $\lambda$ ) in the rest of the world.

This section builds on two interpretations of this optimal relation. The first one is that marginal utility growth should be perfectly correlated across countries. Following this line of reasoning, the first strategy is to compare international consumption and output correlations.

If agents use international financial markets to insulate consumption from idiosyncratic output shocks, international consumption correlations will be higher than output correlations. The reason for this are mainly two. First, if agents consume out of a fully diversified portfolio this will result in perfectly correlated consumption plans. Second, since capital flows mainly follow return differentials, output correlations will tend to fall as these become stronger.

As discussed above, the general finding of the literature is that this prediction does not hold. Most countries exhibit international output correlations which are larger than consumption correlations.

Several factors may prevent full international risk sharing to take place. Among the most common causes there are market incompleteness, enforcement problems, capital market restrictions, non-tradable or durable goods, exchange rate changes, non-tradable labor income risk and habit persistence.<sup>4</sup> However, Lane (2000) argues that most of these restrictions are unlikely to hold for the Irish economy.

The second part of this section is based on a different interpretation of equation (1). More precisely, the fact that growth in marginal income is the same across countries implies that marginal utility differences between two countries should be independent of idiosyncratic output risk. This could be written as follows

$$E [c_t^i - c_t^* | X_t^i] = 0, \quad (2)$$

where  $c_t^i$  and  $c_t^*$  are country's  $i$  and rest of the world's consumption growth rates.  $X_t^i$  is a vector of time-varying characteristics of country  $i$  (e.g. relative output growth) and  $E$  is the expectation operator.

Following these lines of reasoning, the second approach presented here is a regression analysis. Our goal is to study whether idiosyncratic fluctuations in private consumption are independent of idiosyncratic output shocks. Thus, the larger the coefficient associated with real GDP growth differentials the smaller the degree of consumption risk sharing.<sup>5</sup>

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<sup>4</sup>For a review of this literature and examples of models controlling for some of these factors see Obstfeld (1989, 1995), Backus et al. (1995), Stockman and Tesar (1995), Lewis (1996), Hess and Shin (1997), Heathcote and Perri (2000), Obstfeld and Rogoff (2001), Ravn (2001) and Fuhrer and Klein (2006).

<sup>5</sup>One advantage of this approach, relative to the correlation analysis, is that the regression-based strategy helps putting in evidence the mechanisms through which output and consumption are de-coupled. This is attained by including additional explanatory variables that are interacted with output growth differentials.

## 2.1 Correlation analysis

Table 1 reports Ireland’s international correlations for consumption and output growth in the 1970-2007 period. For consumption we use household consumption expenditure while for output we take GDP. Both variables are measured in constant U.S. dollars and their source is the National Accounts Main Aggregates database of the United Nations.

We then assess the changes in correlations in time and split the above sample into two different sets of sub-samples. Although the goal of this paper is to document whether risk sharing changed in time, we put the focus on two representative dates of the European integration process. First, we split the period in 1993 and then we do it in 1999. We call these “Split 1” and “Split 2”, respectively.

The choice of the former follows the Maastricht Treaty signature while the later the start of the European Monetary Union (EMU). The later is of particular importance for risk sharing in the Irish context. Lane (2009) argues that the introduction of the euro acted as a stimulus for financial liberalization with sharp reductions in interest rates. This relaxed credit constraints and stimulated private consumption. In countries like in Ireland this effect was amplified by booms in the residential and commercial property sectors.

All correlation coefficients for the full period and the two splits are presented in Table 1. The first panel shows international consumption correlations while the second presents output correlations. Rows (1) take the World total in the UN database (excluding Ireland) as the rest-of-world benchmark. In line with the results of Lane (2000) for the 1973-1998 period, we find consumption correlations being stronger than output correlations. This pattern emerges in 1970-2007 period as well as in the different subperiods.

A complete correlation-based analysis should also account for the fact that not all the rest-of-world countries have the same importance. Shocks to financial or trade partners will spread more quickly into the Irish economy. Therefore, if bilateral linkages are not accounted for, a shock to one of these countries could be confused with a shock the idiosyncratic part of Ireland’s output. Taking this into account, we compute correlations and estimate regression models using rest-of-world benchmarks that explicitly account for these linkages.

Rows (2) to (4) use bilateral international investment data.<sup>6</sup> Row (2) uses bilateral portfolio data and computes a rest of the world measure by taking the weighted average of the top fifteen country partners. Following the same methodology, rows (3) and (4) use bank and direct investment linkages, respectively. In all cases, we use foreign assets plus foreign

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However, the goal of this paper is to document risk sharing and assess whether it changed over time. Thus, we do not include additional explanatory variables nor interactions terms.

<sup>6</sup>The source for bilateral portfolio investment is the IMF’s Coordinated Portfolio Investment Survey (CPIS). Bilateral data on bank loans are obtained from the Bank of International Settlements (BIS) locational database while FDI data are from the United Nation Conference on Trade and Development (UNCTAD).



liabilities. We choose to take portfolio investment weights following the theoretical portfolio balance literature that focuses on portfolio investment as a mean for risk diversification. However, these weights may not be entirely informative for the Irish case since this country provides financial centre services. An important part of the flows associated with portfolio investment do not stay in Ireland.<sup>7</sup> Next, we take bilateral bank debt weights having in mind that bank inflows were a crucial determinant for Ireland's GDP growth in the years preceding the crisis. Finally, we use FDI weights taking into account Ireland's particular dependence on direct investment.

As in the broad rest-of-world measure, these correlations give support to the consumption risk sharing hypothesis. International consumption correlations are strong and greater than international output correlations.

Rows (5) present the same set of correlations but taking Ireland's fifteen most important trade partners. This exercise yields results that are similar to the previous case. Consumption correlations are positive and stronger than output correlations. To complement this analysis, Figures 2 and 3 present bilateral consumption and output correlations vis-à-vis each of the 190 countries in the UN database. Instead of aggregating a rest-of-world measure, these present bilateral correlations taking into account Ireland's trade intensities.

Figure 2 shows that many consumption correlations were greater than output correlations in the full period. In particular, this is the case for Ireland's main trading partners. Figure 3 reproduces the previous exercise but taking each subperiod individually. It shows that the standard deviation of consumption and output correlations increased. Moreover, it also shows that bilateral correlations with important trade partners substantially increased in later years.

Several papers report that European countries disproportionately invest in each other (Lane 2006 and Lane and Milesi-Ferretti 2007). To account for this, we report correlations vis-à-vis other advanced, EU and EMU countries in Table 1. Rows (6) to (8) show that international consumption correlations were always larger than output correlations giving further evidence of consumption risk sharing.

Finally, following Lane (2000), we also report two sets of bilateral correlations: vis-à-vis the U.S. and the U.K.. As shown in row (9) bilateral consumption correlations are always larger than output correlations for the former. By contrast, these correlations are different with respect to the U.K. in row (10).

Table 1 also reports these correlations for the two sample splits. In line with the previous results consumption correlations are stronger than output correlations, with a greater

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<sup>7</sup>However, we still use these since they include pension funds, which are not part of Ireland's financial centre services.

difference appearing in the first part of the sample.

An alternative strategy is to focus on GDP net of government consumption and investment. (This is also known as “net output”.) This approach is followed by Obstfeld (1995) and Yakhin (2005) who argue that net output could be a more relevant measure for consumption risk sharing. The latter paper focuses on the differences that emerge when these alternative measures are used and concludes that the degree of international risk sharing change for some countries. Taking this into account, we also computed the above correlations using net output. Our previous results are not affected by this change.<sup>8</sup>

Overall, this assessment suggests that consumption risk sharing took place in the years preceding the crisis and that these results are independent of the consumption and output measures as well as of the rest-of-world benchmark.<sup>9</sup>

## 2.2 Regression analysis

Here, we follow a second interpretation of equation 1. More specifically, the fact that growth in marginal income is the same across countries, implies that marginal utility differences between two countries should be independent of idiosyncratic output risk. With this in mind, we estimate several regression models to further look for consumption risk sharing.

Following the previous subsection, we first focus on a baseline model that takes data for the 1970-2007 period and we estimate model (3).

$$c_t - c_t^* = \beta_0 + \beta_1 (y_t - y_t^*) + \varepsilon_t \quad (3)$$

$c_t$  and  $c_t^*$  are real consumption growth rates in Ireland and in the rest of the world,  $y_t$  and  $y_t^*$  are output growth rates and  $\varepsilon_t$  is a vector of orthogonal residuals.  $\beta_0$  is the intercept that will capture permanent deviations of consumption growth rates which are not explained by relative output growth, while  $\beta_1$  measures the impact of changes in output growth differentials (idiosyncratic output) on consumption.

A positive and large  $\beta_1$  would imply that a large proportion of shocks to domestic production pass-through to consumption. Thus, an increase in  $\beta_1$  is associated with a fall in consumption risk sharing.

Table 2 reports the estimates for model (3) in column (1). In line with the previous findings  $\beta_1$  is less than one, indicating that consumption is partially insulated from idiosyncratic

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<sup>8</sup>However, these correlations provide stronger evidence for consumption risk sharing since international net output correlations are lower than GDP correlations.

<sup>9</sup>Taking into account the related theoretical literature that focus on the welfare of a representative agent, we also computed these correlations for consumption and output per capita. The findings discussed above are robust to this change.

output risk. Following the previous section, we also estimated equation (3) for idiosyncratic consumption and idiosyncratic output, computed using different rest-of-world benchmarks. In all cases, the size of  $\beta_1$  is statistically smaller than one. However, its size varies across specification. For instance, models taking the U.K. or EMU members as benchmarks suggest a relatively low degree of risk sharing. By contrast, those using the U.S. and FDI, suggest stronger risk sharing.<sup>10</sup>

We then augment the above model to account for the fact that consumption risk sharing may have changed with the European integration process. To this end, we estimate model (4).

$$c_t - c_t^* = \beta_0 + \beta_1 (y_t - y_t^*) + (\beta_2 + \beta_3 (y_t - y_t^*)) D_t^i + \varepsilon_t, i = 1993, 1999 \quad (4)$$

$D_t^i$  is a dummy variable taking value one for the later years of each of the above two sets of subperiods and zero otherwise.<sup>11</sup>

Table 2 presents these estimates of different versions of the above model in columns (2) and (3). This table shows that  $\beta_1$  becomes statistically insignificant when the  $D_t^{1993}$  period dummy and its interaction with growth differentials are included. In addition, the interaction of this dummy and output growth is statistically zero, meaning that this period is not associated with a change in consumption risk sharing. The results obtained for the  $D_t^{1999}$  period dummy are similar. (The only difference is that  $\beta_1$  remains statistically significant.) That is to say, we are also unable to identify a change in risk sharing in the EMU years. In line with these findings, Demyanyk et al (2008) find that the EMU has not altered consumption risk sharing in euro area countries.<sup>12</sup> As before, we also estimated these models for all the alternative rest-of-world benchmarks and find that the above results hold.

Column (4) of Table 2 and Table 3 take this analysis one step forward and allows for consumption risk sharing to have two breaking points. That is, we include the  $D_t^{1993}$  and  $D_t^{1999}$  dummy variables simultaneously and add their interactions with output growth in the same empirical specification. Again, we do not find a statistically significant effects.<sup>13</sup>

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<sup>10</sup>t-tests based on Monte Carlo simulations indicate that  $\beta_1$  coefficients are different across models using different rest-of-world benchmarks.

<sup>11</sup> $D_t^{1993}$  is a dummy variable taking value one for the 1993-2007 years and zero otherwise.  $D_t^{1999}$  is a dummy variable taking value one for the EMU years (1999-2007) and zero otherwise.

<sup>12</sup>That paper takes a different strategy to analyze the EMU effect. More specifically, it focus on bilateral comovements in consumption among pairs of advanced countries and study the effect of the EMU by interacting idiosyncratic output growth with dummy variables indicating whether the country belongs to the EMU or not. The evidence produced by papers following this strategy and different data types and sources is mixed. Using Penn World Tables data for consumption and GDP, Gerlach and Hoffmann (2008) find that the EMU has improved risk sharing. Lane (2009) confirms these results by estimating these coefficients and obtaining the same sign (in his estimates, these are statistically insignificant) when he uses the same data source. However, when Lane (2009) uses UN, data as we do here, no evidence for an EMU effect emerges.

<sup>13</sup>Alternatively, we also estimated a panel version of all these models but taking bilateral consumption and

In summary, the regression analysis provides further evidence of consumption risk sharing in the 1970-2007 period. When we include both period dummies and the associated interactions terms, the coefficients linking idiosyncratic output growth with consumption become statistically zero in most cases.<sup>14</sup>

These findings seem to be at odds with the increase in financial globalization experienced by Ireland. However, they are consistent with the findings of Artis and Hoffmann (2008a). That paper, argues that consumption-based indicators of risk sharing are unable to pick up the increase in risk sharing because consumption has also been affected by the decline in output volatility, experienced by advanced countries after the 1980s. Moreover, that period is associated with a more gradual response of output to idiosyncratic shocks. Since consumption responds to permanent innovations, it appears to be more volatile in relation to the shifts in output. Additionally, the fact that global shocks became less volatile made international consumption correlations not to increase as international financial linkages became stronger.

### 3 Investment income risk sharing

A complementary approach to assess international risk sharing is to focus on income. While consumption risk sharing deals with ex-post risk sharing, through savings and dissavings, income risk sharing deals with ex-ante risk sharing. The latter is more related to contingent assets. Although complementary, this approach has two main advantages relative to the previous strategy. First, national income data is easier to measure and therefore it is less subject to measurement errors. Second, this strategy is immune to the problems associated with changes in consumption preferences.

Taking this into account, this section studies whether international income flows help stabilizing Ireland's GDP fluctuations. More specifically, we look for evidence of net income inflows increasing when Ireland's GDP growth falls relative to the rest of the world.

This is of particular interest in the context of the Irish economy because a large share of its GDP is generated by multinational firms. Accordingly, Figure 1 shows that *GDP* was larger than *GNI* during most of the years considered here. Its ratio exhibited a negative

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output growth differentials for three groups of countries: advanced, EU and EMU. The results produced by this alternative strategy are in line with our previous findings.

<sup>14</sup>The fact that  $\beta_1$  becomes statistically insignificant in models with period dummies and interaction terms does not necessary mean that output growth was orthogonal to consumption growth in the early years of the sample. This could be related to presence of multicollinearity between growth and its interaction term with the dummy variables. Although this correlation reduces the precision of the coefficient estimates, these are consistent and therefore, could be used to assess the change in consumption risk sharing if the difference between  $\beta_1$  in the baseline, and  $\beta_1$  in models including the dummies and interaction terms is statistically significant.



trend that lasted until 2002, where GDP was greater than GNI by a factor of 1.2. Although this negative trend was reversed in subsequent years, the *GNI/GDP* ratio started falling again in 2007 with a minimum in 2009. In that year GDP was more than 23 percent larger than GNI.

Following the previous section we present a set of regression estimates to analyze the conditional correlations between the change in the *GNI/GDP* ratio and GDP growth deviations from different rest-of-world measures. Column (1) of Table 4 presents the baseline estimates taking the full period and the world total excluding Ireland as the rest-of-world benchmark. It shows that a very low proportion of the *GNI/GDP* variance can be explained by GDP growth deviations alone.

By contrast, the inclusion of interaction terms between the period dummies and output growth, in columns (2) and (3), importantly improves the performance of these models. Here, the interaction terms between output growth and the period dummies suggest that income risk sharing improved over time. The coefficients are negative indicating that increases in net income flows were associated with decelerations of relative GDP. These results emerge in models using both period dummies.

As in the consumption-based case, column (4) of Table 4 and Table 5 present the estimates of models including both period dummies. These show that the income risk sharing improved after 1993 and improved further after 1999 for most rest-of-world benchmarks.

These findings are in line with Sørensen et al (2007) reporting evidence of income smoothing after 1990 in advanced countries and Demyanyk et al (2008) finding that the pass-through from gross domestic product shocks to gross national income declined in the EMU years for euro area members. Moreover, these results are in line with the findings of Artis and Hoffmann (2008b) showing that consumption risk sharing has importantly increased in OECD countries through international investment income flows.

## 4 Conclusions

This paper provides new correlation- and regression-based evidence on international consumption and income risk sharing in Ireland. In particular, we show that idiosyncratic output shocks did not fully pass-through to consumption and national income during the years preceding the crisis.

Additionally, we find that consumption risk sharing was fairly stable in time and that income risk sharing improved as Ireland became more integrated with the international financial system. The latter result is in line with findings of Lane (2000) showing that Ireland's international equity positions contributed to risk diversification. Furthermore, we find that

the existence of income and consumption risk sharing was not dependent on the rest-of-world benchmark used to construct idiosyncratic output or idiosyncratic consumption.

We find evidence indicating consumption and income paths were partially insulated from idiosyncratic output shocks before the outbreak of the crisis. This suggests that the impact of the current crisis on these variables could have been stronger in the absence of these international diversification mechanisms.

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Table 1: Ireland's GDP and consumption correlations vis-à-vis selected country groups.

Ireland vis-à-vis	(1970-07)	Split 1		Split 2	
		(1970-92)	(1993-07)	(1970-98)	(1999-07)
$\text{corr} ( c , c^* )$					
(1) ROW	0.49	0.61	0.60	0.51	0.65
(2) PI	0.48	0.60	0.74	0.52	0.76
(3) BANK	0.50	0.58	0.72	0.53	0.72
(4) FDI	0.62	0.68	0.70	0.67	0.73
(5) TRADE	0.49	0.57	0.70	0.51	0.74
(6) ADV	0.43	0.60	0.72	0.49	0.79
(7) EU14	0.39	0.59	0.72	0.44	0.83
(8) EMU11	0.30	0.57	0.70	0.36	0.86
(9) U.S.	0.46	0.45	0.64	0.46	0.72
(10) U.K.	0.44	0.43	0.50	0.44	0.44
$\text{corr} ( y , y^* )$					
(1) ROW	0.10	0.09	0.31	0.08	0.14
(2) PI	0.19	0.18	0.68	0.18	0.66
(3) BANK	0.21	0.13	0.63	0.18	0.67
(4) FDI	0.27	0.14	0.69	0.23	0.71
(5) TRADE	0.21	0.15	0.60	0.19	0.61
(6) ADV	0.15	0.24	0.63	0.17	0.54
(7) EU14	0.17	0.18	0.64	0.15	0.61
(8) EMU11	0.12	0.21	0.64	0.12	0.60
(9) U.S.	0.19	0.16	0.52	0.19	0.56
(10) U.K.	0.20	0.03	0.40	0.15	0.62

**Note:** Correlations are computed using the real growth rate of household consumption expenditure and GDP from the UN National Accounts Main Aggregates database.

Table 2: Idiosyncratic consumption as dependent variable.

(c-c*)	(1)	(2)	(3)	(4)
(y-y*)	0.50*** (0.12)	0.22 (0.13)	0.41*** (0.14)	0.22 (0.14)
D1993		0.98 (0.86)		0.19 (0.98)
D1993x(y-y*)		0.34 (0.23)		0.39 (0.32)
D1999			0.90 (0.91)	0.82 (1.15)
D1999x(y-y*)			0.26 (0.23)	0.06 (0.35)
$R^2$	0.28	0.39	0.35	0.40

**Note:** Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively. All models include a constant. Idiosyncratic output growth is constructed using World total in the UN database excluding Ireland.

Table 3: Two sample breaks: idiosyncratic consumption as dependent variable. Alternative rest-of-world benchmarks.

(c-c*)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PI	BANK	FDI	TRADE	ADV	EU14	EMU11	U.S.	U.K.
(y-y*)	0.23 (0.18)	0.31* (0.18)	0.20 (0.19)	0.31* (0.18)	0.18 (0.20)	0.27 (0.21)	0.23 (0.22)	0.23 (0.23)	0.53*** (0.18)
D1993	0.61 (1.09)	0.64 (1.00)	0.49 (0.94)	0.48 (0.93)	0.33 (1.13)	1.05 (1.55)	1.22 (1.84)	0.24 (0.81)	0.48 (0.93)
D1993x(y-y*)	0.28 (0.35)	0.19 (0.33)	0.23 (0.35)	0.23 (0.33)	0.38 (0.37)	0.23 (0.41)	0.26 (0.45)	0.27 (0.38)	0.03 (0.26)
D1999	0.75 (1.64)	0.85 (1.59)	1.60 (1.78)	1.15 (1.48)	0.75 (1.55)	0.80 (1.95)	1.00 (2.18)	0.37 (1.22)	0.67 (1.39)
D1999x(y-y*)	0.05 (0.41)	0.03 (0.39)	-0.09 (0.45)	-0.03 (0.38)	0.07 (0.39)	0.01 (0.43)	-0.02 (0.46)	0.15 (0.38)	0.05 (0.34)
$R^2$	0.41	0.41	0.36	0.40	0.42	0.44	0.47	0.31	0.40

**Note:** Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively. All models include a constant. Coefficients associated with (y-y\*), D1993x(y-y\*) and D1999x(y-y\*) are jointly significant at standard confidence levels in most models. The exceptions are those in FDI and EMU11, with associated p-values of 0.26 and 0.11, respectively.



Table 4:  $\Delta \ln(GNI/GDP)$  as dependent variable.

$\Delta \ln(\frac{GNI}{GDP})$	(1)	(2)	(3)	(4)
(y-y*)	-0.02 (0.08)	0.07 (0.11)	0.05 (0.08)	0.07 (0.11)
D1993		2.05** (0.79)		2.11*** (0.57)
D1993x(y-y*)		-0.46** (0.19)		-0.35* (0.18)
D1999			2.36** (1.05)	0.37 (1.17)
D1999x(y-y*)			-0.69*** (0.21)	-0.35 (0.24)
$R^2$	0.002	0.22	0.24	0.31

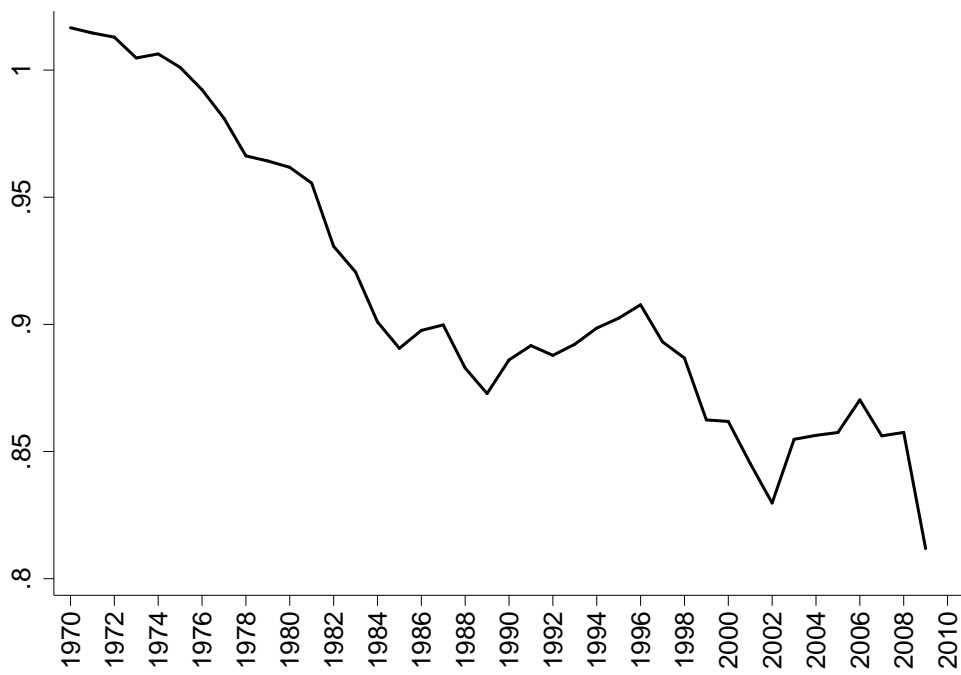
**Note:** Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively. All models include a constant.

Table 5: Two sample breaks:  $\Delta \ln(GNI/GDP)$  as dependent variable. Alternative rest-of-world benchmarks.

$\Delta \ln(\frac{GNI}{GDP})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PI	BANK	FDI	TRADE	ADV	EU14	EMU11	U.S.	U.K.
(y-y*)	0.03 (0.11)	0.03 (0.10)	0.01 (0.11)	0.04 (0.11)	0.03 (0.11)	-0.01 (0.10)	-0.03 (0.10)	0.06 (0.10)	0.07 (0.09)
D1993	2.05*** (0.55)	2.01*** (0.52)	1.84*** (0.52)	1.94*** (0.49)	2.12*** (0.57)	2.34*** (0.61)	2.45*** (0.67)	1.50*** (0.43)	1.80*** (0.46)
D1993x(y-y*)	-0.29* (0.17)	-0.29* (0.16)	-0.26 (0.18)	-0.29* (0.16)	-0.31* (0.18)	-0.29* (0.17)	-0.28 (0.17)	-0.25 (0.17)	-0.29** (0.14)
D1999	1.75 (1.53)	1.65 (1.49)	1.84 (1.59)	1.59 (1.44)	1.59 (1.50)	1.11 (1.51)	0.96 (1.53)	2.25 (1.66)	1.47 (1.34)
D1999x(y-y*)	-0.56* (0.29)	-0.55* (0.28)	-0.59* (0.32)	-0.55* (0.28)	-0.53* (0.29)	-0.43 (0.26)	-0.40 (0.25)	-0.69* (0.38)	-0.53* (0.28)
$R^2$	0.29	0.28	0.26	0.29	0.31	0.25	0.24	0.34	0.29

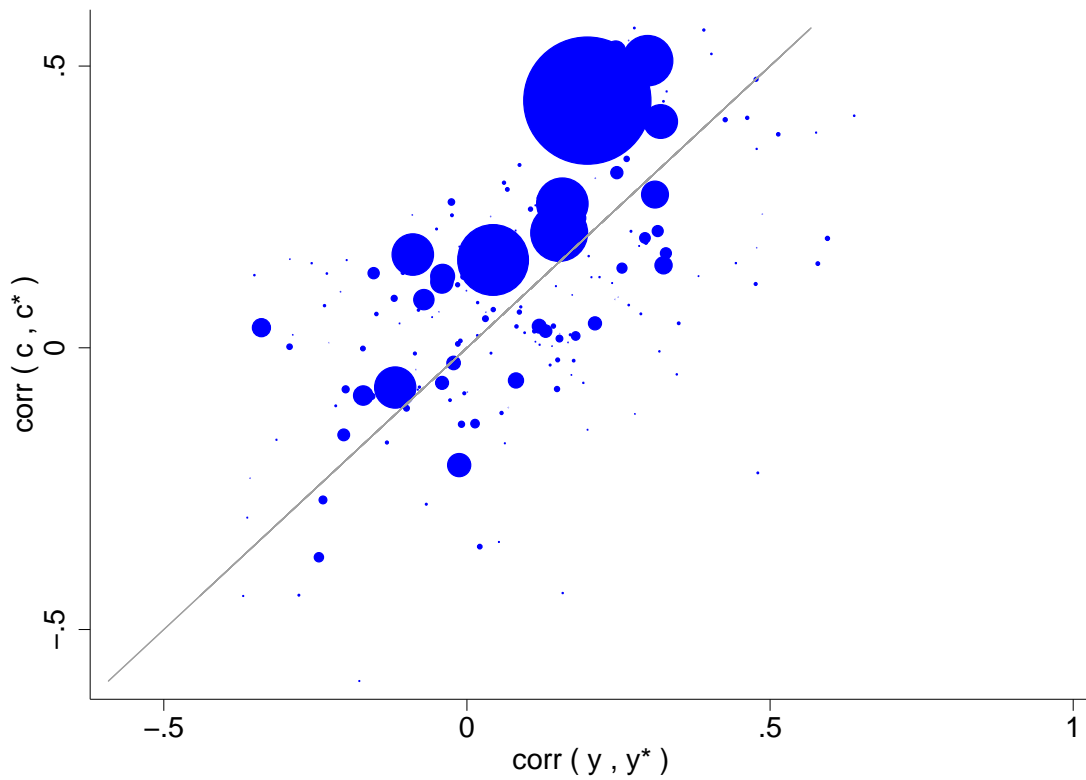
**Note:** Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significant at 1%, 5% and 10% respectively. All models include a constant.

Figure 1:  $\frac{GNI}{GDP}$  ratio



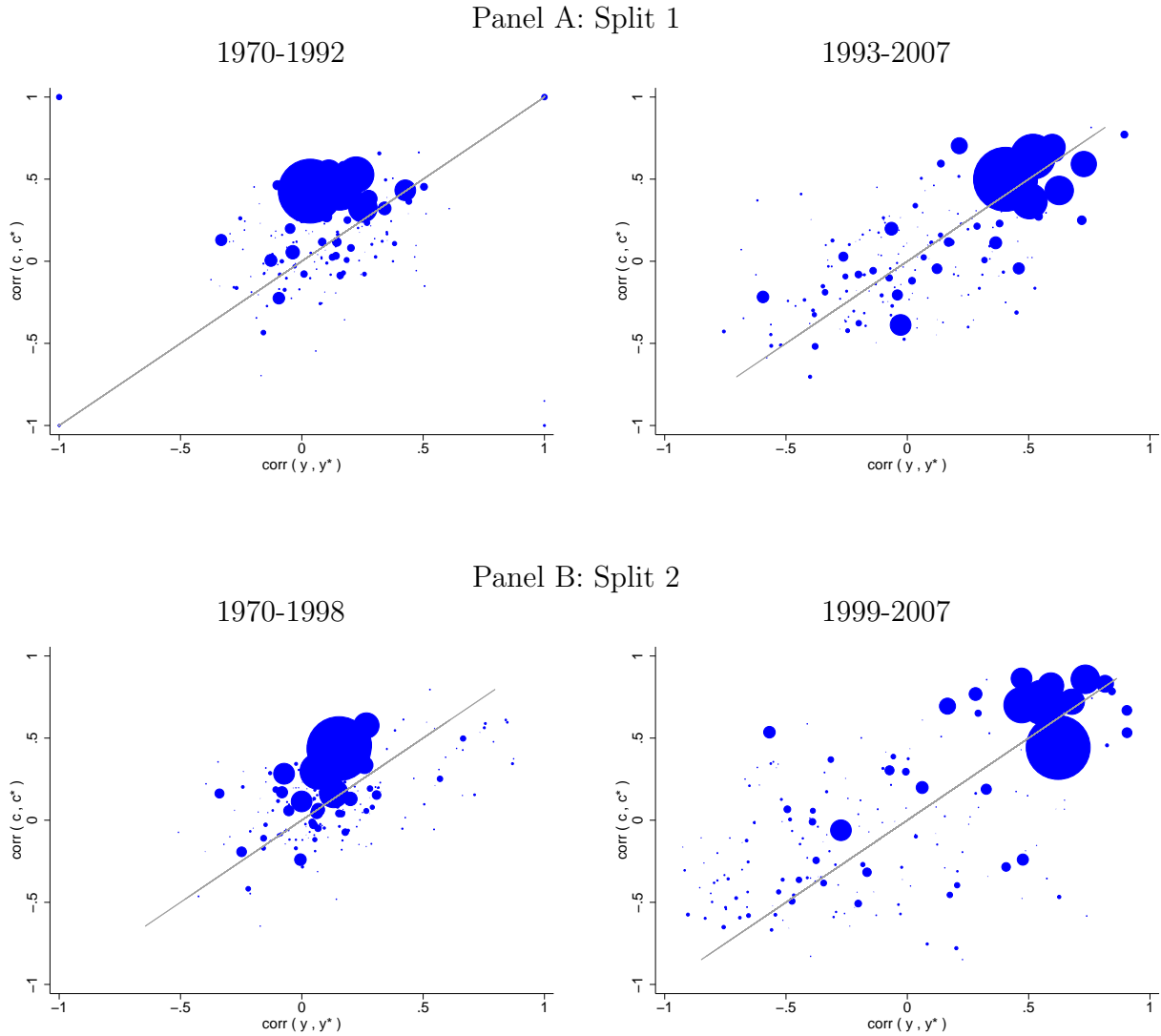
**Source:** Author's calculations based on IMF and OECD data.

Figure 2: GDP and consumption correlations. Full period: 1970-2007



**Note:** Ireland's bilateral correlation with respect to 190 countries in the United Nations database. Bubble size indicates trade intensity.

Figure 3: GDP and consumption correlations: different subperiods.



**Note:** Ireland's bilateral correlation with respect to 190 countries in the United Nations database. Bubble size indicates trade intensity.



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