

NATIONAL INSTITUTIONS AND INTERNATIONAL MACROECONOMICS: Within-Country Risk-Reallocation under Incomplete Markets*

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Abstract

The paper explores empirically the possibility that, when risks cannot be fully diversified on international financial markets, as it is the case of fluctuations in labor incomes, national institutions may provide some form of *within-country risk-reallocation* and significantly alter the way aggregate consumption responds to idiosyncratic income shocks. Based on a consumption insurance test modified to account for the interaction between shocks and institutions, the analysis is made on a panel of macroeconomic shocks and labor and credit market institutions for 15 OECD countries observed over the 1971-2003 period. Estimation results clearly detect the existence of a (so far) unexplored insurance channel: institutional settings play a significant role in smoothing out the effects of country-specific shocks, and results from the (baseline) cross-sectional analysis are robust to the inclusion of institutional time-series information and of further international macroeconomics concerns such as the impact of aggregate world-wide shocks and of cross-country real price changes.

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1 Introduction

Understanding whether people effectively insure against country-specific shocks to their income or wealth is a central concern in international macroeconomics. Standard representative agent models of international trade in risky assets state that, when markets are complete and there are no trade costs, optimizing agents should use markets in contingent claims to fully insure. Assuming a standard (in macroeconomics) power utility function, these models lead to very strong testable predictions: cross-country consumption movements should be the same and should not be affected by country-specific circumstances (the so-called "full consumption insurance hypothesis"). A theory which has been soundly rejected by the data: empirical studies observe a substantial lack of risk-sharing in consumption comovements across countries (*consumption home bias*).¹ Moreover, consumption correlations are not just less than perfect, but even lower than output ones, the so-called *consumption correlation puzzle* (Backus Kehoe and Kydland, 1992).

As a rejection of the full consumption insurance hypothesis raises serious questions about how the economy behaves, a great deal of economic literature has tried to reconcile the theory with the data. Over the past years, the three assumptions at the basis of the standard model, namely, a power utility function, costless asset trading, and complete markets, have been progressively relaxed and macroeconomists have provided several plausible but not fully satisfactory explanations. The remaining empirical puzzles signal that our understanding of how the economy works is far from being perfect.²

This paper falls in the strand of studies which focus on studying risk-sharing under incomplete markets, and contributes to the ongoing debate by addressing a topic still unexplored in theory and not documented empirically: the relationship between international asset trade in risky assets and (national) institutional insurance provisions. It explores empirically the possibility that, when risks cannot be fully diversified on financial markets, as it is the case of fluctuations in labor incomes, national institutions may provide some form of *within-country risk-reallocation* and affect the response of aggregate consumption to idiosyncratic income shocks.

The analysis is motivated by the idea, first suggested by Bertola and

¹On testing consumption insurance see, for instance, Mace (1991) and Cochrane (1991) on micro data, and Obstfeld (1994), on consumption comovements across countries.

²Besides home bias in consumption, complete markets models have proved to be unable to explain several empirical facts. For an overview on the six major puzzles in international macroeconomics see the paper by Obstfeld and Rogoff (2000). Combined with the critique raised by Engel (2000), it represents a good example of how far the literature is from having found convincing and resolute answers.

Drazen (1994) in a paper on capital flow volatility, that when individuals differ in the possibility to access financial markets to insure consumption there could be an incentive for governments to use institutional instruments to smooth out the effects of country-specific shocks. While not modelled in international macroeconomics, the possibility that a wide array of institutional arrangements may introduce a (generic) social insurance component in disposable incomes is not new to labor economics. The "social insurance approach to institutional analysis" states that, when private markets cannot perfectly accommodate households' demand for insurance against labour income risk, labour market institutions represent a second-best instrument for sharing risks.³ As existing contributions in the field focus on shocks which cancel-out in the national aggregate, what is missing in labor economics is the assessment of the insurance outcomes of institutions when the shock is idiosyncratic to a country as a whole instead that to a single domestic individual or sector.

The approach proposed in the present paper, by exploiting elements from both international macroeconomics and labor economics, bridges the two strands of literature and uncovers novel and useful insights on risk-sharing opportunities available under incomplete markets. It introduces (non-market) institutional insurance elements in a macroeconomic analysis of international trade in risky assets, and shows how the inclusion of these national features may substantially affect the transmission of country-specific income shocks.

While the role of within-country risk-reallocation is explored in theory in a companion working paper (Lo Prete, 2007), this article focuses on testing the effects of institutional risk-sharing arrangements on observed international consumption growth rates. To introduce to the basic argument, the analysis hinges upon the idea that labor market institutions, by promoting risk-reallocation within national borders, reduce the fluctuations of otherwise uninsured labor incomes at the expense of an amplification of the fluctuations of tradable national income components, overall altering the way aggregate consumption and capital flows respond to country-specific income shocks. The existence of a (so far) unexplored insurance channel will be demonstrated by showing that different institutional settings produce different consumption volatility outcomes. OECD countries differ along several institutional dimensions and this heterogeneity will be exploited (à la Blanchard and Wolfers) to point out the significance of the interaction between

³The idea that a set of institutions may provide labor incomes with a non-market insurance component dates back to Azariadis (1975). But it has been explicitly addressed and formalized only in 1990s, to assess the (social) insurance role of labor market institutions under incomplete market as, for instance, in Blank and Freeman (1994) and Agell (1999, 2002).

shocks and institutions. The analysis is based on a panel of macroeconomic shocks and labour and credit market institutions for 15 OECD countries observed over the 1971-2003 period. Estimation results are relevant for their implications and for their high statistical significance: institutional settings play a significant role in smoothing out the effects of country-specific shocks, and results from the (baseline) cross-sectional analysis are robust to the inclusion of time-series information and of further international macroeconomics concerns (e.g. the impact of aggregate world-wide shocks and cross-country real price changes).

The paper is organized as follows. Section 2 relates the approach to the literature and outlines the scope of the analysis. Section 3 defines which (national) labour and credit market institutional features may be relevant in terms of consumption insurance, and briefly discusses how institutions may interact with macroeconomic shocks to generate within-country risk-reallocation. Section 4 presents the estimation strategy and the database. The econometric specification merges the empirical methodology used for testing consumption insurance in international macroeconomic models and the one introduced by Blanchard and Wolfers (2000) to study the interaction between macroeconomic shocks and labour market institutions. The dataset is briefly described, referring to the Appendix for a detailed presentation of institutional measures. The next two Sections present estimation results. Section 5, besides reporting on qualitative results from the (baseline) cross-sectional specification, illustrates the "quantitative" impact of within-country risk-reallocation provisions by providing insights on which (individual) institutions and which countries do a better job in smoothing out idiosyncratic shocks. Then, it shows that results are robust to the inclusion of information on institutional time variation, and discusses some econometric issues. Section 6 assesses the reliability of the empirical approach with respect to some international macroeconomic concerns by accounting for the potential role of common worldwide shocks and relative real (cross-country) price changes. Section 7 concludes.

2 Motivation and scope of the analysis

Models of international assets trade where people can access complete markets to fully insure against idiosyncratic risks represent a valuable work-house to study risk allocation. In practice, however, the behaviour of cross-country (per capita) consumption growth rates and capital flows reflects the existence of a more imperfect and complicated world than the one formalized by standard representative agent models of international trade in risky assets.

Financial markets can be incomplete and imperfect along several dimensions. In reality, it seems difficult for people to privately diversify every kind of risk to their income or wealth: intratemporal trade in state-contingent securities does not accommodate demand for insuring, for instance, against fluctuations in labor incomes; and even accessing alternative consumption smoothing channels, like intertemporal trade in riskless bonds, appears not easy in a world where lending and borrowing opportunities are limited by the existence of many credit markets imperfections. This departure from the complete markets' paradigm suggests that, in a second-best environment, there could be scope for non-market insurance mechanisms, such as formal and informal institutions, to provide risk-sharing arrangements as an alternative to asset trade on international financial markets.

To introduce to the basic argument, this Section relates the approach proposed in the paper to the literature, first, with regard to international macroeconomics and, next, with regard to labor economics; then, it summarizes the main contributions of the analysis and its scope.

2.1 International macroeconomics: sharing idiosyncratic risk

A large literature in international macroeconomics focuses on answering the question of whether people effectively insure against country-specific shocks to their income or wealth. Since the classic works by Arrow (1964) and Debreu (1959), economists have used representative agent models of international trade in risky assets to think about cross-country risk allocation. According to standard analytical frameworks, when markets are complete and there exist no trade costs agents exploit the benefits from sharing risks on international financial markets and fully insure against future contingencies. Under the additional assumption of homothetic preferences, these models imply very strong testable predictions: consumption movements across countries should be the same and should not be affected by country-specific shocks

(the so-called "full consumption insurance hypothesis"). In early 1990s, empirical research has found that data did not match these theoretical predictions. Testing consumption insurance, Obstfeld (1994) and other authors found that consumption comovements across countries reflected a substantial lack of risk-sharing (*consumption home bias*). Moreover, Backus, Kehoe and Kydland (1992) estimated that consumption correlations were not just less than perfect, but even lower than output ones (the *consumption correlation puzzle*).

As the behaviour of international consumption and capital flows seems to reject the perfect risk-sharing prediction of classic complete markets models, a great deal of literature has sought to reconcile the theory with the data. Puzzles stem from (only) three basic assumptions: a power utility function, costless asset trading, and complete asset markets. Over the past years, the three hypotheses have been progressively relaxed, and economists have extended the baseline model in several directions.

A first strand of explanations starts by keeping the hypothesis of complete markets. Some authors studied the consequences of choosing utility functional forms other than those in the HARA class, and analyzed the impact of habit formation (Fuhrer and Klein, 1998) and other kinds of comparative behaviour. Others figured out a role for non-separable components in the utility function, such as non-traded goods (Stockman and Tesar, 1995) and government spending (Marrinan, 1998), introduced barriers to trade (Obstfeld and Rogoff, 2000), analyzed the impact of combinations of trade costs and non-separabilities (Lewis, 1996). Unfortunately, all these studies failed to provide exhaustive explanations for consumption puzzles.

A second approach consists in stepping outside the complete markets framework and admitting that people cannot privately insure against every kind of risk. In this case agents will reasonably look for alternative insurance mechanisms; thus, the issue becomes that of identifying these alternatives and of modifying the basic modelling set-up to account for their potential role.

A first well-known alternative is represented by intertemporal consumption smoothing. Even if risks are not fully insurable by trade in contingent securities, agents may self-insure by borrowing and lending on credit markets. According to the permanent income hypothesis (PIH), consumption is expected to respond to idiosyncratic shocks, even if only to their permanent component, thus leading to a failure of the full insurance paradigm. Moreover, when markets, besides being incomplete, are imperfect, people's behaviour can depart from the PIH, too, and consumption may exhibit some sensitivity to current income. The topic has been addressed by macroeconomists from the point of view of measuring the separate or joint contribution

to risk-sharing of the intertemporal consumption smoothing channel and of intratemporal risk-sharing opportunities (see, for a discussion on the issue, Asdrubali and Kim, 2005).

The paper focuses on a second potential and, in international macroeconomics mostly unexplored, alternative, represented by country-specific risk-sharing opportunities provided by national institutions. As first suggested by Bertola and Drazen (1994) in a paper on capital flow volatility, when individuals differ in the possibility to access financial markets to smooth consumption, there could be an incentive for governments to use institutional instruments to smooth out the effects of country-specific shocks. The paper takes this argument further, and analyzes what happens at an international level when national institutional settings play a role in filtering idiosyncratic shocks and generate what is defined "within-country risk-reallocation".

2.2 Labor economics: assessing the outcomes of institutions

The background for the present approach to the analysis of the (insurance) macroeconomic outcomes of institutions can be found in labor economics. This literature addresses as separate topics, and from different perspectives, the two elements at the heart of the analysis proposed in the thesis: the insurance role of national institutions, and the impact of labor market institutions on macroeconomic shocks. Thus, the issue becomes to merge these approaches, potentially paving the way for a new strand of contributions in the field.

The idea that there exists an insurance rationale behind the setting-up of national policies is not new to labor economics and constitutes the basis of the so-called "social insurance approach to institutional analysis" (see, for instance, Blank and Freeman, 1994, and Agell, 1999). The latter states that, when private markets cannot perfectly accommodate households' demand for insurance against labour income fluctuations, several characteristics of institutional interference with free-market outcomes are meant to provide risk-sharing opportunities rather than mirroring rent-seeking behaviour. Recent examples of studies on the topic analyzed the role of wage bargaining (Agell and Lommerud, 1992, and Agell, 2002), job security provisions (Bertola, 2004), unemployment insurance benefits (Acemoglu and Shimer, 2000). All the contributions in the field focus on income shocks which are idiosyncratic to an individual agent or sector within a country and cancel-out in the national aggregate. The paper, instead, will focus on

(aggregate) country-specific shocks and on the macroeconomic outcome, in terms of within-country risk-shifting arrangements, of national labor market policies.

What has been analyzed from a macroeconomic perspective is the role of labor market institutions in affecting unemployment dynamics. According to the so-called "Unified theory" (see Blank, 1997) exogenous macroeconomic shocks and labor market institutions interact among each other and influence unemployment outcomes. As the works of Blanchard and Wolfers (2000), and Bertola et alii (2002) confirm, differences in the response of unemployment rates to common shocks among OECD countries may be explained by the presence of heterogeneous institutional settings. Despite the different subject under analysis, the same analytical tools used by these authors can be exploited in the paper to investigate the shocks-institutions interaction in terms of risk-reallocation, and to study its effects on the behaviour of international consumption growth rates in response to country-specific exogenous income shocks.

2.3 The role of national institutions in international macroeconomics

The above discussion, by linking elements apparently far apart in the literature, has uncovered a new perspective on the potential role of national formal institutions in smoothing-out country-specific macroeconomic shocks. This Subsection summarizes the main contributions that the analysis proposed here will bring to the literature and, then, outlines few points on its scope.

The paper addresses a topic still unexplored in theory and not documented empirically: the connection between asset trade on international financial markets and non-market insurance provisions via national institutional settings. In doing so, it contributes to both international macroeconomics and labor economics as, on one hand, international macroeconomists did not figure out a role for formal institutional insurance provided by national institutions in affecting consumption and capital flows dynamics; on the other hand, labor economists did not stress the insurance role of labor market institutions in smoothing out aggregate (to a country) income shocks. In summary, the approach proposed, by exploiting elements from both international macroeconomics and labor economics, bridges the two strands of literature and offers novel and useful insights on risk-sharing opportunities available under incomplete markets.

To capture the idea that national institutional features matter, the paper tests empirically the effects of within-country risk-reallocation on observed international consumption growth rates. The empirical specification will merge elements from econometric studies of both international macroeconomics and labor economics. OECD countries differ along several institutional dimensions and this heterogeneity will be exploited (à la Blanchard and Wolfers) to stress the significance of shocks-institutions interactions: the existence of a national formal non-market insurance channel will be demonstrated by proving that different institutional settings produce different consumption volatility outcomes. Before proceeding, a couple of points are worth noting on the scope of the analysis.

As anticipated when reviewing the literature on consumption insurance, there are at least two broad alternatives to risk-sharing on international financial markets, and, hence, two broad structural features that can be expected to influence the transmission of idiosyncratic income shocks: the mix of labor market policies, which relates to the intratemporal dimension of consumption smoothing (within-country risk-reallocation); and the efficiency of credit markets, which relates to self-insurance and liquidity constraints (intertemporal consumption smoothing). Hence, the empirical analysis will account for both labour and credit markets' heterogeneity.

The second point regards policy complementarities among institutional dimensions. Several studies investigate the interactions among labor market policies (see, for instance, Coe and Snower, 1997, and Bertola and Rogerson, 1997), as well as the relationship between labor and credit markets institutions, to explore the possibility that standard intratemporal insurance-based incentives to implement redistribution policies are enhanced when people cannot fully access intertemporal trade in noncontingent bonds (Bertola and Koeniger, 2007). Unfortunately, in theory, the complementarities among institutions are still poorly understood. The empirical analysis will implicitly avoid the issue by studying the impact of within-country risk-reallocation à la Blanchard and Wolfers (2000), that is, by allowing each institution to interact separately with macroeconomic shocks.

Overall, how a rich set of national institutions interferes with free-market outcomes is a complex phenomenon whose analysis goes far beyond the scope of the present study. Hence, leaving to future research the task to deepen these topics, the next Sections will focus on the central question of whether the interaction between shocks and national institutional features may alter the predictions of standard representative agent models of international trade in risky assets and, in doing so, will provide a new perspective on our way of thinking about risk allocation.

3 Country-specific institutional features influencing consumption insurance

To define labor and credit markets characteristics and provide information on both the cross-sectional and the time-varying dimensions of institutions, the OECD and several authors have collected various indicators of institutional intervention. These variables are useful but imperfect measures of the institutional dimensions they want to represent, and some caution is needed when evaluating their informative contribution in empirical analyses. Hence, before presenting the main features of the indicators, few remarks are worth noting on general limitations to our knowledge of institutional features and on how these measures have been used in the literature.

There are several gaps in both cross-sectional and time-series data: comparable indicators are not available for all the OECD countries; and, in past decades, data have not always been recorded on a yearly basis, so that information on time variation is sometimes scarce. Papers that have first analyzed the interaction between shocks and institutions and on which the empirical strategy of the paper will be grounded (i.e. Blanchard and Wolfers, 2000 and Bertola et alii, 2002), got valuable results only by using time-invariant measures. As their authors state, while worrying, these findings may depend on the poor quality of available data and, overall, the choice to consider current values of institutions if people are taking forward looking decisions based on their expected impact may be at least questionable. A recent strand of empirical literature on the macroeconomic outcomes of labor market institutions focused on filling the gaps in institutional time-series to better exploit time variation. Unlike previous studies, results support the hypothesis that changes in institutions alone may explain unemployment shifts in the OECD countries, thus revaluing the importance of time-series information, but at the price of quite tricky compilation strategies and over-refined empirical specifications (see Nickell et alii, 2005).

This Section outlines both cross-sectional and time-varying features of institutional indicators. The database that has been collected for the paper includes data on 15 OECD countries observed over the 1971-2003 period, and differs from those ones used in the above quoted studies as it exploits a refined set of indicators. Referring to the Appendix for a detailed description of the variables, the following discussion points out which institutional features may be relevant in terms of consumption insurance, first presenting their cross-sectional characteristics, then analyzing how the same institutions have changed over time and which information can be added by exploiting their time variation.

3.1 Institutional indicators: cross-sectional heterogeneity

The first step of the analysis will be to define the main characteristics of the institutional structures of labor and credit markets by exploiting information on cross-sectional heterogeneity. Institutions in the labor market will be grouped in four main categories, according to whether they relate to employment protection, unemployment benefits systems, wage bargaining process, and labor taxation. Then, structural features of credit markets will be summarized by using an indicator of credit supply conditions.

Employment protection

Employment protection legislation (EPL) is the mix of all the mandatory measures that regulate hiring and firing with the aim to protect employment. The OECD provides two synthetic indicators of the tightness of EPL. Both measures account for several dimensions of employment protection which pertain to laws governing regular and temporary contracts, and differ in that the more recently compiled, the so-called "version 2", adds items on collective dismissals' requirements. Table 1 reports the values of the two indicators in early 2000s. Looking at the Spearman's rank correlation coefficient, the information provided on the relative position of countries is almost the same aside from the version. Turning to the data, there is a wide variation of EPL across states: "Anglo-Saxon" countries have less stringent regulations; Continental Europe, despite a notable variety in provisions, grants a great protection to workers; Denmark departs from the "Continental model", and constitutes a third way by combining low EPL and high social protection, the so-called "flexicurity" approach. Along with social protection, these policies are usually viewed as determinants of labor market "rigidity". Actually, the effect of EPL on employment and wages is quite ambiguous and closely related to the wage setting process, while their (beneficial) impact on workers' welfare and productive efficiency when markets are incomplete has been assessed in some recent contributions (see for instance Bertola, 2004). The present analysis on EPL insurance outcomes against aggregate shocks will add a new dimension to the ongoing debate. As outlined in labor economics, in presence of turnover costs the labour share is increased (decreased) when business conditions turn bad (good) with respect to what would happen in a free-market economy (see Kessing, 2003, and Giammarioli et alii, 2002). Adjustment costs drive a wedge between the marginal product of labor and the wage that firms pay to employees and, hence, reduce labor income fluctuations across states of nature. Overall, employment protection policies are expected to play a significant role in reallocating risks within national

Table 1. National Institutional Features, early 2000s (first part)

	Employment Protection Index		Benefit Replacement Rates (%)		Benefit Duration (monthly)	ALMPs Index
	EPL version 1	EPL version 2	NRRs	GRRs		
Austria	2,2	1,9	73	32	9	11,0
Belgium	2,5	2,2	65	38	unlimited	18,8
Canada	1,1	0,8	51	15	9	5,9
Denmark	1,8	1,4	79	51	48	35,0
Finland	2,1	2	77	35	23	10,3
France	2,9	3	73	44	30	14,6
Germany	2,5	2,2	76	30	12	14,8
Italy	2,4	1,9	6	34	6	4,9
Japan	1,8	1,8	65	9	10	5,7
Netherlands	2,3	2,1	77	53	18	60,6
Portugal	3,5	3,5	69	41	24	14,6
Spain	3,1	3,1	53	36	24	7,6
Sweden	2,6	2,2	77	24	14	34,1
United Kingdom	1,1	0,7	65	17	6	6,9
United States	0,7	0,2	31	14	6	3,1
Rank correlation	0,97		0,49			

Notes: Data refer to 2001, or earliest available values over 2000s: EPL (2003), NRRs (2001), GRRs (2001), Benefit duration (2002), ALMPs (2001). The statistic used to evaluate the "Rank correlation" is the Spearman's rank correlation coefficient.

borders and, thus, in shielding otherwise uninsured incomes.

Unemployment benefits systems

Public unemployment benefits systems are set-up to provide what moral hazard considerations prevent private insurance companies from supplying: insurance against the risk of unemployment and social assistance to unemployed workers. Start considering two aspects that may well summarize benefits sufficiency: the level of income that is maintained when becoming unemployed, measured by the so-called replacement rate, and the length of entitlement to unemployment benefits. The OECD (2004a) constructs two indicators for the level of benefits: Net replacement rates (NRRs), a refined measure made available in updated OECD databases which takes into account the progressivity of the tax system and indexes (net) in-work income maintained after a job loss; and an older and raw measure of the generosity of the benefits system, Gross replacement rates (GRRs). The last row of Table 1 shows that the rank correlation between the two indicators is pretty low, and, thus, indicates that their information content is actually different. Since NRRs captures the effect of payroll deductions, taxes, and transfers it provides more accurate information on the direct effect of unemployment benefits, and better fits the present analysis.⁴ The fifth column of Table

⁴For a detailed discussion on the advantages of using NRRs instead of GRRs when

1 reports data on the duration of unemployment benefits measured as the maximum number of months of entitlement to benefits provisions. Looking at the numbers, relatively lower levels of benefits are granted in Anglo-Saxon countries, Italy, Spain and Belgium; the duration of entitlement is low in Austria and all the above listed countries with the exception of Spain and Belgium. The literature has not analyzed the effect of unemployment benefits on labor share dynamics yet, and the macroeconomic effect of these two social welfare institutions in terms of consumption smoothing may be controversial. As long as public provisions of social insurance are meant as an alternative to informal and costless family networks (see Bentolila and Ichino, 2006), the response of consumption growth rates to unemployment shocks may be (relatively) amplified in countries where longer unemployment benefits and higher replacement rates are granted, according to whether the cost of benefits systems is not fully reallocated from uninsured labor incomes to internationally diversifiable capital incomes.

A third dimension of the structure of unemployment benefits systems is the amount of spending on Active Labor Market Programmes (ALMPs), which includes all the social expenditures, other than education, undertaken to promote and increase the quality of employment for those enrolled in the programmes. The values in Table 1 refer to an index built as spending on ALMPs per unemployed person as a percentage of GDP per member of the labor force (see Nickell, 1997). Usually low values of ALMPs are recorded in countries with less generous benefits systems.⁵ This may indicate that high levels of ALMPs are needed to offset adverse effects of unemployment benefits systems on the willingness to fill a vacant position and, hence, push unemployed individuals into work. On the basis of this interpretation ALMPs would be expected to represent a cost and, thus, to imply additional consumption losses if they were partially financed out of labor incomes.

Wage bargaining

Institutional features that have a direct impact on wage setting, as trade union power and coordination in wage bargaining, may be relevant elements of a coherent mix of policies which aims at shielding workers from uninsurable income fluctuations (see Bertola, 2001). Trade union power can be summarized by two complementary indicators: collective bargaining coverage, that is, the share of workers actually covered by union bargaining; and union density, which measures the percentage of wage-earners who are mem-

assessing the insurance scope of unemployment benefits, see OECD (2004a).

⁵Among Scandinavian countries, which record high values on all the benefits system's dimensions, Finland represents an exception, with a value of ALMPs more than three times lower than those ones of Denmark and Sweden.

Table 2. National Institutional Features, early 2000s (second part)

	CB Coverage (%)	Union Density (%)	Coordination Index	Labor Taxation		Loan-to-Value	
				Tax wedge, rate in (%)		Ratios	
				Marginal	Average	Typical	Maximum
Austria	95	35,7	4,0	56,6	29,0	60	80
Belgium	90	55,8	4,5	66,6	40,3	83	100
Canada	32	28,2	1,0	43,9	20,4	75	95
Denmark	80	73,8	4,0	50,8	30,7	80	80
Finland	90	77,8	5,0	56,9	38,8	75	80
France	90	9,6	2,0	54,1	39,4	67	100
Germany	68	23,5	4,0	58,1	32,7	67	80
Italy	80	34,8	4,0	53,7	35,4	55	80
Japan	15	20,9	4,0	28,1	20,4	80	100
Netherlands	80	22,6	4,0	51,3	33,0	90	115
Portugal	80	23,4	4,0	38,0	24,1	83	90
Spain	80	13,8	3,0	43,6	31,1	70	100
Sweden	90	78,3	3,0	52,5	41,1	77	80
United Kingdom	30	30,7	1,0	46,5	18,1	69	110
United States	14	12,6	1,0	40,2	18,3	78	100
Rank correlation				0,70		0,38	

Notes: Data refer to 2001, or earliest available values over 2000s: CB Coverage (2000), Union density (2001), Coordination (average over 1995-2000), Tax wedges (2001), LTV ratios (2002). The statistic used to evaluate the "Rank correlation" is the Spearman's rank correlation coefficient.

bers of a trade union. Wage setting institutions play a significant role in most OECD countries. Looking at Table 2, collective bargaining coverage is high everywhere but in Anglo-Saxon countries and Germany; trade union density, instead, is quite low on average, with values below 30% in Anglo-Saxon countries and half of Continental Europe. This gap is worth noting, as the degree by which union decisions affect workers who are not enrolled in their ranks may index the relevance of insiders' practices. As well known in labor economics, when there exist restrictive rules on union membership, the presence of turnover costs may entail incumbent workers (insiders) to bargain over wages exploiting a position of advantage with respect to outsiders (see Lindbeck and Snower, 2001). In a country where enrolled workers have enough power to discriminate wages and cause a segmentation of manpower (Fehr, 1990), as it could be the case when there is a high number of temporary contracts, workers' consumption fluctuations can end up (relatively) increased (decreased) as long as the net effect of insiders practices leads to a destabilization (stabilization) of overall labor incomes. A second important aspect of wage determination is the degree of coordination in wage bargaining on the part of both unions and employers. The corresponding indicator, reported in the third column of Table 2, measures the extent to which trade unions consider the consequences of wage setting for the whole economy (the higher the index, the wider the scope of coordination). Data indicate that coordination is pretty high in all the countries but Canada, France, UK, and

the US. Overall, this measure of flexibility in pay negotiations is expected to reduce the insurance scope of wage bargaining by counterbalancing trade union power (see, for instance, Nickell and Layard, 1999).

Labor taxation

Taxes on labor income are mandatory contributions collected by the government to insure workers against (uninsurable) shocks to their incomes. The effective tax burden, or "tax wedge", is computed as the difference between the cost of labor borne by the employer and the net take-home pay (see OECD, 2005). Two dimensions of the tax burden may be relevant for the present purposes: the average tax wedge, which captures the overall generosity of the social security system; and the marginal tax wedge, a measure of progressivity which accounts for the percentage of additional earnings that is taxed-away. Looking at Table 2, the marginal tax rate exceeds the average rate in all the countries, indicating that all the systems are to some extent progressive. Continental Europe exhibits, with the exceptions of Portugal and Spain, marginal rates higher than Anglo-Saxon countries, with values greater than 50%. The Spearman's rank correlation coefficient between marginal and average tax wedges is pretty low, meaning that the different information content of the two measures generates a significant gap in country rankings. Since what is important, in terms of consumption insurance, is the ability of the tax system to reduce the variance of net income across states of nature, the present analysis will focus on the progressivity of the tax system.

Efficiency of credit markets

Besides within-country risk-reallocation, when markets are incomplete, a well-known alternative to trade in contingent securities is intertemporal trade in risk-free bonds. Workers' ability to smooth consumption intertemporally and self-insure depends on the degree of development of credit markets: liquidity constraints and other credit markets imperfections impose serious limits on borrowing and lending. The direct effect of these restrictions can be summarized by an indicator of credit supply conditions, the *loan-to-value ratio* (LTV). Table 2 reports two measures: the typical LTV can be interpreted as the fraction of house value that is financed, on average, by private intermediaries in a country; the maximum LTV accounts for the maximum access to financing that the mortgage market can grant to households.⁶ The first measure is more informative in terms of overall limits to borrowing in a country, while the maximum LTV refers to collateralized mortgages provided to first class borrowers only (i.e. to agents who are not going to face borrowing constraints). The Spearman's statistic shows that this gap in information

⁶For a more precise definition of the two indicators, see the data Appendix.

contents translates in fairly different rankings. Countries are very heterogeneous as regards typical LTV ratios: Austria, France, Germany, Italy, Spain and UK exhibit the lower ratios, equal or below 70%. While maximum LTV ratios are above 80% in the overall sample and indicate a substantial convergence towards higher efficiency of credit markets for, at least, top-class borrowers.

3.2 Institutional indicators: time-series information

Consider, now, how the previously introduced institutional features have changed over time. Given limitations on data availability, it has been possible to collect information on the time variation of eleven of the institutional indicators listed in Tables 1 and 2 (ALMPs and typical LTV are missing). Referring to the Appendix for a detailed discussion on time-series and compilation strategies, this Subsection summarizes the informative contribution of institutional time-variation to the present analysis with the help of some descriptive statistics. The contents of Table 3 will allow, first, to draw a general picture on the change in the set of indicators and, then, to describe what happened to single institutional dimensions.

Overall, as the first column of Table 3 indicates, variables significantly differ with respect to the time span for which observations are available. Most indicators have records since the 1970s or the 1980s, while fewer observations are available for EPL version 2 and the marginal tax wedge, which record values since the late 1990s, and for NRRs, a series compiled by the OECD for early 2000s only. Looking further at time variation, the Table reports changes in average (with respect to the country sample) levels of the indicators and Spearman's rank correlation statistics, which provide information on what happened in terms of countries' relative positions. The main message from average values is that institutions have remained quite stable over time. Changes in levels are lower than 10% for most indicators, while relevant variations regard EPL version 1 and trade union density, which decreased by 21% and 15% respectively, and GRRs and maximum LTV ratios which increased by 62% and 29%. Turning to Spearman's statistics it is possible to understand if these changes reflect a common evolution pattern in all the countries, or concentrate in particular countries.⁷ Correlations refer to country rankings at three points in time (1971, 1980, 1990) with respect to the situation in 2003 (or the latest available year of observation). Over

⁷The statistic can be read as follows: a high Spearman's rank correlation coefficient indicates that country ranking has not changed that much and, hence, that institutions have varied in similar ways in the country sample.

Table 3. National Institutional Features: Time Variation, 1971-2003

	First and last year of recorded observations	Average values (levels)			Spearman's Rank Correlation with 2003 measure		
		1971	2003	Change	1971	1980	1990
EPL version 1	1971-2003 ^a	2,4	1,9	-0,21	0,80	0,86 ^b	0,89
EPL version 2	1998-2003	2,3	2,2	-0,04	-	-	0,94
NRRs	2001-2003	62,5	62,4	0,00	-	-	0,97
GRRs	1971-2003	19,3	31,3	0,62	0,34	0,58	0,87
Benefit Duration	1989-2002	1,8	1,8	0,01	-	0,84	0,85
CB Coverage	1980-2000	68,2	67,6	-0,01	-	0,84	0,91
Union Density	1971-2002	42,1	35,9	-0,15	0,86	0,90	0,99
Coordination	1970-2000 ^a	3,5	3,2	-0,08	0,80	0,80	0,89
Tax Wedge, Marginal	1997-2003	50,1	49,4	-0,01	-	-	0,92
Tax Wedge, Average	1979-2003	29,2	29,6	0,01	0,80	0,76	0,79
LTV maximum	1971-2003 ^a	71,1	91,3	0,29	0,15	0,08 ^c	0,44

Notes: (a) Time-series have average values over some period interval (see the data Appendix): EPL version 1 1971-1984; Coordination 1971-1974, 1975-1979, and so on (>-year basis); LTV maximum 1971-1980, 1981-1987.

(b) The rank correlation coefficient refers to 1985.

(c) The rank correlation coefficient refers to 1981.

the 1971-2003 period, institutional change in terms of relative positions has been pretty low with the exceptions of GRRs and maximum LTV ratios.

To refine the picture, previous findings may be read in light of historical information on the evolution of single institutions. EPL has significantly changed since the 1970s, decade in which employment protection laws have been introduced for the first time in several countries. Over the past 15 years there has been some convergence in regulations across countries, with main changes occurring in the 1990s: EPL has been relaxed in all the countries, with stronger reforms in Denmark, Italy and Spain. As Table 3 confirms, EPL decreased on average by 21% over the period, but relative positions did not change much, especially since late 1980s.

Benefits systems remain almost stable as regards the length of entitlement, but show a significant variation in the level of unemployment benefits. Unfortunately there is basically no information about the change in NRRs; given that countries greatly differ in benefits taxation, this measure would have been the more powerful indicator of replacement rates for international comparisons. Looking at GRRs, it augmented by more than 60% over the period; data reflect the fact that, up to early 1980s, all countries implemented more generous benefit systems, but since then they moved in different directions, thus leading to significant differences in international rankings.

Data on wage setting institutions are by far the more complete. All the

indicators record a decrease over the past 30 years, more pronounced for trade union density. Overall, the substantial stability of rankings indicates that all the countries experienced a similar evolution pattern.

Information on the change of labor taxation is available mainly for average tax wedges. The general degree of fiscal pressure has changed mainly in 1980s in slightly different ways across countries, but, on average, has not varied significantly. The scarce information on the progressivity of labor taxation allows (just) detecting a substantial stability in the indicator since late 1990s in all the countries.

Finally, maximum LTV ratios changed both in levels and in relative terms. Looking at the data, this finding may be ascribed to the increase and relative convergence of credit markets standards in the country sample, which led several countries to occupy the same rank and, hence, biased the Spearman's rank coefficient.

The discussion on time variation pointed out that, in most cases, the relative position of countries has not changed much in last decades.⁸ Given that the choice of using time-invariant institutional measures corresponds to assume that institutions do not vary over time, these findings justify as a reasonable approximation the time-constant approach to the comparison of institutional settings, and suggest that the inclusion of time-varying measures should provide (at best) a further check for empirical findings from the time-invariant institutions model.

4 Shock-institutions interaction: the empirical specification

This Section develops a consumption-based empirical analysis to test for the existence of within-country risk-reallocation: a baseline model of consumption insurance under complete markets will be modified to account for both market incompleteness and the existence of alternative insurance channels at the national level (i.e. within-country risk-reallocation and intertemporal trade in riskless bonds). Then, it presents the set of macroeconomic variables and institutional indicators which will be included in the empirical specification.

⁸There are only two institutional dimensions whose change may be relevant when choosing between a time-invariant and a time-varying approach to the study of the role of institutions: GRRs and typical LTV ratios.

4.1 The empirical model

Standard representative agent models used to study risk-sharing behaviour under complete markets predict that individual consumption should move together with aggregate consumption rather than with idiosyncratic variables (e.g. country-specific income).⁹ Assuming a CRRA utility function, this statement can be empirically tested in terms of growth rates by estimating the following linear model:

$$\Delta c_{jt} = \delta_t + \beta \Delta \tilde{y}_{jt} + \varepsilon_{jt} \quad (1)$$

where $\Delta c_{jt} = \Delta \ln C_{jt}$ is the first difference of the natural logarithm of real consumption per capita of country j in period t , a measure for the growth rate of consumption; δ_t a dummy variable accounting for the common consumption growth rate in the aggregate; and $\Delta \tilde{y}_{jt}$ the country-specific shock variable, namely, the idiosyncratic rate of growth of real output per capita. The disturbance term, ε_{jt} , includes several effects: the time-varying component of individual and aggregate preference shocks; unexpected changes to permanent income; and (possible) measurement errors from consumption and income data. If markets were complete agents would share all the risk, and unexpected revisions to permanent income should be identical across countries and captured by the aggregate consumption growth rate. Hence, consumption would not depend on idiosyncratic income growth and the hypothesis $\beta = 0$ holds true. As discussed in Section 2, empirical analyses on international data led to the rejection of the full consumption insurance hypothesis, finding that the estimated β significantly differs from zero.¹⁰

The idea that the effects of idiosyncratic income shocks on consumption depend on country-specific sets of national institutions may be included in equation (3.1) using the modelling strategy developed by Blanchard and Wolfers (2000) to study the interaction between shocks and institutions and its role in explaining unemployment dynamics. The empirical model becomes:

$$\Delta c_{jt} = \delta_t + \beta \Delta \tilde{y}_{jt} \left(1 + \sum_{i=1}^I \gamma_i \tilde{X}_{ij} \right) + \alpha_j + \varepsilon_{jt} \quad (2)$$

In the above specification risk-sharing and rule-of-thumb behaviour coexist due to financial markets incompleteness and consumption growth rates are

⁹For a derivation of the testable implications of consumption insurance under complete markets (and extensions to include uninsurable risks components) see, for instance, Obstfeld (1994).

¹⁰On empirical results from the estimation of equations in the form of (1) see, for instance, Lewis (1999).

determined by two factors: a common (cross-country) movement, captured by the time dummy, and a country-specific change in income. The expression in parenthesis accounts for the interaction between idiosyncratic shocks and (heterogeneous) national institutional settings. \tilde{X}_{ij} is the value of institution i in country j , computed as the deviation from the mean value in the aggregate; while in (2) institutional indicators do not exhibit the time subscript t (i.e. are time-invariant), the next Section will report estimates from a model including institutional time-varying measures, too. It is worth noting that each institution is allowed to interact separately with the shock; the parameters γ_i enter with a negative (positive) sign when institution i contributes to smooth out (amplify) the effect of the shock. This formulation, as pointed out by Blanchard and Wolfers, has most of all a descriptive relevance; it captures the hypothesis that heterogeneity in institutional provisions matters when looking at the outcomes of macroeconomic shocks.

The coefficient β represents the sensitivity of consumption growth to idiosyncratic income growth of a country displaying an average (with respect to the sample aggregate) institutional framework. Notice the difference with respect to what predicted by the basic model of international trade in risky assets: here full insurance ($\beta = 0$) may be reached through the combination of trade on financial markets and national social insurance. Moreover, in (1), the coefficient in front of the idiosyncratic variable is expected not only to differ from zero, but even to be country-specific, thus stressing the importance to take into account institutional heterogeneity.

Country dummies (α_j) are introduced to control for (potential) current account imbalances over the whole sample period. Standard models of international trade in risky assets assume that the share that each country holds in the world tradable output mutual funds is constant and predict no current account imbalances. But consider what would happen if, for instance, after a permanent productivity shock the weight of a country in world output increased (decreased): its current account would display a deficit (surplus) as the country's saving would increase (decrease) only partially to match higher (lower) domestic investment while foreign capital would flow in (out). The introduction of country effects is basically an accounting device to track the new international distribution of assets needed to maintain efficient global pooling of a country output risk.

Finally, the model in (2) will be estimated using non-linear least squares.

4.2 Data on shocks and institutions

The specification in (2) will be estimated using annual data on OECD countries and a set of institutional indicators. The dataset includes the 15 countries for which it has been possible to collect indicators for all the institutional dimensions discussed below, namely: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Portugal, Spain, Sweden, United Kingdom, and United States. Countries are observed over the 1971-2003 time interval, and create an unbalance panel dataset, for a total of 470 observations.

Data on national accounts are taken from the World Development Indicators online database of the World Bank. Income and consumption series refer to per capita annual real income and consumption, computed (respectively) as Gross Domestic Product and Household Private Consumption Expenditure, deflated by the Consumer Price Index, and divided by Population. The main macroeconomic shock variable is a proxy for the idiosyncratic rate of growth of real output per capita, computed as the difference between the growth rate of income in a country and the mean growth rate of income in the sample aggregate: $\Delta \tilde{y}_{jt} = \Delta \ln Y_{jt} - \Delta \ln Y_t^A$.¹¹ In addition, all the empirical models account for the effects of the Portuguese Revolution by including a "pre-Portuguese revolution dummy" which takes value 1 before 1975 and zero otherwise. The control is introduced in light of what stated by Blanchard (1997) who estimated that, after the revolution, the Portuguese labor share increased permanently.¹²

Institutional indicators are provided by OECD publications, several studies in the labor economic literature, and author's calculations. The *baseline specification* will include the set of time-invariant institutional indicators which better describe the insurance dimension of labor and credit markets settings. Since there has been a little variation in the relative positions of countries (see Subsection 3.2), the decision to use time-constant measures can be a reasonable approximation. The choice of the set of indicators is driven by the aim to exploit information on indicators which better fit in a consumption smoothing analysis. Recalling the discussion of Subsection 3.1, the structure of the labor and credit markets will be described along nine institutional features, namely:

- employment protection legislation (version 2),

¹¹On the choice of this proxy for the country-specific shock variable see, for instance, Lewis (1996) and Asdrubali et alii (1996).

¹²Blanchard and Wolfers (2000) and Bertola et alii (2002) accounted for this dummy variable when analyzing unemployment dynamics, hence from a slightly different perspective.

- net replacement rates,
- unemployment benefits' duration,
- active labor market policies,
- collective bargaining coverage,
- trade union density,
- coordination in wage bargaining,
- marginal labor tax wedge,¹³
- typical LTV ratios.

The following econometric analysis, besides the baseline specification, will assess the impact of alternative institutional indicators and additional macro-economic shocks variables.

5 Results

This Section reports on estimation results from the empirical analysis. The first Subsection presents the main regression outcomes: estimates from the baseline (time-invariant) specification are reported and discussed along several analytical perspectives. The next two Subsections, respectively, investigate what happens by including time-varying institutional measures and discuss some econometric issues.

5.1 Main estimation outcomes

Table 4 reports the outcomes from the main regression; the two columns differ according to whether country dummies are included or not. Results are fairly strong: by allowing idiosyncratic macroeconomic shocks to interact with a set of time-invariant institutions, the specification in (2) captures important features of the data.

The coefficients of institutional indicators are jointly strongly significant, and the high adjusted R-squared indicates a fairly good overall fit. Looking at how single institutions perform, the sign of labor and credit market indicators provides information about their role in smoothing-out macroeconomic shocks. Higher values of employment protection legislation, benefits replacement rates, union density, progressivity of tax systems, and credit markets development are associated with higher income shielding (negative sign);

¹³The choice of labor markets' dimensions resembles Blanchard and Wolfers (2000) and Bertola et alii (2002), who adopt the set of eight measures originally compiled by Nickell (1997), with the difference that, now, replacement rates and the labor tax wedge are represented by less general measures of benefit and tax systems to provide a more precise description of the direct (insurance) effect of these institutions.

Table 4. NL-LS estimation results, Time-Invariant Institutional Indicators

Dependent variable: Country-specific Consumption growth rate				
	1		2	
Idiosyncratic income shock	0,826	(0,000)	0,817	(0,000)
Pre-Portuguese Revolution	0,019	(0,007)	0,024	(0,001)
Employment Protection	- 0,298	(0,053)	- 0,311	(0,058)
Benefits replacement rate	- 0,001	(0,769)	- 0,001	(0,819)
Duration of entitlement	0,114	(0,003)	0,115	(0,004)
ALMPs	0,010	(0,012)	0,008	(0,038)
Coll. Barg. Coverage	0,009	(0,156)	0,010	(0,156)
Trade union density	- 0,008	(0,003)	- 0,008	(0,002)
Coordination	0,051	(0,200)	0,047	(0,251)
Labor tax wedge	- 0,028	(0,023)	- 0,030	(0,028)
Loan-to-value ratio	- 0,022	(0,005)	- 0,021	(0,012)
Period Dummies	yes		yes	
Country Dummies	no		yes	
Number obs.	470		470	
Adj. R_squared	0,8646		0,8660	

Notes: P-values, in parentheses, are computed under the assumption of iid residuals.

Test on the joint significance of the shocks-institutions interaction terms: the null hypothesis of the Wald test is rejected both in column 1 ($F(9,426)=3,42$) and column 2 ($F(9,412)=3,20$).

longer-lasting benefit duration, higher expenditures on ALMPs, higher collective bargaining coverage and coordination in wage bargaining contribute to amplify the effects of income shocks (positive sign). The impact of institutions is statistically significant in six cases out of nine.

Consider what happens in terms of broad institutional categories. The strictness of employment protection laws and the progressivity of the tax system do play a role in smoothing-out shocks, confirming the priors formulated in Section 3. Findings on benefit systems deserve attention: unemployment insurance provisions are relevant not in terms of the level but of the duration, and, together with higher spending on ALMPs, longer lengths of entitlement imply greater consumption losses. This evidence suggests that the cost of more generous benefits systems is partially born by labor incomes (i.e. not fully shifted on internationally diversifiable capital incomes), thus implying a (relatively) higher aggregate consumption volatility, and may support to some extent the idea, stated by authors like Bentolila and Ichino (2006), that public provisions of social insurance represent an alternative to informal and costless family networks. Besides any intuitive explanation, a more accurate analysis on the effect of these formal institutions on labor share dynamics would be needed to explain what lies behind empirical findings. Turning to systems of wage determination, they seem to exert an insurance function mainly through trade union density. The positive sign of collective bargain-

Table 5. Country Effects (units in percentage points)

Austria	0,190	(0,396)	Japan	0,456	(0,041)
Belgium	0,142	(0,522)	Netherlands	- 0,181	(0,431)
Canada	- 0,015	(0,946)	Portugal	- 0,430	(0,076)
Denmark	- 0,478	(0,034)	Spain	- 0,223	(0,319)
Finland	0,073	(0,746)	Sweden	- 0,196	(0,380)
France	0,025	(0,909)	United Kingdom	0,293	(0,190)
Germany	- 0,122	(0,759)	United States	0,255	(0,269)
Italy	0,210	(0,391)			

Notes: Estimates refer to the regression reported in Table 4, column (2). P-values, in parentheses, are computed under the assumption of iid residuals.

ing coverage and coordination in wage bargaining suggests that insider practices and the inclusion of economy-wide considerations in the wage-setting process would weaken within-country risk-reallocation if they were relevant. Finally, the efficiency of credit markets significantly contributes to smooth out macroeconomic shocks, thus confirming the importance of intertemporal trade opportunities.

The impact of idiosyncratic income shocks is positive and highly significant. Assuming that measurement errors are not strongly relevant (otherwise they would bias upward the idiosyncratic variable's coefficient), this result translates in a firm rejection of the full consumption insurance hypothesis and indicates that market incompleteness matters even when financial markets risk-sharing opportunities are integrated by within-country risk-reallocation. The pre-Portuguese revolution dummy displays a positive and significant coefficient, too, indicating that the downsizing imposed on the share of labor under the dictatorship (i.e. before 1975) had the same effect of an exogenous increase of the volatility of workers' incomes.¹⁴

Consider, now, the role of period and country effects. Time dummies track well the average consumption growth in the country-aggregate, while results from estimating equation (2) with or without country dummies only slightly differ as country effects are jointly not significant. Only three country effects are relevant, those referring to Denmark, Japan, and Portugal. Estimates reported in Table 5 indicate that the shares of world tradable output that the three countries held in 1971 have changed over the period, increasing in Denmark and Portugal (negative sign) and decreasing in Japan (positive sign).¹⁵

¹⁴The exclusion of this macroeconomic shock variable would not affect the main estimation results. As it will be discussed in the next Note, it matters (only) for the significance

Table 6. Within-country risk-reallocation, Sense of magnitudes (by Institution)

Dependent variable: Country-specific Consumption growth rate							
	Estimation results		Range of independent variable ^a		Implied range of effect of the shock (mean=1)		
Idiosyncratic income shock	0,817	(0,000)					
Employment Protection	- 0,311	(0,058)	-1,47	1,33	1,46	0,59	
Benefits replacement rate	- 0,001	(0,819)	-56,47	16,53	1,06	0,98	
Duration of entitlement	0,115	(0,004)	-1,29	5,21	0,85	1,60	
ALMPs	0,008	(0,038)	-13,41	44,12	0,89	1,35	
Coll. Barg. Coverage	0,010	(0,156)	-53,6	27,4	0,46	1,27	
Trade union density	- 0,008	(0,002)	-26,5	42,2	1,21	0,66	
Coordination	0,047	(0,251)	-2,23	1,77	0,90	1,08	
Labor tax wedge	- 0,030	(0,028)	-21,3	17,19	1,64	0,48	
Loan-to-value ratio	- 0,021	(0,012)	-18,93	16,07	1,40	0,66	

Notes: Estimates refer to the regression reported in Table 4, column (2); the model includes period effects, country effects, and the Pre-Portuguese Revolution dummy. P-values, in parentheses, are computed under the assumption of iid residuals.

(a) Institutional variables are expressed as deviations from the mean value in the country aggregate.

So far the discussion focused on qualitative considerations on the role of institutional settings; but what can be said about the quantitative impact of single institutions or set of national policies? To get an idea of the magnitudes of the (estimated) effects of single institutions, look at Table 6. The first column reports estimation results from the baseline specification which includes both time and country dummies. The central part of the Table shows the range of values of the indicators, which, recall, are computed as deviations from the mean in the aggregate. To understand how to read the table, consider the last two columns of, for instance, the first row: they say that, assuming that countries differ with respect to employment protection legislation only, a shock that would be worth one percentage point in a (ideal) country with the mean values of all the institutions leads to a 1,46 percentage point shock in the country which displays the lowest ELP value, is smoothed to 0,59% in the country with more stringent EPL provisions. Overall, the last part of the table indicates that progressive labor taxation is the more

of the Portugal country effect.

¹⁵The Portugal country-effect is significant only when controlling for the effects of the Portuguese revolution. This finding may be interpreted as follows: the share owned by Portugal in world tradable output before 1974 was higher than what would have been under free-markets, because (tradable) capital incomes were granted a higher share in national production. By getting rid of this "dictatorship-induced" upper bias, it has been possible to highline that on average (over the period) Portugal has increased its share in world output.

Table 7. Within-country risk-reallocation, Sense of magnitudes (by Country)

Dependent variable: Country-specific Consumption growth rate				
	Estimation results		Implied range of effect of the shock (mean=1)	
Idiosyncratic income shock	0,817	(0,000)		
Employment Protection	- 0,311	(0,058)	Austria	0,91
Benefits replacement rate	- 0,001	(0,819)	Belgium	0,65
Duration of entitlement	0,115	(0,004)	Canada	1,23
ALMPs	0,008	(0,038)	Denmark	1,17
Coll. Barg. Coverage	0,010	(0,156)	Finland	0,44
Trade union density	- 0,008	(0,002)	France	1,03
Coordination	0,047	(0,251)	Germany	0,78
Labor tax wedge	- 0,030	(0,028)	Italy	0,98
Loan-to-value ratio	- 0,021	(0,012)	Japan	1,45
			Netherlands	1,00
			Portugal	0,86
Pre-Port. Rev. Dummy	yes		Spain	1,08
Period Dummies	yes		Sweden	0,47
Country Dummies	yes		United Kingdom	1,35
Adj. R_squared	0,8660		United States	1,59

Notes: Estimates refer to the regression reported in Table 4, column (2). P-values, in parentheses, are computed under the assumption of iid residuals.

effective income smoothing institution; the other institutions produce quite similar (in magnitudes) dampening (ELP, union density, and LTV ratio) or amplifying (unemployment benefits duration and ALMPs) effects.

The same exercise on magnitudes is repeated in Table 7 to provide some indications about which countries are doing a better job in smoothing out idiosyncratic shocks. The analysis focuses on country-specific sets of institutions. The last column shows the effect that a shock of 1% in a country with the average values of all institutions has in each of the 15 OECD countries in the sample. Scandinavian countries, with the exception of Denmark, have the more effective institutional settings: the same shock will be smoothed out to 0,44% in Finland and 0,47% in Sweden. The other countries that successfully dampen shocks belong to Continental Europe: Austria, Belgium, Germany, Portugal, and, by a lower extent, Italy. The Netherlands perform exactly how a country with a mean (in values) set of institutions would. Anglo-Saxon countries seem to have implemented mixes of policies by far less powerful in providing income insurance. Finally, France and Spain slightly amplify shocks, respectively to 1,03% and 1,08%.

Table 8. Alternative Measures of Institutions, Time-Invariant Institutional Indicators

Dependent variable: Country-specific Consumption growth rate								
	EPL (version 1)		GRRs		Tax Wedge (average)		LTV (maximum)	
Idiosyncratic income shock	0,820	(0,000)	0,819	(0,000)	0,842	(0,000)	0,778	(0,000)
Employment Protection	- 0,288	(0,047)	- 0,209	(0,289)	- 0,026	(0,786)	- 0,499	(0,007)
Benefits replacement rate	0,001	(0,672)	0,007	(0,401)	- 0,001	(0,842)	- 0,004	(0,149)
Duration of entitlement	0,114	(0,004)	0,091	(0,060)	0,088	(0,014)	0,061	(0,098)
ALMPs	0,006	(0,149)	0,007	(0,087)	0,010	(0,012)	0,000	(0,986)
Coll. Barg. Coverage	0,009	(0,141)	0,004	(0,706)	- 0,001	(0,885)	0,021	(0,016)
Trade union density	- 0,009	(0,002)	- 0,006	(0,099)	- 0,006	(0,044)	- 0,006	(0,102)
Coordination	0,060	(0,149)	0,037	(0,386)	0,066	(0,095)	0,037	(0,394)
Labor tax wedge	- 0,029	(0,024)	- 0,023	(0,126)	- 0,014	(0,105)	- 0,035	(0,037)
Loan-to-value ratio	- 0,020	(0,016)	- 0,022	(0,005)	- 0,020	(0,012)	0,010	(0,218)
Number obs.	470		470		470		470	
Adj. R_squared	0,8661		0,8662		0,8651		0,8645	

Notes: NL-LS estimation. All the models include period effects, country effects, and the Pre-Portuguese Revolution dummy. P-values, in parentheses, are computed under the assumption of iid residuals.

Test on the joint significance of the shocks-institutions interaction terms: the null hypothesis of the Wald test is rejected: in column 1 $F(9,412)=3,27$; in column 2 $F(9,426)=3,30$; in column 3 $F(9,426)=3,07$; in column 4 $F(9,426)=2,42$.

The final part of this Subsection investigates what happens when the baseline specification is modified to include some alternative institutional indicators. Recalling what said in Section 3, the choice of measuring an institutional dimension by using an indicator instead of another can have serious implications when the information content of the two measures significantly differ in a way that one theoretically better fits to the analysis. The estimates collected in Table 8 refer to results obtained substituting, one at a time, the indicators of the baseline specification with alternative measures for employment protection (column 1), replacement rates (column 2), labor taxation (column 3), and credit markets' efficiency (column 4). All the models include time dummies, country effects, and the pre-Portuguese revolution control variable.

The first column of Table 8 embeds the EPL version 1 index: results basically replicate the findings of Table 4 (with the exception of the coefficient of ALMPs which becomes not significant). These similarities in empirical findings are due to the fact that, as anticipated in Section 3, the two indicators of EPL have pretty the same information content. Estimates in column (2) and column (3) refer to specifications which include more general measures of benefits and tax systems. The inclusion of the Gross Replacement Rates does not worsen the goodness of fit, but causes a loss of significance of two interaction terms, those referring to employment protection and labor taxation. These two institutional dimensions are no more relevant even when substituting the average tax wedge indicator for its marginal rate version;

moreover, in column (3), coordination in wage bargaining becomes significant, while overall the goodness of fit worsens. The fourth and last column embeds the maximum LTV ratios: differently from Table 4, the model finds no significant effects for benefits systems and credit market's efficiency and exhibits a much lower adjusted R-squared. To conclude, it is worth noting that, looking more in general at the shock-institutions interaction terms, they are jointly significant in all the four models.

The main message coming from the above discussion is that, overall, some caution is needed when evaluating the information content of single institutional indicators. To run an empirical specification which does not take into account potential interaction among institutions, it is crucial to include measures which do capture the direct effects of institutions.

5.2 Time-varying institutional indicators

This Subsection investigates the implications of using time-varying measures for most of the nine institutional dimensions under analysis. As discussed in the Appendix, it has been possible to collect time-series for all the institutions in the dataset with the exception of ALMPs and typical LTV ratios. Information on time variation is more detailed for some indicators than others; as reported in Table 3, the period span for which data are available goes from the full 1971-2003 time interval (EPL version 1, GRRs, union density, maximum LTV ratios) to (just) a three-year period (NRRs).

Table 9 reports on the outcomes from estimating the time-varying version of a slightly modified baseline model. The main differences regard the set of institutional indicators and pertain to two dimensions: employment protection and credit markets efficiency. To allow for as much time variation as possible employment protection has been measured by EPL version 1 and the efficiency of credit markets by the maximum LTV ratios. Results are not going to be affected in the case of EPL; recall that differences between the two versions of the indicator are negligible. In the case of LTV ratios the substitution is motivated by the preference towards having more information on the evolution on credit markets than an accurate indication on the relevance of credit constraints. The reasoning is straightforward. The main contribution of a time series analysis is to track the evolution of national sets of institutions over time. Hence, provided that trade on credit markets and within-country risk-reallocation constitute two alternative and potentially mutually-substitutive insurance channels, missing information on the change of one of these (broad) institutions would seriously limit the scope of the analysis.

Table 9. NL-LS estimation results, Time-Varying Institutional Indicators

Dependent variable: Country-specific Consumption growth rate				
	1		2	
Idiosyncratic income shock	0,823	(0,000)	0,822	(0,000)
Pre-Portuguese Revolution	0,019	(0,007)	0,025	(0,001)
Employment Protection	- 0,101	(0,048)	- 0,087	(0,096)
Benefits replacement rate	- 0,006	(0,063)	- 0,005	(0,119)
Duration of entitlement	0,060	(0,136)	0,068	(0,099)
ALMPs	0,009	(0,014)	0,008	(0,047)
Coll. Barg. Coverage	0,008	(0,046)	0,008	(0,033)
Trade union density	- 0,004	(0,077)	- 0,004	(0,045)
Coordination	0,012	(0,739)	0,004	(0,907)
Labor tax wedge	- 0,016	(0,026)	- 0,019	(0,015)
Loan-to-value ratio	- 0,007	(0,108)	- 0,005	(0,265)
Period Dummies	yes		yes	
Country Dummies	no		yes	
Number obs.	470		470	
Adj. R_squared	0,8619		0,8638	

Notes: P-values, in parentheses, are computed under the assumption of iid residuals.

Test on the joint significance of the shocks-institutions interaction terms: the null hypothesis of the Wald test is rejected both in column 1 ($F(9,426)=2,36$) and column 2 ($F(9,412)=2,44$).

Looking at regression's results, Table 9 shows that allowing for time variation does confirm the main conclusions of the time-invariant model. The effects of the shock-institutions interactions are the same in sign, that is, institutions contribute in the same way to smooth-out (negative sign) or increase (positive sign) the impact of macroeconomic shocks; and, even if the size of the coefficients decreases by almost one half, the impacts of the institutional dimensions are jointly significant.

As regards the significance of the role of single institutions, a direct comparison with Table 4 is not allowed, as some indicators are not the same; what is possible to assess is the similarity in outcomes. The inclusion of country effects slightly modifies the findings on benefits systems: in column (1), the impact of replacement rates is significant, while the same cannot be said of duration of entitlement; when country dummies are included (column 2), the opposite is true, thus confirming the findings of the time invariant specification in Table 4. Collective bargaining coverage exerts a significant, amplifying, effect on macroeconomic shocks in both columns; recalling what said in Section 3.1, this finding can be interpreted as evidence in favour of the idea that insider practices may harm the overall scope of within-country risk-reallocation. The coefficient in front of the LTV indicator has the expected negative sign, but is no more significantly different from zero, as it was the

case of the maximum LTV in the time-invariant specification of Table 8.

Once institutional time variation is added, the lack of joint significance of country dummies indicates that institutional reforms do not have different effects in different countries. It is worth noting that country effects in column (2) are, individually, significant for the same countries of the previous Subsection, namely Denmark, Japan, and Portugal. Finally, macroeconomic shocks play the same role as in the time-invariant case.

It is unusual for a study on the macroeconomic impact of institutions to find basically the same results by using time-invariant and time-varying institutional indicators.¹⁶ This evidence can be considered a preliminary step towards a more accurate analysis: as new information on time variation will be made available by the OECD or similar studies, there will be scope for further research on how mixes of policies evolved over time.

To conclude on institutional time variation, consider the implications of including alternative institutional variables. Table 10 shows the results from modifying the above specification to include two measures which decrease the overall degree of time variation, and two indexes for which more detailed time-series are available but which are less suited for a consumption insurance analysis. The specification in column (1) embeds the EPL version 2 indicator; estimates do not significantly differ from results in Table 9. The inclusion of typical LTV (second column), confirms priors about the importance of accounting for the evolution of credit markets; when the latter information is missing, two of the most significant institutional dimensions, employment protection and trade union density, lose significance. Overall, the adjusted R-squared indicates that the more time variation is added, the lower the goodness of fit. This may reflect the poor quality, along the time dimension, of the indicators on labor and credit markets institutions; conclusion which makes even more strong results previously got by using time-varying measures. The third and the fourth columns, which include, respectively, GRs and average tax wedge, do a far worse job in explaining the evolution of consumption growth rates. These findings may be ascribed both to the change in relative position implied by their time-series, and to the lack of precision in capturing the direct (insurance) effect of the institutional dimensions.

¹⁶As anticipated in Section 3, previous studies in labor economics did not obtain significant results by using time-varying measures, but at the expense of tricky empirical specifications.

Table 10. Alternative Measures of Institutions, Time-Varying Institutional Indicators

Dependent variable: Country-specific Consumption growth rate								
	EPL (version 2)		LTV typical		GRRs		Average Tax Wedge	
Idiosyncratic income shock	0,826	(0,000)	0,830	(0,000)	0,826	(0,000)	0,833	(0,000)
Employment Protection (version1)	- 0,123	(0,069)	- 0,045	(0,373)	- 0,029	(0,616)	0,003	(0,949)
Benefits replacement rate	- 0,005	(0,153)	- 0,005	(0,127)	0,004	(0,348)	- 0,003	(0,352)
Duration of entitlement	0,067	(0,102)	0,108	(0,021)	0,033	(0,455)	0,030	(0,426)
ALMPs	0,007	(0,054)	0,008	(0,028)	0,003	(0,424)	0,008	(0,050)
Coll. Barg. Coverage	0,010	(0,022)	0,006	(0,132)	0,005	(0,202)	0,003	(0,339)
Trade union density	- 0,004	(0,089)	- 0,002	(0,550)	- 0,004	(0,055)	- 0,005	(0,014)
Coordination	- 0,008	(0,810)	0,004	(0,904)	- 0,026	(0,450)	0,012	(0,732)
Labor tax wedge	- 0,022	(0,010)	- 0,027	(0,001)	- 0,013	(0,042)	- 0,010	(0,249)
Loan-to-value ratio (maximum)	- 0,006	(0,176)	- 0,013	(0,073)	- 0,008	(0,079)	- 0,005	(0,406)
Number obs.	470		470		470		470	
Adj. R_squared	0,8639		0,8644		0,8633		0,8622	

Notes: NL-LS estimation. All the models include period effects, country effects, and the Pre-Portuguese Revolution dummy. P-values, in parentheses, are computed under the assumption of iid residuals.

Test on the joint significance of the shocks-institutions interaction terms: the null hypothesis of the Wald test is rejected: in column 1 $F(9,412)=2,52$; in column 2 $F(9,426)=2,71$; in column 3 $F(9,426)=2,27$; in column 4 $F(9,426)=1,92$.

5.3 Econometric issues

Few points are worth noting on some potential econometric concerns.

The above results indicate that the efficiency of credit markets is a relevant feature when evaluating the role of country-specific insurance channels: the less binding are country-specific liquidity constraints, the higher the possibility to insure via intertemporal trade. These findings suggest that some caution is needed when deciding which approach to choose for estimating the model in (2). The reasoning proceeds as follows. When people smooth consumption intertemporally and credit markets are imperfect, observed rule-of-thumb behaviour may be (at least partially) due to deviations from the permanent income hypothesis. If this was the case, consumption would exhibit excess sensitivity to past income, and unexpected changes in (idiosyncratic) real disposable income would likely contain information about idiosyncratic changes in permanent income. Hence, implementing non-linear least squares would lead to an upward biased β estimate, since consumption growth rates can be expected to be sensitive to current idiosyncratic income changes.

To deal with this potential simultaneity bias, the model in (2) has been modified to include as separate terms the idiosyncratic shock variable and the shock-institutions interaction terms, and then has been estimated by using the instrumental variable (IV) technique. The instruments introduced to predict future changes in idiosyncratic income growth and in consumption

Table 11. Alternative Specifications and International Macroeconomic Issues

A. Dependent variable: Country-specific Consumption growth rate			
	1	2	3
15 OECD (mean) Consumption growth rate	0,993 (0,000)	0,992 (0,000)	-
World-wide shock to oil price	-	0,000 (0,875)	-
Country-specific shock to exchange rates	-	-	0,000 (0,766)
Idiosyncratic income shock	0,806 (0,000)	0,805 (0,000)	0,840 (0,000)
Employment Protection (version1)	- 0,287 (0,065)	- 0,287 (0,066)	- 0,289 (0,095)
Benefits replacement rate	- 0,000 (0,855)	- 0,000 (0,857)	0,002 (0,421)
Duration of entitlement	0,099 (0,009)	0,099 (0,009)	0,095 (0,027)
ALMPs	0,007 (0,063)	0,007 (0,063)	0,009 (0,034)
Coll. Barg. Coverage	0,009 (0,147)	0,009 (0,149)	0,010 (0,137)
Trade union density	- 0,007 (0,006)	- 0,007 (0,006)	- 0,006 (0,053)
Coordination	- 0,032 (0,412)	0,032 (0,413)	0,004 (0,925)
Labor tax wedge	- 0,028 (0,026)	- 0,028 (0,026)	- 0,033 (0,018)
Loan-to-value ratio (maximum)	- 0,017 (0,025)	- 0,017 (0,025)	- 0,018 (0,058)
Pre-Portuguese Revolution	yes	yes	no
Period dummies	no	no	yes
Number obs.	470	470	400
Adj. R_squared	0,8742	0,8739	0,8400
B. Dependent variable: 15 OECD (mean) Consumption growth rate			
World Consumption Growth Rate	0,243 (0,000)		
World-wide shock (oil price changes)	0,010 (0,007)		
Number obs.	470		
Adj. R_squared	0,2877		

Notes: NL-LS estimation. All the models include country effects. P-values, in parentheses, are computed under the assumption of iid residuals. The model in column (3) is estimated using data for the sub-period 1976-2003.

changes are lagged values of both idiosyncratic income and consumption growth rates.¹⁷ Regression outcomes indicate that the variables are not relevant instruments (i.e. not significant in the first-stage regression), an empirical finding that can be interpreted as follows. Even if consumption sensitivity is likely to play an important role when looking at country-level consumption and income variables, in the present dataset, when looking at aggregate variables, idiosyncratic income growth becomes almost unpredictable and consumption seems to follow a random walk. In summary, no simultaneity bias arises when running non-linear least squares.

Looking at the specification in (2) a potential concern may stem from the choice to track the path of consumption risk-sharing on international financial markets by using time dummies instead of the growth rate of consumption in the country aggregate (as for instance in Mace, 1991). In Subsection 5.1 it has already been said that time dummies track well the average growth rate in the OECD sample; a more formal check can be done by estimating

¹⁷See Campbell and Mankiw (1990) on the use of the instrumental variables approach. And Bayoumi (1997) for a discussion on the choice of the instruments.

the model:

$$\Delta c_{jt} = \delta_o \Delta c_t^A + \beta \Delta \tilde{y}_{jt} \left(1 + \sum_{i=1}^I \gamma_i \tilde{X}_{ij} \right) + \alpha_j + \varepsilon_{jt} \quad (3)$$

where c_t^A is the natural logarithm of real mean aggregate consumption. In the above specification perfect risk-sharing is tested by the joint hypothesis $\delta_o = 1$ and $\beta = 0$. Comparing estimates from the above equation (reported in the first column of Table 11, Panel A) with those ones in Table 4, it makes clear that results are basically unaffected by the choice of using different measures of risk-sharing behaviour.

6 International macroeconomic issues

When idiosyncratic risks to income or wealth are not fully tradable on international financial markets, the above analysis demonstrates that country-specific institutional frameworks may provide some non-market insurance to reduce fluctuations of (otherwise nonsmoothable) consumption. Looking at the empirical specification from an international macroeconomic perspective, there are a couple of aspects which have not been (explicitly) dealt with and are worth noting.

Loosely speaking, the notions of "idiosyncratic" and "real" (referred to income and consumption variables) introduced in the previous Sections have less innocuous interpretations than it appears at a first glance: saying that variables are "idiosyncratic" with respect to a limited country-sample means disregarding the fact that agents may diversify risk world-wide; and including variables in "real" terms with respect to the CPI deflator may not account for the potential role of relative (cross-country) price changes. In what follows, the Section investigates the reliability of the approach with respect to these two issues by explicitly dealing with how much actually integrated are OECD financial markets and with real exchange rate risks' diversification.

6.1 Is consumption risk globally diversified?

So far consumption insurance has been tested against shocks which were *idiosyncratic* with respect to the prevailing conditions in the 15 OECD country-sample. That is, it has been implicitly assumed that cross-border trade in

contingent assets works more efficiently within the OECD countries than world-wide; but is it a reasonable approximation of how things work in reality?

To answer the question, render *explicit* the assumption that the 15 OECD countries trade among each other the assets that hedge their relative consumption risk and, hence, can be treated as a unique macroeconomic subject, from now on called "macro-area". Then, a simple testable implication follows: a common shock to all the components of the macro-area affects their consumption growth rates in the same way. Consider, for instance, the impact of a (supply) shock to the price of oil and estimate the following model:

$$\Delta c_{jt} = \delta_o \Delta c_t^A + \delta_1 OILP_t + \beta \Delta \tilde{y}_{jt} \left(1 + \sum_{i=1}^I \gamma_i \tilde{X}_{ij} \right) + \alpha_j + \varepsilon_{jt} \quad (4)$$

To emphasize the behaviour of aggregate variables, the above specification includes the average growth rate of consumption in the macro-area (Δc_t^A) instead of period dummies.¹⁸ The variable OILP refers to changes in the real price of oil and, hence, the coefficient δ_1 captures the effects of the common shock to the world economy.¹⁹ The reasoning proceeds as follows: if OECD countries constitute a macro-area, they will respond all in the same way to the shock and the joint hypothesis $\delta_o = 1$ and $\delta_1 = 0$ will hold true.

Results from estimating (4) are shown in the second column of Table 11 (Panel A). The coefficient in front of the aggregate consumption growth rate almost equals one and is strongly significant, while the oil price shock variable does not significantly differ from zero. These findings are sufficient to justify the implicit assumption at the basis of the empirical specification adopted in the previous Section; while, to corroborate the hypothesis that the 15 OECD countries in the sample almost fully share *tradable* risks among each other, at least a further check is needed.

It is not possible to exclude a priori that these results are driven by perfect diversification of tradable risks' components on world markets. As perfect risk-sharing would imply that the growth rate of tradable consumption in the OECD sub-sample equals the growth rate of tradable consumption in the rest of the world, the doubt can be solved running a simple test. Panel B of Table 11 reports the estimates from the following equation, which investigates the

¹⁸Recalling the discussion done in Section 5.3, the two approaches to the measurement of risk-sharing behaviour are almost equivalent.

¹⁹The *real oil price* is computed as the annual average crude oil price, in dollars, adjusted for inflation using the current US CPI (Sources: www.inflationdata.com, on data from US Department of Energy, and Bureau of Labor Statistics).

determinants of the aggregate growth rate in the 15 OECD sample:

$$\Delta c_t^A = \delta_o \Delta c_t^{world} + \delta_1 OILP_t + \varepsilon_{jt} \quad (5)$$

where Δc_t^{world} is the growth rate of world consumption.²⁰ Results indicate that the mean consumption growth rate in the OECD sample is only slightly correlated with world consumption growth while the effect of oil price changes is highly significant; hence the hypothesis of (world-wide) perfect risk-sharing is soundly rejected.

Overall, the above evidence raises serious questions about the extent of financial markets' integration. It suggests that not only markets are imperfect and incomplete; OECD countries seem to have a strong bias towards trade assets among themselves, too. It would be interesting to assess what is the role of national institutions and undiversifiable consumption risks in the world economy, enlarging the sample to include countries which possess (at least) developing financial markets; an issue which goes far beyond the scope of the present analysis and, hence, will be left to future research.

6.2 The role of relative price changes

The choice to deflate consumption and income variables by using national Consumption Price Indexes (CPIs) distinguishes the present analysis from international macroeconomic studies which, in most cases, take macro data from the Penn World Table Database and, thus, compare countries on the basis of Purchasing Power Parities (PPPs). To understand why this may represent a problem for international data comparability, consider the nature of the two price deflators. CPIs and PPPs refer, respectively, to the time and the spatial dimension of price changes: the CPI measures how prices change over time, within country borders; the PPP indexes cross-country price changes. The choice of using the CPI in the paper has been motivated by the focus on the interaction between institutions and shocks to otherwise uninsurable *domestic* consumption components. What has not been explicitly dealt with is the impact (if any) of cross-country price changes.

Real (effective) exchange rate risks can affect estimation results only if they cannot be traded on international financial markets and, thus, constitute an undiversifiable risk component for all the agents in the economy. To test

²⁰The "world" comprehends the 30 OECD countries plus the 14 countries which best rank for financial markets developments in The *Business Week* Global 1000 ranking of 2004, namely: Argentina, Brazil, Chile, China, Hong Kong (China), India, Indonesia, Israel, Malaysia, Philippines, Russian Federation, Singapore, South Africa, Thailand.

for this possibility, the model in (2), where the incidence of risk-sharing behaviour is captured by time dummies, will be modified as follows:

$$\Delta c_{jt} = \delta_t + \delta_2 \widetilde{RE}_{jt} + \beta \Delta \widetilde{y}_{jt} \left(1 + \sum_{i=1}^I \gamma_i \widetilde{X}_{ij} \right) + \alpha_j + \varepsilon_{jt} \quad (6)$$

where the variable \widetilde{RE}_{jt} accounts for the aggregate, country j -specific, change in price levels, and the coefficient δ_2 captures the effect of (potentially) uninsurable exchange rate risks.²¹ Since the relative price deflator used to compute cross-country price changes is available since 1976, the model will be estimated on data for the 1976-2003 time span. Results in third column of Table 11 (Panel A) indicate that, as implicitly assumed in the previous Sections, real exchange rate risks are internationally diversifiable and, thus, do not affect risk-sharing behaviour (i.e. $\delta_2 = 0$).

Given that investors can trade effective exchange rate risk, a further check could be made to test if national institutions play any role in reallocating idiosyncratic income shocks due to cross-country changes in price levels. Once (6) is modified to embed the regressor \widetilde{RE}_{jt} in the shock-institutions interaction term as an additional source of undiversifiable income risk for some agents in the economy, results (not reported here) indicate that exchange rate risk does not affect within-country risk-allocation arrangements. Overall, evidence confirm what could have been intuitively expected: national institutions do not include cross-country comparative (PPP) concerns when deciding on consumption insurance provisions.

7 Concluding remarks

The above analysis focuses on the idea that, in a world where markets are far from being perfect and complete, several risk-sharing channels may co-exist: cross-border trade in contingent assets, intertemporal trade in riskless bonds, insurance provisions from non-market formal institutions. Estimation results are striking given that they clearly detect the existence of a (so far) unexplored insurance channel: institutional settings play a significant role in smoothing out the effects of country-specific shocks, and results from the

²¹Since the PPP deflator allows comparisons of economic aggregates on the basis of physical levels of output, but does not account for price and exchange rate distortions, a more accurate measure has been preferred. The real (effective) exchange rate shock variable refers to the *change in the ratio of the PPP conversion factor to the official exchange rate* (Source: World Bank, World Development Indicators online database).

(baseline) cross-sectional analysis are robust to the inclusion of time-series information and of further international macroeconomics concerns (e.g. the impact of aggregate world-wide shocks and cross-country real price changes).

Since within-country risk-reallocation has proved to play a role in explaining consumption dynamics, the paper paves the way for a potentially wide array of theoretical studies and empirical applications in both international macroeconomics and labor economics. Among the directions of future research in international macroeconomics, the implications of the interaction between (international) asset trade and (national) institutional insurance provisions could be studied in terms of portfolio allocation and hedging strategies, with the aim of contributing to the literature on the observed "home bias in equities". And, as regards labor economics, more detailed analyses on the macroeconomic insurance outcomes of single (or sets of) national labor and credit market institutions and on potential policies complementaries among institutional dimensions would be desirable; indeed, from a normative point of view, these even preliminary results suggest that national labor and credit market reforms need to be carefully assessed as affecting risk-sharing opportunities available to agents who likely do not to have access to international financial markets.

A Labor and credit market institutions database

The Appendix will show the main novelties of the dataset in terms of updated and (sometimes) newly-compiled indicators, and will provide a comprehensive overview on the institutional measures available in the literature. The data analysis is organized as follows. The next Subsection will present the main features of the database and its links with the existing literature. Then, institutional indicators will be introduced and discussed one at a time.

A.1 Data and sources, general features

The set of institutional indicators used in the empirical analysis provides information on the evolution of labor and credit markets in 15 OECD countries from 1971 to 2003. Countries in the sample are, namely: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Portugal, Spain, Sweden, United Kingdom, and United States.²² Indicators refer to thirteen institutional dimensions. Time-series has been constructed for eleven institutional measures according to the following (from now on "standard") compilation strategy: when yearly observations were missing, data have been interpolated; and for years before (after) the first (last) observation available no change has been assumed, thus assigning the value recorded in the first (last) year of observation back (up) to all years since the starting (ending) point in the dataset.

The database has been assembled with the aim to enrich the set of institutional indicators previously used in labor economics to include some measures more suitable to a consumption smoothing analysis and information made available in recent OECD publications. Table A.1 surveys the general features of the most complete datasets used in the strand of the literature which studies the macroeconomic outcomes of *sets* of labor market institutions, and shows how they relate with the present database. Nickell, in 1997, wrote a seminal paper where he analyzed the role of eight institutional dimensions in explaining long term trends in unemployment dynamics. Then, more recent studies by Blanchard and Wolfers in 2000 (BW), Bertola Blau and Kahn in 2002 (BBK), and Nickell Nunziata and Ochel in 2005 (NNO), have extended the scope of the analysis and the institutional indicators sample by including updated measures and information on time variation.

²²These are the countries for which it has been possible to collect data for all the variables included in the baseline time-invariant specification (see Section 4).

It is worth noting that, even if every year the OECD up-dates and attempts to improve the quality of institutional indicators made available through its publications, data limitations are still a burden on institutional analyses, and collecting a comprehensive dataset on institutional indicators can be quite a hard task. As the table points out, the primary sources of data on institutional indicators are OECD publications and datasets compiled by several authors (e.g. Lazear, 1990, on employment protection and Visser, 1996, on trade union density). Existing datasets fairly differ as regard indicators' definitions and time variation; the choice of institutional measures is driven by their goodness of fit with respect to the subject of the analysis (e.g. explaining long-term vs. short-term trends of the dependent variable), and by the quality and availability of data. In what follows the indicators will be presented and compared according to the institutional dimension they belong to.

A.2 Institutional indicators

Employment protection legislation (EPL)

The first attempt to measure the strictness of employment protection laws dates back to Lazear (1990), who collected data on severance payments and notice periods expressed in means over the period 1956-1984. More comprehensive indicators are compiled by the OECD, which provides two versions of the EPL index. The broader one, the so-called *version 2*, describes EPL along 18 basic items, grouped in three main categories: employment protection for regular contracts (8); regulations of temporary contracts (6); and specific requirements for collective dismissals (4). The indicator is built as a weighted average of these items, and recorded at two points in time: 1998 ("late 1990s") and 2003. *EPL version 1* is a less broad measure: it is computed as the unweighted average of the two categories for which data are available since 1985 ("late 1980s"), namely, regulations on regular and temporary contracts. Values on both the indicators, reported in the OECD Employment Outlook (2004), range from 0 to 6, with lower scores indexing looser regulations.

Starting from these two data sources, previous studies built EPL time-series as follows. BW expressed values in rankings, chained data from Lazear with the OECD's ELP version 1 index, and linearly interpolated when observations were not available. BBK used the same time series made available by BW. NNO interpolated the BW series to get yearly observations and readjusted data in mean, obtaining an indicator with range between 0 and 2.

Table A.1. Institutional Indicators in the Literature, Comparing Datasets

	MICKELL (1997)	BLANCHARD and WOLFERS (2000)	BERTOLA, BLAU and KAHN (2002)	NICKELL, MINZIATA and OCHEL (2006)	LO PRETE (2007)
Institutional Indicators	Time INVARIANT	Time INVARIANT	Time VARYING	Time VARYING	Time INVARIANT
Employment Protection Legislation	Ranking on OECD (EPL version 1)	Mickell	B/W	B/W	Two indexes 0-6 (EPL version1 and EPL version2, OECD)
Replacement rates	GRRs in 1st year (OECD)	Mickell	B/W	B/W	EPL version1 + Lazear (severance pay and notice), EPL version2
Unemployment Benefits Duration	Length of entitlement (years)	Mickell	Indicator of duration 0-4	GRRs every 2 years (OECD), interpolated	MRRs and GRRs (OECD) ^a
ALMP	Index by Mickell on OECD data	Mickell	B/W	no	Length of entitlement (years)
Collective Bargaining Coverage	Index 1-3 (OECD)	Mickell	Index % (OECD)	no	Index defined as in Mickell (1997)
Trade Union Density	Index % (OECD)	Mickell	Yes (OECD and Visser, 1996)	Index % from Ebbinghaus and Visser (2000) plus various (national) sources	Index % (OECD)
Coordination in wage bargaining	Index 2-6 (OECD)	Mickell	Ranking on OECD data	Two indexes 1-3 (OECD and other sources)	Index % (OECD online database)
Labor taxation	Total tax rate (payroll, income and consumption taxes)	Mickell	Labor taxation (payroll and income taxes plus mandated benefits)	Tax wedge (payroll, income and consumption tax rates)	Index 1-5 (OECD)
Credit market development	no	no	no	no	Total tax wedge, marginal and average rate (OECD)
Sample	1983-1994 6-year 20	1960-1995* 5-year 20	1970-1999 5-year 26	1961-1995 annual 20	LTV ratios, typical and maximum (OECD, Jappelli and Pagano, 1994)
Period	1983-1994	1960-1995*	1970-1999	1961-1995	1971-2003
Periodicity	6-year	5-year	5-year	annual	annual
Number of countries	20	20	26	20	15

Notes: *Where the cell records "Mickell" or "BW" the indicator used in the dataset is the same as the one compiled by, respectively, Mickell (1997) or Blanchard and Wolfers (2000).
(a) Data refer to average MRRs over 5 years of unemployment, and to the average of GRRs for three lengths of unemployment.

The present dataset compiles two time-series: the first one exploits information provided by the EPL version 2 only and, thus, allows for few time variation; the second one is built using both EPL version 1 and Lazear's data. The compilation strategy significantly differs from those ones adopted by previous works. According to the author, the only way to acknowledge the true contribution of Lazear's data is to consider that they provide information only on two out of the fourteen basic items which constitute the OECD's index. Hence, following the general rule of dating back the value of the first observation available, EPL version 1 has been up-graded with values over the 1971-1984 period, by decomposing the index in 14 items and, then, substituting Lazear's data to those ones recorded in 1985 for severance payments and period of notice components only.²³

Benefit replacement rates (NRRs and GRRs)

The OECD Benefits and Wages (2004) compiles two indicators of the level of unemployment benefits: net replacements rates (NRRs) and gross replacement rates (GRRs). The first one indicates the percentage of in-work pay that is maintained when becoming unemployed. It represents an update with respect to GRRs, is available only for the early 2000s, and better fits a benefits analysis: by taking into account the progressivity of taxes and income redistribution policies, it allows to better isolate the effects of benefits from those ones of other relevant institutional dimension; moreover, given that countries greatly differ in benefits taxation, it represents a more powerful indicator for international comparisons.²⁴ The measure included in the dataset refers to the average of NRRs over 60 months of unemployment, calculated for four family types and two earnings levels (in percentage value). Unfortunately, for NRRs it is not possible to build a time-varying measure; the models used to compute this indicator have been revisited since 2001, thus introducing a break in the time-series that does not allow for comparability with the values available for 1997 and 1999 (OECD, 2002).

All the previous studies in the literature use the GRRs. This is a raw measure of the generosity of the benefit system, whose main advantage is the

²³Lazear's data are first converted from the original unit of measurement and normalized to range from 0 to 6 according to the scores' assignment scheme of the OECD (see Annex 2.A1 of the OECD Employment Outlook, 2004). Then, the two derived items are weighted according to the OECD weighting scheme and become part of the final time-varying index of EPL. Lazear reports data on severance payment upon dismissals and on notice period granted to workers with ten years of service, while the OECD distinguish and convert data referring to workers with 9 months, 4 years and 20 years tenure. Here it has been chosen to apply to data from Lazear the conversion scheme corresponding to 20 years tenure.

²⁴For a detailed comparison of the two indicators, see the OECD Benefits and Wages 2002.

richer historical dimension: it is available since 1961 and recorded on a 2-year basis up to 2003. The measure in the dataset corresponds to the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations, and three durations of unemployment.²⁵ It is worth recalling, from Section 3.1, that the information content of GRRs greatly differs from that one of NRRs.

Duration of unemployment benefits

To index the length of unemployment benefit entitlement the dataset used the (monthly) "maximum benefit duration" of entitlements to unemployment insurance.²⁶ The corresponding time-series is built on values collected for 1989 (OECD Employment Outlook, 1991), 1996 (OECD Employment Outlook, 1996), and 2002 (OECD Benefits and Wages: OECD Indicators, 2004). Observations have been transformed from monthly to yearly (with "unlimited" duration normalized to 7 years), and a time-series has been compiled following the standard compilation strategy.

The time-varying indicator is something new with respect to previous studies. Indeed, BW and BBK used time invariant indexes corresponding, respectively, to the yearly length of unemployment benefits entitlement and to some indicators of benefit duration ranging between 0 and 4. NNO computed a time-series by using a variable which is a weighted average of the ratios of GRRs received at various years of unemployment to (as a common basis) GRRs granted in the first year.

Active Labor Market Programmes

The Active Labor Market Policies index is defined as originally in Nickell (1997), and, then, in BW and BBK, as the amount of expenditures on ALMPs per unemployed person as a percentage of GDP per member of the labor force.²⁷ Like in previous papers by BW and BBK, no time-series has been compiled for this indicator; NNO simply did not include ALMPs in the set of institutional indicators.

²⁵The measure of GRRs available in previous datasets refers to the benefits granted in the first year of unemployment only.

²⁶This measure disregards the contribution of other types of benefits like unemployment assistance, guaranteed minimum income, and social welfare.

²⁷In previous studies the dependent variable was the unemployment rate. To avoid endogeneity problems stemming from the fact that current GDP was normalized on current unemployment, they instrumented ALMPs with a variable built as current GDP spent on ALMP on the average unemployment rate over a period.

Collective bargaining coverage

The collective bargaining coverage index is taken from OECD Employment Outlook (2004). It is recorded at three years: 1980, 1990, and 2000. Data are interpolated according to the standard compilation strategy. BBK and NNO used OECD data and the same compilation strategy, while BW did not compile a time-series for this institutional indicator.

Trade union density

The OECD Labor Market Statistics Database (online) provides data on trade union density rates by collecting both surveys and administrative information. Administrative information for the EU countries refers to the so-called Visser's version: data are adjusted for non-active and self-employed members, along the model used by Ebbinghaus and Visser (2000) and by the OECD (1991). For non-EU countries no adjustment has been performed; anyway, since surveys and (rough) administrative data provide the same information on the relative positions of countries, an eventual merging would not to create relevant differences in estimation results. The database uses, for EU countries, administrative data, available for 1970-2001 (sometimes 2002). Portugal and Spain have fewer information, since 1978 and 1981 (up to 2001), respectively. Canada, UK and the USA series are built as a mix of administrative and surveys data, using the latter where possible (in line with the OECD standard approach). The USA series contains surveys data for 1973-2002 and administrative data for 1970-1972; Canada has administrative data for 1970-1983, and surveys information for 1984-2002; UK has administrative data for 1970-1994, and surveys for 1995-2002. Exploiting this information and following the standard compilation strategy, a time-series has been created.

As regards previous studies: BW employed a time-invariant measure only; BBK an indicator from Visser (1996), available over the 1970-1993 period; NNO information on EU countries contained in Ebbinghaus and Visser (2000), plus various national and international sources and compilation criteria to get information for non-EU countries.

Coordination in wage bargaining

To index coordination in wage bargaining it has been used the indicator compiled by the OECD and published in the Employment Outlook (2004). According to the OECD, this measure represents an improvement with respect to indicators made available in previous editions, since it benefits from more detailed descriptive information and richer historical data. The index has range between 1 and 5, with higher values indicating economy-wide levels

of coordination, and is recorded on a 5-year basis over the period 1970-2000. The corresponding time-series has been completed following the standard compilation strategy.

Indexes used in previous works differ both in range and (because of less precise information was available in past years) information contents. BW use data from the Nickell (1997), without building a time-series. BBK employ a continuous variable made available in the OECD Employment Outlook (1994). NNO compiled two indexes: the first one by interpolating data from the OECD Employment Outlook (1996) and, then, matching the resulting series with the data provided by Belot and Van Ours (2000); the second one was based on Nickell et alii (2001) and allowed for short-term variation (for a full description see Ochel, 2000).

Labor taxation

Measures on labor taxation are provided by "Taxing Wages: 2003/2004" (OECD, 2005) and by the OECD online database. The OECD (2005) calculates the tax "wedge" as income taxes plus employee and employer contributions less cash benefits, as a percentage of total labor costs (i.e. gross wages plus employer social security contribution and, in some countries, payroll taxes). The index is computed for eight illustrative family types, and three earnings levels (computed as percentages of the earnings of an average production worker, APW).

The *marginal tax wedge* in the dataset is an unweighted average of the homonymous indicator over four family types; the indicator is available for the period 1997-2003. The *average tax wedge* refers to the tax wedge of the one-earner family with two children (i.e. "married" APW); data are collected on a two-year basis for the period 1979-1997, and every year since 1999. Historical data between 1979 and 2004 are available for all countries with the exception of France, for which information about employers' social security contributions is missing over the 1979-1993 period.

In previous studies, information on tax burdens refers to slightly different tax/benefits combinations: BW use data from Nickell (1997), who computes the tax wedge on the basis of average payroll, income and consumption tax rates; BBK add, to income and payroll taxes, mandated benefits; NNO include payroll, income and consumption tax rates. Only NNO provide a time-series, over the 1960-1995 period, by updating data coming from the London School of Economics CEP-OECD database.

Loan-to-Value ratios

The Loan-to-Value is an index of labor supply conditions that measures the ability of the mortgage markets to provide access to financing. Data are collected by several authors on the basis of national and international sources and according to different compilation criteria. This makes it hard to confront existing datasets and, together with the poorness of data availability, explains why no time-series for LTV is up to now available. Leaving to future research a critical assessment of the information used in previous studies, the dataset includes two indicators exploiting data provided by an OECD Economic Study by Catte et alii (2004), and by Jappelli and Pagano (1994). The OECD collects data for typical and maximum LTV without reporting on the years of observations; here the choice has been to ascribe the records to "early 2000s" (i.e. to the 2000-2003 period).²⁸ Jappelli and Pagano collected data as period averages over 1961-1970, 1971-1980, and 1981-1987 for the maximum LTV, only. Hence, for the typical LTV, no time-series has been compiled. The maximum LTV time-series merges data coming from Jappelli and Pagano, the OECD, and various sources to add information on countries not included by the OECD, namely: Canada (Canada Mortgage and Housing Corporation), Japan (Standard & Poor's Reports), and the USA (Millennial Housing Commission).²⁹

²⁸The assumption is not going to affect results: estimation outcomes do not significantly change when ascribing the values to longer time spans.

²⁹On Canadian data, see www.cmhc-schl.gc.ca. Standard & Poor's Reports on Japanese Mortgage Market are by Kenji Kondo (2002): "Coming Changes to Japanese Housing Market Likely to Further Boost RMBS Issuance"; and Naoko Nemoto (2005): "Battle Over Japan's Mortgage Market Raises Default Risks". On US data, see Collins (2002): "Pursuing the American Dream: Homeownership and the Role of Federal Housing Policy", *Paper prepared for the Millennial Housing Commission*.

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