LABOUR MARKET INSTITUTIONS AND HOUSEHOLD CONSUMPTION INSURANCE WITHIN OECD COUNTRIES

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Abstract

This paper tests empirically whether the effect of idiosyncratic income shocks on aggregate consumption depends on institutional features of national labour markets. The results show that, in a sample of 15 OECD countries, institutional heterogeneity is a significant determinant of the response of household consumption to country-specific income shocks. This is consistent with the idea that institutionally-provided social insurance may help increase income stability when people differ in their ability to access financial markets and smooth consumption fluctuations.

I. Introduction

Standard representative agent models of international trade in risky assets predict that, when markets are complete and there are no trade costs, optimizing agents should use markets in contingent claims to insure fully. In a world where competition forces and financial market development are the ultimate engines of economic and social growth it would be hard to rationalise labour market institutions as risk-reducing devices. Following this line of reasoning, since the early 1990s the OECD recommended to pursue structural reforms in the labour market to reduce institutional and policy interference with free-market outcomes (OECD, 1994). In practice, however, the data soundly reject the hypothesis that cross-country consumption movements should be the same and should not be affected by country-specific circumstances (see Lewis, 1999, and its references).

A large literature has tried to reconcile the theory with the data, providing several plausible but not fully satisfactory explanations for this evidence. Authors have analysed the impact of habit formation (Fuhrer and Klein, 2006) and other kinds of comparative behaviour; non-separable components in the utility function (Stockman and Tesar, 1995; Marrinan, 1998); barriers to trade (Obstfeld and Rogoff, 2001; Lewis, 1996); limited insurance markets where people cannot write contracts contingent on the realization of future labour income (see Heaton and Lucas, 1996, and related literature). A strand of studies has moved from testing to measuring the amount of risk sharing between countries. Asrubali et al. (1996) and Sorensen and Yosha (1998) have identified three main channels through which risk can be shared at least imperfectly across borders, namely cross-border ownership of claims to output, lending and borrowing on credit markets, and super-national government redistribution. Melitz and Zumer (1999) and Sorensen et al. (2007) have added to the analysis country-specific features like business-cycle position, size, shock persistence, home bias as

factors able to influence the decomposition of the smoothing through the different channels. When markets are incomplete, consumption risk sharing may not smooth fully macroeconomic shocks also due to expropriation risk (Fratzscher and Imbs, 2009) and credit imperfections (Wasmer and Weil, 2004; Nitschka, 2010 and its references).

This paper contributes to the ongoing debate by testing whether country-specific features of the mix of labour market institutions may influence individuals' ability to smooth consumption within national borders and in turn affect the response of aggregate consumption to country-specific income shocks. While novel to international economics, the idea that a wide array of institutional arrangements may introduce a social insurance component in disposable incomes is a well-known feature of labour economics. The social insurance approach to institutional analysis studies the insurance role of labour market institutions under incomplete markets, although mainly focusing on individual or sector specific shocks rather than on country-level uncertainty. In recent years, several studies have shown that labour market institutions such as job security provisions (Bertola, 2004), wage setting (Agell, 2002), and unemployment insurance benefits (Acemoglu and Shimer, 1999) may work as risk-reducing devices able to smooth income and therefore consumption.

A first attempt to link international macroeconomics to the social insurance approach to institutional analysis was made by Bertola and Drazen (2006) who suggest that if, as in reality, individuals within each country differ in their ability to access private markets, institutions that would be redundant in a representative-agent economy may play an important role by redistributing income between agent types. Theoretical support for this argument has been provided by Lo Prete (2013). In a model of international trade in risky assets modified to include a subset of agents, labor-owners who do not access financial markets, and employment security provisions, labour market institutions can promote risk-shifting

arrangements between agent with or without access to financial market, and this so-called "within-country risk sharing" in turn affects aggregate consumption and capital flows. Similarly to Kocherlakota and Pistaferri (2007), where limited within-country risk sharing against idiosyncratic (to an individual) shocks generates ex post heterogeneity across agents and helps explain the real exchange rate anomalies first documented by Backus and Smith (1993), this paper's empirical analysis is motivated by considerations on the effects of within-country risk sharing on the response of aggregate consumption to macroeconomic shocks.[1]

To find evidence of the role of labour market institutions as providers of social insurance, the present paper tests whether idiosyncratic income shocks may affect household consumption differently depending on country-specific institutional settings. OECD countries differ along several structural dimensions and this heterogeneity will be exploited to point out the significance of the interaction between shocks and institutions.

The paper documents that labour market institutions are relevant not only to unemployment responses to shocks (Blanchard and Wolfers, 2000; Bertola et al., 2002; Nickell et al., 2005) or inflation (Zanetti, 2011) but also to the character of deviations from perfect risk sharing. Empirical estimation from a panel of 15 OECD countries observed over the 1971-2008 period indicates that institutional heterogeneity is a significant determinant of cross-country differences in household consumption responsiveness to income shocks. Smaller employment and wage fluctuations, and more progressive tax systems reduce the effect of income shocks on household consumption at the country level. The results are

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[1] Starting from a different premise, Fidrmuc et al. (2011) considered labour market rigidity as a factor that, together with FDI, may increase cross-country risk sharing by fostering bilateral consumption correlations, as if in highly regulated countries implicit contracts should be easier to enforce and labour incomes should more easily work as collateral.

robust to the inclusion of unobservable country-level heterogeneity, time series information, and further hypotheses and robustness checks.

The paper is organized as follows. Section II motivates the claim that institutions may reallocate risks that cannot be fully diversified on financial markets, such as labour income fluctuations, and in turn alter the way aggregate consumption responds to country-specific income shocks. Section III describes the configuration of national labour markets by using indicators of their structural features, and discusses how different institutional dimensions may be relevant to aggregate consumption insurance. Section IV presents the empirical strategy, and shows how a standard cross-country consumption insurance test can be extended to account for the interaction between macroeconomic shocks and institutions. Sections V and VI report the estimation results and robustness checks, respectively. Section 7 concludes.

II. National institutions and risk sharing

Structural features of labour markets would not matter for cross-country risk allocation in a framework where people can access complete markets. If it was possible to insure fully against country-specific shocks to income or wealth, consumption should not be affected by country-specific circumstances, satisfying the so-called "full consumption insurance hypothesis" (Obstfeld and Rogoff, 2001). In that setting it would be hard to rationalize labour market institutions as risk-reducing devices: in an economy where workers may write and trade assets on their human capital, consumption would be sheltered from labour income fluctuations.

Empirically, however, there is very little evidence of risk sharing in consumption comovements across countries (consumption home bias), and the behaviour of cross-country (per capita) consumption growth rates reflects the existence of a more imperfect and

complicated world than the one formalized by complete market models of international trade in risky assets (Lewis, 1996, 1999).

In a reality where private markets do not perfectly accommodate the demand for insurance against labour income fluctuations, people can still access alternative consumption smoothing channels. For instance, if risks are not fully insurable by trade in contingent securities, agents may self-insure by borrowing and lending on credit markets (Cochrane, 1991). According to the permanent income hypothesis, consumption is expected to respond to idiosyncratic shocks, even if only to their permanent component, thus leading to a rejection of the full consumption insurance hypothesis. But not even intertemporal trade in riskless bonds solves the issue in a world where lending and borrowing opportunities are limited by the existence of many credit market imperfections (Asdrubali and Kim, 2005).

Departures from the complete-market 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 financial markets. This paper tests the hypothesis that structural features of labour markets matter for cross-country risk allocation by assessing whether institutional heterogeneity is a significant determinant of cross-country differences in household consumption responsiveness to income changes.

A precursor to the present approach to the study of the role of national institutions in international macroeconomics is a paper by Bertola and Drazen (1994) on capital flow volatility. They suggest that when individuals differ in their possibility of accessing 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 present paper takes the argument further and investigates the social insurance role of labour market

institutions as risk-reducing devices meant to mitigate the fluctuations of otherwise non-traded national income components.

The interpretation that the paper advances for the observed differences in consumption volatility across countries hinges upon two elements: the insurance role of labour market institutions, and the impact of their interaction with country-level shocks in terms of macroeconomic insurance outcomes.

As regards the first element, an important reference for the present approach to the analysis of the (insurance) outcomes of institutions can be found in labour economics. The idea that a set of institutions may provide labour income with a non-market insurance component dates back to Azariadis (1975), but was explicitly addressed and formalized only in the 1990s as, for instance, in Blank and Freeman (1994) and Agell (1999, 2002). The social insurance approach to institutional analysis states that, while the introduction of labour market institutions may be hardly motivated in a frictionless economy where workers can perfectly insure against labour income risk, several institutional features such as job security provisions (Bertola, 2004), wage setting (Agell and Lommerud, 1992, and Agell, 2002) and unemployment insurance benefits (Acemoglu and Shimer, 1999) may represent second-best instruments for sharing risk in a reality characterized by incomplete and imperfect financial markets. These contributions focus on income shocks which are idiosyncratic to an individual agent or sector within a country and cancel out at the national aggregate level. The present analysis, instead, investigates whether the same institutions may provide insurance in the form of risk reallocation between agent types within national borders when the shock is aggregate to a country as a whole.

As regards the impact of labour market institutions on macroeconomic shocks, the key elements of the income insuring mechanism whereby labour market institutional features

may promote risk-shifting arrangements between agents with or without access to financial markets are illustrated in theory by Lo Prete (2013). In a model of international trade in risky assets where agents differ in the ability to access financial markets, the reduction of employment and wage fluctuations may be part of a policy package that fosters within-country risk reallocation. The mechanism redistributes total national incomes from labour to capital when business conditions turn good, and from capital to labour when business conditions turn bad, leading to a negative correlation of the labour share with productivity shocks. In turn, this insurance channel, by mitigating the fluctuations of otherwise uninsured labour incomes at the expense of an amplification of the fluctuations of tradable national income components, is expected to affect the response of aggregate consumption to country-specific income shocks.

III. Dimensions of social insurance in the labour market

Following Nickell (1997) seminal paper, it is possible to describe the configuration of national labour markets by grouping labour market institutional indicators in four main categories: employment protection legislation, passive and active labour market policies, characteristics of the wage bargaining process, and labour taxation.

Employment protection legislation is the mix of all the mandatory measures that regulate hiring and firing with the aim of protecting employment. Along with social protection, these policies are usually viewed as determinants of labour market "rigidity". However, the effect of employment protection legislation on employment and wages is quite ambiguous, closely related to the wage-setting process, and may be even beneficial for workers' welfare and productive efficiency when markets are incomplete (Bertola, 2004). As outlined by Kessing (2003), adjustment costs drive a wedge between the marginal product of labour and the wage that firms pay to employees and hence reduce labour income fluctuations across states

of nature. In a cross-country setting, employment protection plays a significant role in reallocating risk within national borders, shielding labour incomes and smoothing consumption fluctuations (Lo Prete, 2013). The OECD indicator of the strictness of employment protection in Table 1 (EPL) accounts for several dimensions pertaining to laws governing regular and temporary contracts and shows that the variation of EPL is wide across countries. Anglo-Saxon countries feature less stringent regulations while Continental Europe and Scandinavian countries grants greater protection to workers, with the notable exception of Denmark that departs from the "Continental model" and constitutes a third way by combining low EPL and high social protection - the so-called "flexicurity" approach.

Passive and active labour market policies. Public unemployment benefit systems are passive policies that provide what moral hazard prevents private insurance companies from supplying: insurance against the risk of unemployment and social assistance to unemployed workers. Two features that may be representative of the main differences in passive labour market policies across countries are the level and the duration of unemployment benefits. In Table 1, the OECD indicator of net replacement rates (RR) measures the level of in-work income maintained after a job loss taking into account the progressivity of the tax system and the impact of income redistribution policies. Together with OECD information on the maximum number of months of entitlement to benefits provisions (BD), the data indicate that Anglo-Saxon countries, Japan, Italy, Spain and Belgium grant lower levels of benefits, while the duration of entitlement is short in Austria and all the above-listed countries with the exception of Spain and Belgium. Another policy dimension worth considering is the amount of spending on all the social expenditures other than education meant to promote and increase the quality of employment for those enrolled in the so-called active labour market programmes. Looking at the indicator in Table 1 (ALMP), built as spending on active

labour market programmes per unemployed person as a percentage of GDP per member of the labour force (see Nickell, 1997), countries with less generous benefits systems typically feature low values of ALMP. This is consistent with the idea that high ALMP are meant to offset the adverse effects of unemployment benefit systems on the willingness to fill a vacant position and hence push unemployed individuals into work. In theory, the response of consumption to macroeconomic shocks may or may not be (relatively) amplified in countries where longer unemployment benefits and higher replacement rates are available, as the effect of these institutions depends on whether the cost of benefit systems is or is not fully shifted from uninsured labour incomes to internationally diversifiable capital incomes.

Wage bargaining. To describe the main features of the wage setting process, it is possible to use indicators of the power of trade unions and of the extent of coordination in the wage setting process. Two complementary indicators of trade unions' power are trade union density, defined as the percentage of wage-earners who are members of a trade union, and collective bargaining coverage, defined as the share of workers actually covered by union bargaining. Interestingly, data in Table 1 show that trade union density (TU) is quite low on average, with values below 30% in Anglo-Saxon countries, Japan, and half of Continental Europe, while collective bargaining coverage (CB) is high everywhere but in Anglo-Saxon countries and Japan. This gap is worth noting as the degree to which union decisions affect workers who are not enrolled in their ranks may index the relevance of insider practices. In theory, when restrictive rules on union membership and the presence of turnover costs endow incumbent workers, the so-called insiders, with additional bargaining power with respect to outsiders, the implications of collective bargaining coverage for the stabilization of aggregate labour income and workers' consumption are indeed ambiguous. They depend, for example, on whether insiders exploit their power to allow marginal workers to be employed

at lower wages or on temporary contracts (Fehr, 1990). As to the degree of coordination in wage bargaining on the part of both unions and employers, the corresponding indicator in Table 1 (CO), 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). Coordination is high in all countries except Canada, France, the UK, and the US. To the extent that trade unions let wages be more sensitive to changes in economic circumstances (Nickell and Layard, 1999), coordination may be expected to increase the responsiveness of aggregate consumption to country-specific shocks.

Labour taxation. Taxes on labour income are mandatory contributions collected by the government to insure workers against shocks to their income. In terms of consumption smoothing, what matters most is the progressivity of the tax system rather than the average level of taxes: when private markets are incomplete for exogenous reasons, the theory predicts that progressive tax systems may substitute private insurance and increase consumption risk sharing by helping reduce the variance of net income across states of nature (see Krueger and Perri, 2009). To proxy this institutional dimension, Table 1 reports OECD data on the difference between the cost of labour borne by the employer and the net take-home pay, the so-called "tax wedge" (TW), in marginal terms, that is, accounting for the percentage of additional earnings that is taxed away and hence for the progressivity of the tax system. All tax systems are to some extent progressive as marginal tax rate exceeds the average rate, with Continental Europe exhibiting, with the exceptions of Portugal and Spain, marginal rates higher than Anglo-Saxon countries and Japan.

IV. Empirical specification

Standard representative agent models that 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).[2] Under CRRA preferences, this hypothesis can be tested empirically by estimating the linear model

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

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 is a dummy variable accounting for the common consumption growth rate in the sample, and $\tilde{y}_{jt}$ is the country-specific shock variable, namely the idiosyncratic rate of growth of real output per capita. The disturbance term, ε_{jt}, includes the time-varying component of individual and aggregate preference shocks, unexpected changes to permanent income, and potential measurement errors from consumption and income data. Finally, while standard models of international trade in risky assets assume that the share that each country holds of the initial world tradable output is constant, country dummies (α_j) check for potential differences in the international distribution of assets over the period. A negative (positive) and significant country effect would indicate a current account deficit (surplus), thus signalling an increase (decrease) in a country's share in world tradable output over the period.

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 $\beta = 0$ would hold true. As discussed in Section II, empirical analyses of international data led to a rejection of the full consumption insurance hypothesis, finding that the estimated β from model (1) significantly differs from zero. Moreover, by running separate regressions of the country-specific growth rate of consumption on the country-specific growth

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

rate of income, it can be shown that the coefficient of the idiosyncratic variable not only differs

from zero but is even country-specific (Lewis, 1999).

The empirical strategy proposed in this paper stresses the importance of institutional

heterogeneity by testing whether the difference in slopes may be explained by differences in

institutional (non-market) insurance provisions. The idea that the effects of idiosyncratic income

shocks on consumption depend on country-specific sets of national institutions may be included

in equation (1) by 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 main specification, estimated by nonlinear least squares, then reads

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

In this empirical model, consumption growth is explained by two components: a common

pattern across countries that is captured by time dummies, δ_t, and a country-specific component

that depends on the interaction between the idiosyncratic change in income and a sum of

institutional effects, where $\tilde{X}_{ij}$ is the value of institution i in country j, computed as the

deviation from the mean value in the aggregate. The coefficient β represents the sensitivity of

consumption growth to idiosyncratic income shocks of a country displaying an average (with

respect to the sample aggregate) institutional framework. The parameters γ_i measure the effect

of the configuration of national institutional settings, that is of the set of I institutions of country

j, on country-level shocks. In this model, each institution is allowed to interact separately with

the shock and each coefficient γ is expected to enter with a negative (positive) sign when

institution i contributes to mitigate (amplify) the effect of the shock. The empirical model (2)

does not aim at offering a structural model of the interactions of interest. It has a descriptive

relevance, and in this respect fits well the purpose of offering insights on the relevance of the

interactions between institutions playing a risk sharing role within country borders and

macroeconomic shocks. By allowing the size of the coefficient of the country-level income shock variable to depend on the country-specific level of institutional intervention in the economy, the model tests whether the difference – if any – in slopes may be explained by differences in country-specific institutional configurations, that is the empirical question at the core of the present paper.

IV.1. Data on shocks and institutions

The analysis will be performed on the sample of 15 OECD countries listed in Table 1, and covers the 1971-2008 period (details on sources and definitions are in the Data Appendix). Income and consumption series will refer to per capita annual real income and household consumption, deflated using the CPI deflator.[3] To proxy for the idiosyncratic rate of growth of real output per capita, we follow Lewis (1996) and Asdrubali et al. (1996) and compute the difference between the growth rate of income in a country and the mean growth rate of income in the sample aggregate: $\Delta \tilde{y}_{jt} = \Delta \ln Y_{jt} - \Delta \ln Y_t^A$.

As regards institutional features of national labour markets, model (2) will be estimated using the set of time-invariant measures reported in Table 1. Measuring institutional features is admittedly a difficult task, as indicators are useful but imperfect measures of the dimensions of interest. They allow for cross-country comparisons mainly, because information on time variation is quite scarce. In past decades data have not always been recorded on a yearly basis by the OECD and other sources and compilation strategies have changed making it difficult to collect comparable indicators for all years and all countries. Since in most cases the relative position of countries has not changed much over the last decades, empirical specifications with time-invariant institutional

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[3] The choice to use the CPI deflator (instead of the PPP index) and focus on domestic income dynamics will prove not to represent a problem for international data comparability in the present dataset. As discussed in Section VI, results indicate that shocks to exchange rates do not affect estimation outcomes.

indicators could arguably capture most of the information relevant to present analysis. However, as a robustness check, the next Section will report estimates from a model including institutional time-varying measures, too.[4]

V. Results

The first two columns of Table 2 report the outcomes from estimating model (1). In column (1) time effects capture the effect of the common growth rate of consumption per capita, and in column (2) country dummies control for country-specific unobserved heterogeneity, too. In both columns the coefficient of the idiosyncratic income shock variable is positive and highly significant, and the results are similar because country effects are jointly not significant, while time dummies track well the average consumption growth in the country aggregate. This result, unless driven by measurement errors, confirm the rejection of the full consumption insurance hypothesis. Moreover, by running a seemingly unrelated estimation of the impact of idiosyncratic income shocks on idiosyncratic consumption growth rates, the estimated β-s (not reported) differ significantly across countries. The remaining part of this paper explores the possibility that these differences can be explained by accounting for the role that heterogeneous national institutional settings play in smoothing out the effects of country-specific shocks.

The last two columns of Table 2 show the outcomes from estimating model (2). The results indicate that, by allowing idiosyncratic macroeconomic shocks to interact with the set of time-invariant institutions reported in Table 1, the model captures important features of the data. A positive income shocks is associated with an increase of household consumption growth across countries, indicating that market incompleteness matters even when financial market risk

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[4] As Appendix Table A.1 shows, the time span for which observations are available differs substantially across the variables. Most indicators have records since the 1980s, while fewer observations are available for net replacement rates, a series complied by the OECD for 2000s only.

sharing opportunities are integrated by within-country risk reallocation, and its effect depends on the configuration of national labour market institutions. In countries with higher values of employment protection legislation, trade union density, and tax progressivity, the response of household consumption to income shocks is significantly smoother (negative sign). Higher collective bargaining coverage seems, instead, to contribute to amplify the effects of income shocks (positive sign). These results are consistent with the priors formulated in Section III. The level of unemployment insurance provisions, together with higher spending on ALMPs, imply a greater response of household consumption, while a longer lengths of entitlement dampens it, but these effects are not precisely estimated. Turning to systems of wage determination, they seem to exert an insurance function mainly through trade union density, while the positive sign of collective bargaining coverage suggests that insider practices weakens within-country risk reallocation.

To provide a sense of the magnitudes of the (estimated) effects of each institution, consider Table 3. The first two columns report 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 show that, if countries differed with respect to employment protection legislation only, an idiosyncratic shock that would be worth one percentage point in a country with the mean values of all the institutions would lead to a 1,7 percentage point shock in the country which displays the lowest ELP value, and to a 0,4 percentage point shock in the country with the most stringent EPL provisions. According to this simple exercise, employment protection legislation and progressive labour taxation are the most effective income smoothing institutions. Trade union density dampens the effect of the idiosyncratic shocks by 0.8 points where more workers join trade unions, and amplifies it by 0.8 points where trade unions have fewer members. The coverage of trade unions' agreements,

captured by the index of collective bargaining coverage, instead is associated to bigger shocks. All the other institutional dimensions do not play a significant role.

The empirical analysis presented so far covers the period 1971-2008 and uses time invariant institutional measures. As discussed in Section IV, this modelling choice should not affect the results to the extent that the relative position of countries is stable over time. To test the reliability of this assumption, Table 4 considers if the results from the institutional time-invariant model hold over the shorter 1980-2008 period for which it is possible to collect some information on institutional time variation, too.

Columns (1) and (2) of Table 4 presents results from the empirical model (2) on the shorter 1980-2008 period using time invariant measures, to show that results from the time invariant specification are robust on this shorter time span. Then, using time-varying institutional measures, estimation outcomes in columns (3) and (4) show that adding time series information does confirm the main conclusions of the time-invariant model. The effects of the shock-institution interactions preserve their signs. That is, institutions contribute in the same way to smoothing out (negative sign) or increasing (positive sign) the impact of macroeconomic shocks. As regards the significance of the role of each institution, the effect of employment protection, trade union density, collective bargaining coverage, and labour taxation is the same as in the time-invariant specification.

What is remarkable when considering the evolution of institutions over time is the similarity of the outcomes with respect to the time-invariant cross-sectional results. Unlike studies by Blanchard and Wolfers (2000) and Bertola et al. (2002), which have first analyzed the interaction between shocks and institutions to explain unemployment dynamics, the present analysis finds basically the same results by using time-invariant and time-varying institutional indicators.

The scope of any empirical analysis is, of course, limited. While it is possible to derive insights on the relevance of cross-country differences in institutional frameworks, some caution is needed when evaluating the information content of individual institutional indicators which proxy imperfectly the phenomena of interest. Related studies have investigated interactions among labour market policies (e.g. Bassanini and Duval, 2006), as well as the relationship between labour and credit market structural features (Bertola and Koeniger, 2007). But since the complementarities among institutions are complex and still poorly understood both in theory and empirically, an analysis of these issues is left to future research. The evidence presented in this paper can be considered a preliminary step towards a more accurate analysis: as new information on time variation is made available by the OECD or similar studies, there will be scope for further research on how mixes of policies have evolved over time.

VI. Robustness checks

While institutions have been treated as predetermined, one may wonder whether they are actually endogenous to risk. Countries are substantially heterogeneous in the configuration of risk-reducing institutional settings for reasons mainly rooted in different historical patterns. Although country dummies can account for any endogeneity to risk along the cross-sectional dimension they cannot capture the endogeneity that may arise along the time dimension as a result of the change in external risk. The international integration of markets by affecting households' exposure to external risk may induce changes in non-market insurance provisions (Bertola and Lo Prete, 2009). Although interesting and worth to be dealt with in another paper, this issue is not central to the present analysis. Endogeneity to risk is not as severe as it looks at a first glance; there are other factors such as random variation in institutional structures due to elections that can be relevant along the time dimension but, as seen in the previous Sections, institutions have been quite stable over time despite the high pace of the globalization process.

Table 5 deals with a few points that are worth noting on aspects of robustness that have not been explicitly dealt with so far. Column (1) reports estimates from a specification using a different measure of the common (to the country sample) consumption growth rate. As for instance in Mace (1991), it is possible to use the average consumption growth rate in the sample of countries under analysis. Once the empirical model in column (4) of Table 2 is modified to replace time dummies with the mean growth rate of consumption, estimates in column (1) of Table 5 indicate that the results of interest are basically unaffected.

The second column of Table 5 tests a modelling choice that might have non trivial implications. So far we considered the response of country-level consumption to shocks which were "idiosyncratic" with respect to the macroeconomic conditions that were prevailing in the 15 OECD country sample under analysis. That is, under the implicit assumption that cross-border trade in contingent assets works more efficiently within the OECD countries than world-wide, as if OECD countries mainly traded consumption risk among themselves.

To test whether this is a reasonable approximation of how things work in reality, let us make explicit the hypothesis that the 15 OECD countries trade the assets that hedge their relative consumption risk only among themselves. Thus, they would constitute a macroeconomic entity and a simple testable implication follows: a common shock to all the components of such a macro-area should affect their consumption growth rates in the same way. This could be the case, for instance, of the impact of a supply shock to the price of oil, that can be included in model (2) as

$$\Delta c_{jt} = \delta_0 \Delta c_t^A + \delta_1 OILP_t + \beta \Delta \tilde{y}_{jt} \left(1 + \sum_{i=1}^{I} \gamma_i \tilde{X}_{ij} \right) + \alpha_j + \varepsilon_{jt}$$

where Δc_t^A is the average growth rate of consumption in the macro-area and $OILP_t$ the change in the real price of oil, the coefficient δ_1 capturing the effects of the common shock to the world economy. The results are in column (2) of Table 5. The shock to oil process is not significantly

associated to country-specific growth rates and the joint hypothesis $\delta_0 = 1$ and $\delta_1 = 0$ is not rejected, suggesting that OECD countries do behave as a macro-area and respond in the same way to the shock.[5]

The empirical model in the last column of Table 5 accounts for the impact, if any, of cross-country price changes. The choice to deflate consumption and income variables using national Consumption Price Indexes (CPIs), motivated by the focus on the interaction between institutions and shocks to otherwise uninsurable domestic consumption components, does not allow to explicitly deal with exchange rate risks. This might be relevant if real exchange rate risk cannot be traded on international financial markets and, thus, constitutes an undiversifiable risk component for all the agents in the economy. To test for this possibility, the empirical model in column 3 of Table 5 includes a variable accounting for the aggregate, country j-specific, change in price levels. The estimated effect of shocks to exchange rates is not significant, suggesting that real exchange rate risks are internationally diversifiable and thus do not affect risk sharing behaviour and the main results in the previous Section.

VII. Concluding remarks

This paper has argued that several dimensions of institutional interference with free-market outcomes provide risk sharing opportunities in a world where people differ in their ability to access financial markets. In the OECD country sample under analysis, the configuration of labour markets is relevant to the way household consumption responds to idiosyncratic income shocks

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[5] As a further check of the hypothesis that the 15 OECD countries in the sample share almost fully tradable risks among each other and not world-widely, it is possible to consider that 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. Results (not reported) 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, and hence that there is no evidence of perfect international consumption risk sharing in the data.

and, hence, to the character of deviations from perfect risk sharing. In countries where labour market institutions reduce employment and wage fluctuations, and tax systems are more progressive, the response of aggregate consumption to shocks is smoother.

These empirical findings provide evidence of the existence of an association between institutional income redistribution devices and country-level consumption and income dynamics and pave the way to future research on policy complementarities between institutions, as well as on interactions between international asset trade and within-country risk sharing – as, for instance, social insurance in the labour market may affect portfolio allocation and hedging strategies and help explain the so-called "home bias in equities" (see Bottazzi et al., 1996).

As regards normative implications, while in the early 1990s several countries pursued structural reforms in the labour market to reduce institutional and policy interference with free-market outcomes following the OECD recommendations (OECD, 1994), the 2008-09 financial turmoil gave rise to doubts on the benefits of financial market development and called for some re-regulation of labour and financial markets, making it important to derive insights about the redistribution role of national policies and its impact at the country level. This paper suggests that structural reforms in the labour market may reduce the risk sharing opportunities available to agents who likely do not have access to financial markets. Thus, some caution is needed when thinking about deregulation of labour markets, even in times when economic integration trends call for government retrenchment from economic activity (Bertola and Lo Prete, 2009).

Data Appendix

The dataset used in the empirical analysis provides information on 15 OECD countries from 1971 to 2008. The countries in the sample are: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the United Kingdom, and the United States. The indicators of labour market institutions refer to eight institutional dimensions. Institutional time series have been constructed according to the following 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.

Table A.1. Data sources and definitions

	Data source and variable description
c	Household Private Consumption Expenditure divided by population, from the World Bank online database, and deflated by the OECD Consumer Price Index.
y	Gross Domestic Product divided by population, from the World Bank online database, and deflated by the OECD Consumer Price Index.
EPL	EPL version 1 index from the OECD ranges from 0 to 6, with lower scores indexing looser regulations. The time varying version of this indicator is available since 1985 from the online database "OECD Indicators of Employment Protection".
RR	The net replacement rate summary measure is defined as the average of the net unemployment benefit (including social assistance and cash housing assistance) replacement rates for two earnings levels, three family situations and 60 months of unemployment, from the "OECD Tax-Benefit Models". It is available since 2001.
DB	The length of unemployment benefit entitlement is indexed by the (monthly) "maximum benefit duration" of entitlement to unemployment insurance, from the OECD Benefits and Wages: OECD Indicators, 2004, with "unlimited" duration normalized to 84 months (i.e. 7 years). Values are available for 1989 (OECD Employment Outlook, 1991), 1996 (OECD Employment Outlook, 1996), and 2002 (OECD Benefits and Wages: OECD Indicators, 2004).
ALMP	The ALMP index is defined as originally in Nickell (1997), as the amount of expenditures on ALMPs per unemployed person as a percentage of GDP per member of the labour force. Data are available for the 1985-2004 period.
TU	Trade union density data, from the OECD Labour Market Statistics online Database, are available since 1980.
CB	The collective bargaining coverage index by the OECD, available for 1980, 1990, and 2000 (OECD Employment Outlook, 2004).
CO	The OECD index of coordination in wage bargaining ranges between 1 and 5, with higher values indicating economy-wide levels of coordination. It is recorded on a 5-year basis over the period 1995-2000 (OECD Employment Outlook, 2004).
TW	Total marginal tax wedge of a single person at 100% of average income, from the "OECD - Taxing Wages 2013", online database.
RE	The real (effective) exchange rate shock variable is the change in the ratio of the PPP conversion factor to the official exchange rate, on data from the "World Development Indicators" of the World Bank.
OILP	The real oil price from www.inflationdata.com on data from the US Department of Energy is the "Annual Average Crude Oil Price" adjusted for inflation to December 2011 prices using the Consumer Price Index as presented by the Bureau of Labor Statistics.

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Table 1. National institutional features, early 2000s

	EPL	RR	BD	ALMP	TU	CB	CO	TW
Austria	1.9	55	9	11	36	95	4.0	54
Belgium	2.2	61	unlimited	19	56	90	4.5	67
Canada	0.8	46	9	6	28	32	1.0	43
Denmark	1.4	80	48	35.	73	80	4.0	50
Finland	2	69	23	10	75	90	5.0	57
France	3	62	30	15	8	90	2.0	54
Germany	2.2	64	12	15	24	68	4.0	67
Italy	1.9	21	6	5	34	80	4.0	54
Japan	1.8	57	10	6	21	15	4.0	29
Netherlands	2.1	69	18	61	21	80	4.0	51
Portugal	3.5	57	24	15	22	80	4.0	47
Spain	3.1	50	24	8	16	80	3.0	45
Sweden	2.2	68	14	34.	78	90	3.0	64
United Kingdom	0.7	52	6	7	30	30	1.0	39
United States	0.2	27	6	3	13	14	1.0	34

Notes: Data for employment protection legislation index (EPL), net replacement rates (RRs), monthly unemployment benefit duration (BD), active labour market policies index (ALMP), trade union density (TU), collective bargaining coverage (CB), coordination in wage bargaining (CO), marginal tax wedge (TW). Data refer to 2001, or first value available in early 2000s (i.e. BD in 2002, CB in 2000, CO average over 1995-2000).

Table 2. Shocks and institutions

Dependent variable: Household consumption growth rate				
Column:	1	2	3	4
Income shock	0.709***	0.705***	0.739***	0.726***
	(0.049)	(0.051)	(0.043)	(0.046)
Interaction with				
EPL			-0.408***	-0.395**
			(0.155)	(0.159)
Replacement rate			0.008	0.007
			(0.005)	(0.005)
Benefit duration			-0.015	-0.013
			(0.041)	(0.043)
ALMP			0.003	0.003
			(0.005)	(0.005)
TU density			-0.008**	-0.007*
			(0.004)	(0.004)
CB coverage			0.014***	0.015***
			(0.005)	(0.005)
Coordination			0.018	0.014
			(0.050)	(0.052)
Labour tax wedge			-0.023***	-0.028***
			(0.008)	(0.010)
Period effects	YES	YES	YES	YES
Country effects	NO	YES	NO	YES
R2	0.792	0.797	0.802	0.807
N	550	550	550	550

Notes. Estimation method: OLS in columns 1 and 2, NLLS in columns 3 and 4. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) (1) percent level.

Table 3. Within-country risk sharing, by institution

	Range of the independent variable		Implied range of effect of the shock (mean=1)	
EPL	-1.7	1.6	1.7	0.4
Replacement rate	-34.6	23.6	0.8	1.2
Benefit duration	-1.3	5.2	1.0	1.1
ALMP	-13.5	44.1	1.0	1.1
TU density	-27.8	42.3	1.2	0.7
CB coverage	-53.6	27.4	0.2	1.4
Coordination	-2.2	1.8	1.0	1.0
Labour tax wedge	-21.5	16.4	1.6	0.5

Notes. Effects are computed on the basis of estimates in column 4 of Table 2. Institutional variables are in deviations from the mean value in the country aggregate.

Table 4. Shocks and institutions in 1980-2008

Dependent variable: Household consumption growth rate				
Column:	1	2	3	4
Income shock	0.760***	0.740***	0.759***	0.756***
	(0.033)	(0.035)	(0.035)	(0.037)
Interaction with				
EPL	-0.359***	-0.371***	-0.116**	-0.149***
	(0.108)	(0.109)	(0.052)	(0.047)
Replacement rate	0.011**	0.009	0.010*	0.009
	(0.006)	(0.006)	(0.006)	(0.006)
Benefit duration	-0.009	-0.007	-0.027	-0.023
	(0.041)	(0.042)	(0.046)	(0.048)
ALMP	0.001	0.001	0.000	0.002
	(0.005)	(0.005)	(0.004)	(0.005)
TU density	-0.009**	-0.008*	-0.005	-0.005*
	(0.004)	(0.004)	(0.003)	(0.003)
CB coverage	0.015***	0.016***	0.010**	0.015***
	(0.004)	(0.005)	(0.004)	(0.005)
Coordination	-0.020	-0.019	-0.045	-0.049
	(0.050)	(0.052)	(0.048)	(0.049)
Labour tax wedge	-0.021***	-0.025***	-0.016*	-0.025***
	(0.007)	(0.009)	(0.008)	(0.009)
Period effects	YES	YES	YES	YES
Country effects	NO	YES	NO	YES
R2	0.735	0.754	0.727	0.749
N	424	424	424	424

Notes. Estimation method: NLLS. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) (1) percent level.

Table 5. Extended specifications

Dependent variable: Household consumption growth rate			
Column:	1	2	3
Income shock	0.725***	0.725***	0.777***
	(0.041)	(0.041)	(0.040)
Interaction with			
EPL	-0.370**	-0.370**	-0.276**
	(0.158)	(0.157)	(0.139)
Replacement rate	0.006	0.006	0.006
	(0.005)	(0.005)	(0.005)
Benefit duration	-0.013	-0.013	0.000
	(0.040)	(0.040)	(0.042)
ALMP	0.002	0.002	0.004
	(0.005)	(0.005)	(0.005)
TU density	-0.007*	-0.007*	-0.007*
	(0.004)	(0.004)	(0.004)
CB coverage	0.014***	0.014***	0.015***
	(0.005)	(0.005)	(0.005)
Coordination	0.018	0.018	-0.013
	(0.050)	(0.050)	(0.049)
Labour tax wedge	-0.026***	-0.026***	-0.029***
	(0.009)	(0.009)	(0.009)
Mean consumption growth rate	1.016***	1.016***	1.039***
	(0.049)	(0.049)	(0.059)
Worldwide shock to oil price		0.000	
		(0.002)	
Shock to exchange rates			-0.010
			(0.011)
Period effects	NO	NO	NO
Country effects	YES	YES	YES
R^2	0.806	0.806	0.820
N	550	550	470

Notes. Estimation method: NLLS. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) (1) percent level.

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