Idiosyncratic Risk and Consumption Insurance Across the Italian Regions

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Il lavoro effettua una sintetica ricognizione della letteratura empirica sull'ipotesi di perfetta correlazione dei consumi, individuali o locali, con il consumo aggregato e un'analisi econometrica volta a valutare la presenza di ripartizione geografica del rischio in un'area economica integrata. I risultati indicano che la mancata neutralizzazione degli impulsi idiosincratici derivanti dalla crescita del prodotto locale sul consumo è correlata positivamente al loro grado di persistenza.

This paper offers a brief survey of the empirical literature on the consumption insurance hypothesis and an econometric analysis of risk sharing in an integrated economic area. The results indicate that the observed departures from full consumption smoothing across the Italian regions are positively correlated with the persistence of local output shocks [JEL Code: E21; E32].

1. - Introduction

Markets and institutions are able to smooth consumption patterns across individual units and contribute to insulate agents, regions or nations from the full effects of idiosyncratic income shocks. Existing informal and formal mechanisms range from the presence of related households which have information on each other's resources, Hayashi *et* Al. (1996), to the implementation of federal en-

* The Author is grateful to the anonymous referees and participants at a seminar held at the Research Department for helpful comments on an earlier draft. The views expressed in the article are those of the Author and are not the responsibility of the Bank of Italy.

tities based on collective choices with implicit trade-off between risk sharing and moral hazard, Persson and Tabellini (1996*a*), or insurance and redistribution, Persson and Tabellini (1996*b*).

Full risk sharing implies that consumption should vary across agents only in response to aggregate (uninsurable) impulses and be independent of idiosyncratic (individual) shocks. Numerous formal derivations of this result in a representative agent framework are offered in the literature; see, among others, Mace (1991), Canova and Ravn (1996), Hayashi *et* Al. (1996), Declich and Ventura (2000). Heaton and Lucas (1996) have evaluated theoretically the effects of incomplete markets in an economy in which trade in financial securities is limited by borrowing constraints and transaction costs; they find that frictions narrowing the extent of trade must be large in equilibrium. A related question concerns the size of the potential gains arising from perfect risk sharing; existing results vary widely, due to the ample range of assumptions required. Recent attempts, van Wincoop (1999); Athanasoulis and van Wincoop (2000), indicate that global risk sharing is not likely to be limited by too small potential welfare gains. However, lack of market completeness suggests that perfect consumption insurance is unlikely to hold in practice; the degree of risk sharing, which is inversely related to the sensitivity of consumption growth to agent-specific income innovations, is an empirical question.

With respect to econometrics, it must be considered that tests based on micro data and longitudinal observations are influenced by measurement errors on reported consumption and income and face difficult estimation problems (controlling for heterogeneity in individual preferences and finding suitable exogenous or instrumental variables for estimation). The empirical evaluations based on macroeconomic time series must also take into account the likely presence of aggregation biases and the strictly endogenous nature of income and consumption and of their innovations[1].

[1] CRUCINI M.J. (1999, p. 75): «...Regional consumption will respond to aggregate innovations directly to the extent that agent pool risk..., and indirectly to the extent that innovations to aggregate income convey information about the future path of regional income growth... So long as risk sharing is less than perfect..., regional income innovations will matter for analogous reasons: directly as a source of income and indirectly as information about future aggregate income».

The sharp null of complete insurance is usually rejected on micro data but these tests also indicate that partial risk sharing seems to hold among agents. Mace (1991) observed in a panel of more than ten thousands observations from the Consumer Expenditure Survey on US households that risk-sharing implications are rejected only for some consumption typologies, which differ somewhat across specifications. Nelson (1994) analyzed the role of measurement errors in this sample; she finds that income growth influences consumption changes but that the magnitude of its impact is small. Cochrane (1991) studied US micro data taken from the Panel Study of Income Dynamics (PSID) — which reports food consumption only — and introduced explanatory variables exogenous to consumers in order to drop reported household income, which can be more properly regarded as endogenous. His results indicate that consumption growth rates respond to idiosyncratic shocks for some of the exogenous impulses considered[2]. Hayashi *et* Al. (1996) have obtained evidence against complete risk sharing and full «family» consumption insurance (risk sharing among related households) on PSID data. More recently, Ham and Jacobs (2000) observe that food consumption patterns are influenced by exogenous changes in the unemployment rate associated with the head's occupation; Hess and Shin (2000) find that full consumption insurance is rejected within the PSID and that the extent of risk sharing is limited[3]. Complete risk sharing is ruled out also on Italian micro data. Declich and Ventura (2000) reject the null of perfect insurance on observations drawn from the Survey on Household Income and Wealth periodically

[2] COCHRANE J.H. (1991, p. 974): «...the evidence does not contradict full insurance for illness of less than 100 days, spells of unemployment following an involuntary job loss, loss of work due to strike, and an involuntary move. On the other hand, the loss of more than 100 days of work due to illness and the involuntary loss of a job are important right-hand variables, whose associations with consumption growth are both economically and statistically significant».

[3] HESS G.D. - SHIN K. (2000, p. 558): «...a large fraction of risk is incompletely shared across regions and industries within the US. One can infer from these findings that either asset markets are incomplete so that contracts do not exist for households to diversify their regional and industry related risk. Alternatively,... households prefer to hold assets of local firms or firms within their same industry».

run by the Bank of Italy and show that consumption has been systematically influenced by individual disposable income.

Scorcu (1997; 1998), Pellegrini (1997), Decressin (1999), Dedola, Usai and Vannini (1999); Cellini and Scorcu (2002) have recently evaluated the degree of consumption risk sharing in Italy on aggregate data. Scorcu (1997) finds that the growth rates of total per capita consumption by region in the period 1971-1993 are highly correlated but are also influenced by idiosyncratic factors; full consumption insurance is rejected at conventional significance levels for a subset of regions, suggesting less than complete risk sharing. Pellegrini (1997) applies to Italian data for the period 1983-1992 the statistical methodology introduced by Asdrubali, Sorensen and Yosha (1996); the extent of risk sharing is estimated and disentangled into its main components following the indications given by national and regional accounts identities. Main channels of risk sharing include capital and credit markets smoothing (risk sharing due to asset accumulation), government smoothing (linked to the national tax and transfer system), labor market smoothing (associated to internal migrations). Pellegrini (1997) and Dedola *et* Al. (1999, Table 15.12) find that perfect risk sharing cannot be excluded by this method; the null of full consumption insurance is not rejected, since the non-smoothed residual is not significantly different from zero. Dedola *et* Al. (1999) notice that capital market smoothing is the main channel of regional risk sharing in Italy[4].

[4] Channels of risk sharing seem to differ across countries, but comparability across channels and countries may depend heavily on data availability and imputation methods, see MELITZ J. - ZUMER F. (1999). ALBEROLA E. - ASDRUBALI P. (1997) indicate that in Spain (1973-1993) capital and credit markets account for most of risk sharing (which is not complete, but equal to 51% of the overall shocks), while the role of the labour market is limited. They notice that the smoothing effect of the government has been mainly intertemporal, through fiscal deficits and surpluses. DEDOLA L. *et* AL. (1999) observe that in Italy the percentage of shocks to gross regional product absorbed by government policy is around 16-20%, depending on the detrending method. DECRESSIN J. (1999, p. 21) using different techniques finds for the Italian economy: «risk sharing of about 5% of household income... the fiscal system buffers about 20-30% of region-specific shocks to per capita GDP. Public consumption plays the largest role... Public works and capital spending... contribute little to redistribution and risk sharing... By contrast, the tax system exacerbates risk, owing to a low output elasticity of revenue over the short run».

The sensitivity of aggregate consumption to shocks to endowments is an interesting issue, since it may have an influence on the progress of regional integration in a monetary union. As it is well known, the main policy implication of a monetary union entails the loss of both the exchange rate and of an independent monetary policy as stabilization devices among the participating countries or regions[5]. As a consequence, there have been several attempts at analyzing compensatory schemes which can help to insure the member economies against the impact of asymmetric shocks, among others, Melitz and Vori (1993); von Hagen and Hammond (1997). The difference between a new insurance scheme and a transfer system can be thinner across regions where consumption risk sharing is already higher than the average.

This work offers some new empirical results, based on disaggregated data, on the response of aggregate consumption growth to idiosyncratic shocks in Italy (1983-1995) by examining whether the permanence of local output growth influences risk sharing.

Assuming complete markets, both transitory and more permanent shocks can be diversified away, but under incomplete smoothing these issues are interesting; some recent papers consider the effects of persistence on the consumption insurance hypothesis. Attanasio and Davis (1996) show that in a sample of US households real wage changes do not influence consumption at a one or two years horizon, but that low frequency wage movements are not smoothed. Canova and Ravn (1996) notice in a sample of nine industrial countries that (p. 592): «risk sharing is strong at high frequencies of the spectrum, exists to some extent at standard business cycle frequencies and appears to be lacking at low frequencies». Sorensen and Yosha (1998, p. 235) find that: «for OECD as well as of EC countries, about 40% of shocks to GDP

[5] FRANKEL J.A. - ROSE A.K. (1998) indicate that countries with idiosyncratic business cycle lose the benefit of an independent monetary policy joining a monetary union but that the effects of membership are endogenous; they find empirically that greater integration brings more synchronised cycles and thus lowers country-specific shocks.

are smoothed at the one year frequency... At the three year differencing frequency only 25% of shocks to GDP are smoothed». Dedola, Usai and Vannini (1999) indicate that in Italy the role of credit markets in consumption smoothing declines with the persistence of the shocks and that there is imperfect risk sharing in the long-run. Cellini and Scorcu (2002, p. 171) analyze risk sharing in the Italian economy both in the short- and in the long-run on the basis of a cointegration methodology and error-correction models; they find that: «idiosyncratic risks are neutralized to a larger extent than previously found. In particular, only few areas were unable or unwilling to share their idiosyncratic risks» and that the rejections of full insurance are more evident among the Southern regions. Caruso (1999) observes some differences in output persistence across industries and regions in the Italian economy; it is thus interesting to evaluate how these empirical features may influence risk sharing. Do differences in output persistence also impinge on how regional consumption covaries with idiosyncratic shocks? A precondition for a regional insurance to be feasible may be given by a prevalence of temporary shocks among the concerned economies, since compensating permanent impulses would be equivalent to impose a transfer system rather than an insurance mechanism. On the other hand, main channels of risk sharing associated to asset accumulation or government smoothing are also able to neutralize permanent shocks. Moreover, as suggested by Forni and Reichlin (1999), the long-term variance of income cannot be smoothed away intertemporally but consumption can still be insured to some extent by a pool of heterogeneous countries or regions. Their work offers a methodology based on spectral analysis for analyzing risk sharing at different time horizons.

Results in the next Section confirm empirically that in the aggregate institutions and markets have not completely smoothed regional per capita consumption growth rates. In Section 3 the persistence properties of local growth are carefully evaluated and the insulation properties of risk sharing are tested by considering the effects of the permanence of output shocks; Section 4 briefly concludes.

2. - Consumption Growth and Risk Sharing in a Sample of Italian Regions

This empirical work is based on annual observations obtained from the ISTAT regional economic accounts (*Conti economici regionali*) for the time-period 1983-1995[6]. Real per capita consumption is defined as regional consumption at constant (1990) prices as a ratio of population (midyear estimates). Available consumption data refer to total consumption, overall non-food items, and nine categories of consumption summing up to the aggregate (food, tobacco, clothes, home and energy, furniture and home appliances, health, transportation and communication, entertainment, other goods and services). The sample comprises 260 annual data for each consumption category (13 years and 20 regions); 156 observations refer to the Northern and Central area, 104 to the Southern regions and the Islands[7].

In this sample, the average annual growth rate of total per capita consumption in real terms is about 2.0%, with a standard deviation of 1.9%. In a 13 years time span, average annual growth rates by consumption categories range from –0.8% for tobacco to the yearly changes of about 3.4-3.2% observed for health, entertainment, other goods and services, suggesting ample variations over time in the structure of consumption.

Tests of (less then) perfect risk sharing presented in this Section have the following structure[8]:

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[6] Data are based on *SEC*79 methodology; recently, ISTAT has presented regional economic accounts for the years 1995-1997 on the basis of the new European system *SEC*95. However, problems of comparison with previous data arise (for instance, disaggregated consumption categories now differ) and, temporarily, only observations at current prices are available with the new methodology; for these reasons an analysis of consumption patterns in the recent years is left for further work. *SEC*79 data in levels at both current and 1990 prices are available for the years 1980-1995; three observations have been used up for computing growth rates and instrumental variables lagged one and two periods.

[7] The Northern and Central regions are Piedmont, Valle d'Aosta, Lombardy, Trentino Alto Adige, Veneto, Friuli, Liguria, Emilia Romagna, Tuscany, Umbria, Marche and Lazio. Southern regions and the Islands include Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicily and Sardinia.

[8] The theoretical framework that underlies the empirical tests of risk sharing is described by DECLICH C. - VENTURA L. (2000), among others.

$$(1)\quad dC_{rt} = \lambda_0 + \lambda_1 \mathrm{DREG}_r + \lambda_2 dC_{ITAt} + \lambda_3 d(P_{cr}/P_{ITA})_t + \lambda_4 d(PTR)_{rt} + \\ + \lambda_5 dY_{rt} + \lambda_6 dL_{rt} + \lambda_7 dW_{rt} + u_{rt}$$

Regression *(1)* is a statistical test of risk sharing, with the idiosyncratic growth rates of the variables on the right side. If full insurance holds, regional growth rates of per capita consumption in real terms dC_{rt} mimic aggregate (uninsurable) variations dC_{ITAt} and are independent of idiosyncratic impulses. The first line of specifications *(1)* concerns the control variables (coefficients λ_1-λ_4), while the second line reports the shocks to consumption (λ_5-λ_7), that are expected to be nil under perfect risk sharing.

These tests of full insurance are based on panel data; in order to minimize the impact of preference shifts on the empirical findings, joint estimates for different consumption categories have been obtained and the effects of relative price shocks are also considered. The influence of demographic variables (average family size and age of the household's head, for instance, which may differ across regions) as well as local habits regarding consumption which evolve only slowly and all unmeasured influences which are constant over time are captured by regional dummies ($DREG_r$), controlling for fixed effects. The variable $d(P_{cr}/P_{ITA})_t$ controls for variations over time in the structure of consumption due to relative price changes. Relative prices $d(P_{cr}/P_{ITA})_t$ are defined as (logarithmic) ratios of the disaggregated implicit deflators P_{cr} — available for each region and consumption category — and the aggregate average P_{ITA} (the deflator of total consumption for the Italian economy). The control variable $d(PTR)_{rt}$ is the annual change in the local traded-nontraded price ratio. In an integrated economic area, its dynamics determines the (implicit) real exchange rate across regions and this variable controls for inflation differentials or adverse price movements among regions with heterogeneous production structures and their impact on consumption[9].

[9] The traded/nontraded price ratio has been proxied by the regional implicit deflator of an aggregate output comprising value added in agriculture, manufacturing, energy, transport and communication (output in these sectors summarises traded goods and services) as a (logarithmic) ratio of the implicit deflator of an aggregate local output composed of construction, commerce, credit and insurance,

Macroeconomic shocks considered in this work are the idiosyncratic growth rates of regional real GDP per capita (dY_{rt}), regional employment (dL_{rt}) and local real wages (dW_{rt}). These potentially insurable impulses on consumption synthesize real output and labor income shocks[10]. Regional output per capita is defined as local real GDP as a ratio of population. Real wages have been computed from the ratio of total compensation to total employment (standard units of labour) for each region, expressed in real terms by means of the local implicit total value added deflator. It can be noticed that in regression *(1)* idiosyncratic shocks, under less than perfect risk sharing, are supposed to impinge on consumption differentials rather than on consumption patterns, since aggregate consumption is already introduced in the specification as an explanatory variable.

Test results regarding the consumption insurance hypothesis are shown on Table 1 for the Northern and Central regions (Panel *a)*), and for Southern Italy (Panel *b)*). It is useful to split the sample, because some degree of heterogeneity can be expected a priori. Geographical differences in wealth and its composition, portfolios diversification, liquidity constraints, completeness of markets, enforcement of contracts may change the sensitivity of real per capita consumption growth to idiosyncratic shocks by influencing the actual risk sharing opportunities offered to areas at different levels of development. On the other hand, savings habits, government transfers, family and generational linkages, migration possibilities may contribute to smooth the Southern consumption patterns around the average (aggregate) growth rate. In a world of incomplete markets, it is interesting to know which region-specific shocks have mainly influenced the local patterns of consumption and whether consumption risk sharing behavior differs systematically between the Northern-Central and the Southern regions[11].

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other private services and the public services (which represents, as a first approximation, the regional nontraded goods and services).

[10] Regression *(1)* is a reduced form and impulses on consumption do not have a structural interpretation; as a first approximation, dY_{rt} and dL_{rt} can be interpreted as a productivity and an input shock, respectively, dW_{rt} as labor income.

[11] SCORCU A.E. (1997, Tables 4 and 5) rejects full insurance on aggregate data for two Northern-Central regions (Liguria and Tuscany) and three South-

Regressions for the nine available disaggregated categories of consumption have been estimated jointly by three-stage least squares, an instrumental variable method for estimating a system of simultaneous equation with endogenous explanatory variables and contemporaneous correlation of the disturbances (see the Note in Table 1 for more details on the estimation procedure; the same information set is introduced in all the system's regressions but only coefficient significant at least at the 10% level are reported).

Overall, complete consumption insurance is rejected in both areas of the country. However, as reported in previous studies, see Dedola *et* Al (1999) or Cellini and Scorcu (2002), the degree of risk sharing is considerable. Controlling for aggregate consumption, relative price shocks and the pattern of traded/nontraded prices, in the sample of Northern and Central regions idiosyncratic impulses influence real per capita expenses of four consumption typologies only (tobacco, clothes, transportation and communications, entertainment, Table 1 Panel *a)*). Instead, full insurance cannot be rejected (at the 10% level) in the case of five main consumption items (food, home and energy, furniture, health, other expenses). The influence of idiosyncratic shocks on consumption is estimated to be somewhat more widespread across the Southern regions. Summing up the tests, the rejections of perfect risk sharing for the South (Table 1, Panel *b)*) are more numerous than the estimated departures from full insurance reported for the Northern and Central areas; local shocks have a significant impact on six disaggregated consumption categories. In the

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ern regions (Abruzzo, Basilicata, Sardinia) on OLS regressions. With instrumental variables estimates the null of unpredictability of regional consumption differentials is rejected for Tuscany, Umbria, Abruzzo, Molise; in these regions, idiosyncratic shocks have systematically influenced consumption patterns. CELLINI R. - SCORCU A.E. (2002) indicate that in the years 1960-1995 risk sharing is rejected in the Southern area (both in the short – and long – run), while the presence of consumption insurance is more widespread among the North-eastern and Central regions. On micro data DECLICH C. - VENTURA L. (2000, Tables 1-6), find that full risk sharing cannot be excluded for a few regions only (Trentino, 1989-1991; Umbria, 1993-1995; Molise, 1993-1995; Basilicata, 1989-1991 and 1991-1993; Calabria, 1993-1995).

TABLE 1

IDIOSYNCRATIC SHOCKS AND CONSUMPTION GROWTH ACROSS THE ITALIAN REGIONS*

	Total	Non-food	Food (1)	Tobacco (2	Clothes (3)	Home, Energy (4)	Furniture (5)	Health (6)	Transpo comm. (7)	Entertain (8)	Others (9)
PANEL (a) Northern and Central regions											
Regressors:											
Aggregate consumption:											
dC_{ITAt}	0.9927	0.9645	0.9418	0.8916	1.0381	1.1274	1.0214	0.9064	0.7266	1.0479	1.0086
(S.e.)	(0.0698)	(0.0691)	(0.1827)	(0.0964)	(0.0350)	(0.0925)	(0.0537)	(0.2049)	(0.0760)	(0.0614)	(0.1324)
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relative prices:											
$d(P_{cr}/P_{ITA})_t$	–	–0.2771	–	–	–	–	–	–0.2561	–0.3144	–	–
(S.e.)		(0.1552)						(0.0967)	(0.1138)		
(*p*-value)		(0.074)						(0.008)	(0.006)		
Traded/nontraded goods prices:											
$dPTRA_{rt}$	0.1484	0.1843	–	0.4197	–	–	–	–	–	–	0.2796
(S.e.)	(0.0562)	(0.0633)		(0.1415)							(0.1484)
(*p*-value)	(0.008)	(0.004)		(0.003)							(0.060)
Idiosyncratic shocks to real GDP growth:											
dY_{rt}	–	–	–	–	–	–	–	–	0.5410	–	–
(S.e.)									(0.1505)		
(*p*-value)									(0.000)		
Idiosyncratic shocks to employment:											
dL_{rt}	–	–	–	–	0.1350	–	–	–	–	–	–
(S.e.)					(0.0811)						
(*p*-value)					(0.096)						

cont

(cont.) TABLE 1

IDIOSYNCRATIC SHOCKS AND CONSUMPTION GROWTH ACROSS THE ITALIAN REGIONS*

	Total	Non-food	Food (1)	Tobacco (2	Clothes (3)	Home, Energy (4)	Furniture (5)	Health (6)	Transpo comm. (7)	Entertain (8)	Others (9)
Idiosyncratic shocks to real wages:											
dW_{rt}	–	–	–	0.3987	–	–	–	–	–	–0.1407	–
(S.e.)				(0.1028)						(0.0790)	
(*p*-value)				(0.000)						(0.075)	
R^2	0.8287	0.8375	0.3754	0.6993	0.9092	0.5145	0.7920	0.4359	0.7657	0.7993	0.5500
SER	0.0085	0.0092	0.0061	0.0188	0.0119	0.0128	0.0132	0.0347	0.0198	0.0133	0.0214
Observations	156	156	156	156	156	156	156	156	156	156	156
PANEL b) Southern regions and Islands											
Regressors:											
Aggregate consumption:											
dCITAt	0.9419	0.9948	1.0826	0.9380	0.9941	0.3897	0.8464	0.7181	1.0107	1.0383	0.8678
(S.e.)	(0.0461)	(0.0498)	(0.1482)	(0.1114)	(0.0438)	(0.1847)	(0.0631)	(0.1878)	(0.0681)	(0.0678)	(0.1410)
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.035)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relative prices:											
$d(P_{ct}/P_{ITA})t$	–	0.2507	–	–	–	–	–	0.5232	–	–	–
(S.e.)		(0.1371)						(0.1410)			
(p-value)		(0.068)						(0.000)			
Traded/nontraded goods prices:											
$dPTRA_{rt}$	–	–	–	–	–	–	–	–	–	0.3218	–
(S.e.)										(0.1017)	
(p-value)										(0.002)	

(cont.) TABLE 1

IDIOSYNCRATIC SHOCKS AND CONSUMPTION GROWTH ACROSS THE ITALIAN REGIONS*

	Total	Non-food	Food (1)	Tobacco (2	Clothes (3)	Home, Energy (4)	Furniture (5)	Health (6)	Transpo comm. (7)	Entertain (8)	Others (9)
Idiosyncratic shocks to real GDP growth:											
dY_{rt}	–	–	–	0.3389	–	0.2598	–	–	–	–	–
(S.e.)				(0.1647)		(0.0928)					
(*p*-value)				(0.040)		(0.005)					
Idiosyncratic shocks to employment:											
dL_{rt}	–	–	–	–	–	–	0.1616	–	0.2365	–	0.2584
(S.e.)							(0.0794)		(0.1131)		(0.1105)
(*p*-value)							(0.042)		(0.037)		(0.019)
Idiosyncratic shocks to real wages:											
dW_{rt}	–	–	–	–	–	0.2584	–	–	–	0.4237	–
(S.e.)						(0.1172)				(0.1018)	
(*p*-value)						(0.027)				(0.000)	
R^2	0.8619	0.8677	0.5618	0.5492	0.8713	0.2876	0.7354	0.3774	0.8170	0.7799	0.6176
SER	0.0076	0.0085	0.0060	0.0248	0.0138	0.0154	0.0146	0.0354	0.0201	0.0167	0.0178
Observations	104	104	104	104	104	104	104	104	104	104	104

* Three-stage least squares estimates; Dependent variable: dCrt. Heteroskedastic-consistent estimates, standard errors and *p*-values in parenthesis. Nine categories of consumption (1)-(9) are estimated jointly by 3*SLS*; «Non-food» is estimated jointly with «Food» also by 3*SLS*; regression results for «Total consumption» are instrumental variables estimates and the relative prices are dropped. Regressors include a constant and 19 regional dummies, not shown. The same information set is used for all the regressions but only coefficients significant at least at the 10% level are reported. Instruments are a set of predetermined variables: the first and second lags of the relative price changes and consumption growth rates for each consumption categories, lagged annual variations in aggregate real GDP, real wages, relative price of traded/nontraded goods, number of self-employed and employees; lagged (one period) innovations of output growth in the agricultural, industrial and tertiary sectors, in per capita real GDP growth, in real wage changes, in the price of traded/nontraded goods, in the growth of self-employed and employees, in the relative price changes of consumption goods; a lagged real interest rate (the yield on medium-term government bonds, deflated by the CPI), the constant, regional dummies, time and time squared.

South, complete risk sharing cannot be rejected for expenses on food, clothes and health[12].

3. - The Permanence of Output Shocks and the Departures from Full Insurance

This Section tries to establish whether the rejections of full risk sharing are mainly associated with the transitory or permanent components of output shocks. Assuming that macroeconomic variables fluctuate according to transitory influences around a stochastic secular component which reflects long-term changes, are the observed departure from full insurance correlated to the degree of permanence of the impulses? Forni and Reichlin (1999) suggest that risk is mainly associated with the long-run variance of output, which cannot be smoothed away intertemporally; accordingly, they propose an insurance scheme allowing for cross-sectional variance smoothing across heterogeneous countries or regions. Evidence indicating that transitory impulses are more easily insured than permanent shocks is reported by Canova and Ravn (1996) on the basis of aggregate consumption data for nine countries (comprising Italy), as well as by Sorensen and Yosha (1998), Forni and Reichlin (1999) on European and US macro data. Attanasio and Davis (1996) indicate that in a sample of US households high-frequency movements in wages do not affect consumption, while more persistent variations are not smoothed. Dedola *et* Al. (1999) analyze the impact of persistence of shocks on the relative importance of the main

[12] Relative price shocks lower consumption on "Non-food" "Health" and "Transportation" in the Northern-Central regions and influence positively health and non-food expenses in the Southern area (perhaps signalling a "luxury" or a "superior" good). A higher price of tradable goods relative to nontradables (an implicit depreciation) rises local consumption differentials in both areas of the country; however, its role is less important in the South. Real wages in one case (Entertainment in the Northern and Central regions) yield a negative impact on consumption. An explanation is the presence of a substitution effect; moreover, real wage shocks across the Northern regions may also concern consumers with low incomes and scarce initial assets (because young, or previously unemployed, or recent immigrants). They may face higher consumption uncertainty and/or borrowing constraints; this circumstance may require more precautionary savings when employment is gained and lower average consumption.

channels of risk sharing (capital markets, governments, credit markets) for Italy and the UK.

It is useful to gain some empirical evidence for the Italian economy on the basis of disaggregated output and consumption data. ISTAT regional economic accounts collect output data on 17 industries for each of the 20 Italian regions; they refer to agriculture, 11 industrial[13] and 5 tertiary[14] sectors. This sample comprises 340 local industries and 16 years (1980-1995).

How idiosyncratic (thus potentially insurable) are these 340 local output patterns? It is possible to measure their comovement with aggregate output by running auxiliary regressions for each regional industry (index r numbers the 20 Italian regions, s the 17 sectors, acronym $_{ITA}$ denotes aggregate magnitudes, and t is time):

$$d(Q)_{rst} = b_1 + b_2\, d(Q)_{ITAt} + u_{rst} \tag{2}$$

$$log(Q)_{rst} = a_1 + a_2\, log(Q)_{ITAt} + e_{rst} \tag{3}$$

Specification *(2)* posits local per capita output growth as a function of the Italian annual average; the correlation between the variables is measured by the coefficient of determination R^2. Since a total of 340 local industries are considered, each disaggregated series is a small fraction of aggregate output and the dependent variables are not likely to be correlated by construction with the regressors.

Regression *(3)* considers the levels of the variables and captures the long-run features of the data. The relative degree of comovement is measured by the stationarity of the residuals, observed from both the Durbin-Watson statistics DW and from a Dickey-Fuller (DF) *test*. Comovement in this case is associated to an equilibrium error in a cointegration framework, following Engle and Granger (1987, p. 251: «equilibrium is a stationary point

[13] Energy products; Basic metals; Non-metallic mineral products; Chemicals; Fabricated metal products and machinery; Vehicles and transport equipment; Food, beverages and tobacco; Textile, wearing apparel and leather industries; Paper and paper products, printing and publishing; Wood products, rubber and other manufacturing industries; Constructions.

[14] Wholesale and retail trade, restaurants and hotels; Transport and communication; Finance and insurance; Other market services; Government services.

characterised by forces which tend to push the economy back toward equilibrium whenever it moves away». These authors also discuss the DW and DF cointegration tests. Relatively more stationary residuals (higher than average DW statistics and larger, in absolute value, Dickey-Fuller statistics) signal that local performances do not drift too far apart from aggregate magnitudes and that their (stochastic) comovement is higher.

The next step consists in evaluating the persistence properties of local output and their impact on local consumption. A non-parametric statistics proposed by Cochrane (1988) has been computed; it exploits the autocorrelation pattern of the difference series in order to detect the presence of a unit root in the data and to measure its size. Near random walk behavior of output, suggested by a high persistence measure, implies weak cyclical components and strong low frequency movements, indicating longer-lasting propagation mechanisms of the shocks. The following measure has been applied to the growth rates of regional real value added by industry (1981-1995)[15]:

$$(4) \qquad V^k = \{1 + 2\Sigma_{j=1,k}(1 - j/(k+1))\rho_j\} * (T/T-k)$$

This statistics is a weighted average of k sample autocorrelations ρj of the local output growth rates, corrected for small sample bias by a factor $(T/T-k)$. The ultimate impact of a shock is approximated by a function of autocorrelations and this univariate decomposition between transitory and permanent components is based on window width k_s of 5 years; the reader is referred to the original contribution, Cochrane (1988) and to some recent applications, Fatas (2000) and Caruso (2001), for more information on the estimation procedures[16].

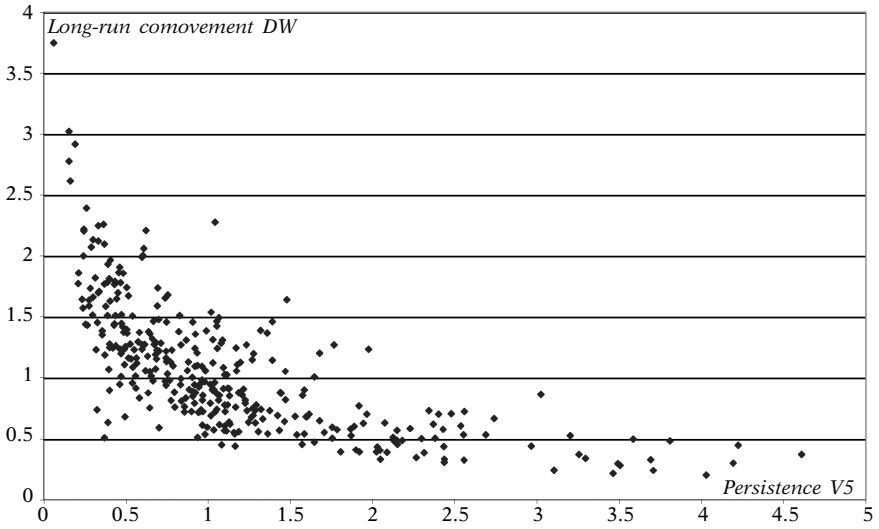
[15] An analysis of this issue can also be conducted by spectral analysis techniques, as proposed by FORNI M. - REICHLIN L. (1999). Differences between estimates of the spectral density function at frequency zero and non-parametric persistence measures disappear asymptotically, see COCHRANE J.H. (1988).

[16] The number of autocorrelations must be sufficient for capturing slow reverting processes; however, too long a sequence would exhaust degrees of freedom, implying a bias toward zero as k approaches the sample size. A persistence measure with a window width of 8 years yields qualitatively very similar results and is positively correlated with the rejections of risk sharing (Table 4).

Persistence measures describe the distribution of idiosyncratic shocks to output in the long-run and consent to evaluate their differential impact on consumption. A relatively high persistence measure indicates that the size of the random walk in output is ampler than the average and that real shocks are not likely to be reversed in the future. On the other hand, low persistence suggests that impulses on output are mainly transitory and that their mean-reverting component is relatively large[17]. A scatter plot (Graph 1) indicates that a higher incidence of temporary impulses on output dynamics in these 340 industries (a low persistence statistics) is associated with a higher long-run comovement with aggregate real value added (a high *DW* statistics); the relationship between *V*5 and *DW* is negative and non-linear. Local industries on the right side of Graph 1 present a higher-than-average per-

GRAPH 1

OUTPUT PERSISTENCE AND LONG-RUN COMOVEMENT WITH AGGREGATE DATA ACROSS 340 LOCAL INDUSTRIES, 1981-1995



[17] D'AMATO M. and PISTORESI B. (1997) study persistence in regional output on Italian data; CARUSO M. (1999) offers some empirical results on the persistence and convergence properties of Italian productivity by industry.

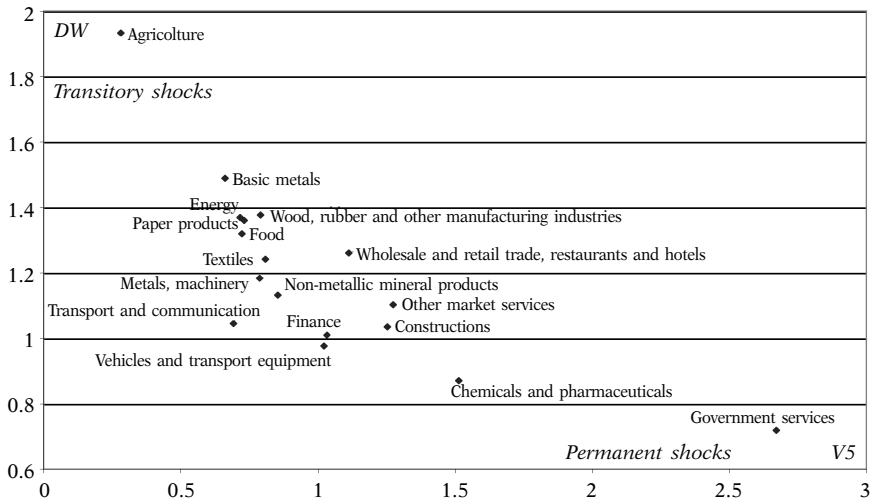
manent component; output impulses in these sectors of the economy are also relatively more idiosyncratic (low *DW* statistics indicate lack of stationarity with aggregate output levels), suggesting divergent patterns and more insurable long-run outcomes in a cross-section framework.

A larger impact of these shocks on consumption would support the indications by Forni and Reichlin (1999) on the advantages of pooling regions or countries for insuring the long-run variance of income, which is not already smoothed inter-temporally.

Output persistence differs widely across economic sectors; average statistics are shown in Graph 2. Table 2 reports the results of a regression of persistence measures on industry dummies (the constant represents agriculture, where temporary output movements prevail)[18].

GRAPH 2

OUTPUT PERSISTENCE AND LONG-RUN COMOVEMENT WITH AGGREGATE DATA: INDUSTRY AVERAGES



[18] Since the time period considered is 15 years, persistence and comovement measures are not likely to be estimated with precision; however, the cross-section dimension is fairly large, and this contributes to shed light on the long-run differences in output dynamics across the local industries.

TABLE 2

OUTPUT PERSISTENCE AND COMOVEMENT ACROSS 340 ITALIAN LOCAL INDUSTRIES (OLS ESTIMATES)*

Dependent variables:	Output Persistence V^5	Long-run Comovement *DW*	Long-run Comovement *abs(DF)*	Short-run Comovement R^2
Mean	1.1384	1.0613	2.5539	0.1265
Stand. dev.	0.8166	0.5277	1.1577	0.1481
Regressors:	(1)	(2)	(3)	(4)
Constant	0.3892	1.7843	4.0737	0.0395
	(6.022)*	(10.04)*	(6.702)*	(4.088)*
South	0.0874	0.0224	0.0825	–0.0214
	(1.148)	(0.420)	(0.639)	(–1.540)
Energy	0.4487	–0.5736	–1.1473	0.0554
	(3.033)*	(–2.684)*	(–1.733)***	(1.960)***
Basic metals	0.3806	–0.4443	–1.2678	0.0338
	(2.889)*	(–2.022)**	(–1.855)***	(1.815)***
Non-metallic products	0.5718	–0.8013	–1.8066	0.1840
	(5.971)*	(–4.085)*	(–2.789)*	(4.702)*
Chemical products	1.2329	–1.0625	–2.0108	0.0507
	(6.082)*	(–5.406)*	(–3.088)*	(1.857)***
Metal p. and machines	0.5062	–0.7501	–1.4106	0.1788
	(3.744)*	(–3.829)*	(–2.138)**	(3.816)*
Vehicles	0.7410	–0.9566	–2.1103	0.1479
	(4.786)*	(–4.722)*	(–3.217)*	(3.987)*
Food, beverages	0.4415	–0.6135	–1.4411	0.0138
	(2.637)*	(–2.981)*	(–2.211)**	(0.929)
Textiles, leather	0.5270	–0.6917	–1.5104	0.1328
	(3.656)*	(–3.295)*	(–2.284)**	(3.720)*
Paper p. and printing	0.4355	–0.5644	–1.4219	0.0391
	(3.186)*	(–2.507)*	(–2.076)**	(2.114)**
Wood, rubber, other i.	0.5099	–0.5568	–1.2899	0.1489
	(2.721)*	(–2.720)*	(–1.941)***	(4.880)*
Constructions	0.9716	–0.8986	–1.8056	0.0641
	(4.357)*	(–4.126)*	(–2.631)*	(2.476)**
Trade, restaurants, h.	0.8307	–0.6721	–1.5450	0.3209
	(6.001)*	(–3.261)*	(–2.345)**	(7.792)*
Transport, commun.	0.4103	–0.8881	–2.1515	0.0818
	(4.516)*	(–4.323)*	(–3.246)*	(3.272)*
Finance and insurance	0.7512	–0.9235	–1.9318	0.0051
	(9.194)*	(–4.957)*	(–3.029)*	(0.525)
Other market services	0.9935	–0.8310	–1.5531	0.1163
	(4.399)*	(–3.836)*	(–2.330)**	(3.491)*
Government services	2.3896	–1.2150	–1.9951	0.0525
	(10.74)*	(–6.437)*	(–3.016)*	(1.982)*
R^2	0.3842	0.2586	0.1828	0.3027
SER	0.6557	0.4662	1.0738	0.1269
DW	1.779	1.747	1.869	1.603
Observations	340	340	340	340

* Heteroskedastic-consistent *t* statistics in parentheses. 1%, 5% and 10% significance levels are denoted by *, **, *** , respectively.

It can be noticed a higher degree of permanence of shocks on service activities, especially Government and Other market services. Industrial output shows more stationary processes; however, some manufacturing activities where the role of technical innovation is more pervasive have an important permanent component in output dynamics (chemicals and pharmaceuticals; vehicles and transport equipment). Industries producing basic metals, paper products, food and textiles evidence a lower persistence of innovations and more cyclical patterns. Output dynamics in these sectors are prevalently determined by demand conditions, if they are referred, as it is usual in the literature on real business cycles, to the evolution of the transitory component, while the permanent effect is mainly associated to the contribution of the supply factors.

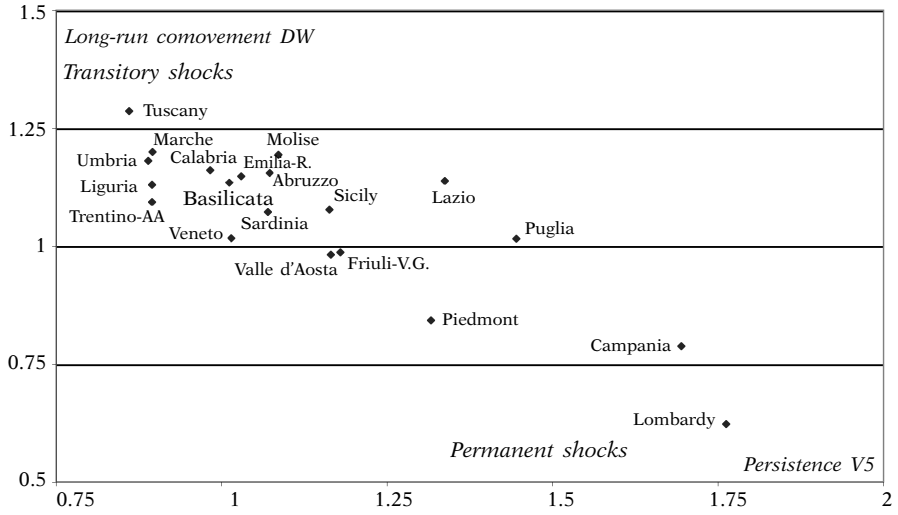
Overall, mean reversion to the aggregate (stationarity) is lower and innovations in growth rates of output *per capita* more persistent for service activities, constructions, production of chemicals and vehicles. A larger size of the permanent component indicates that long-run uncertainty is higher and that a cross-region or cross-country insurance scheme is potentially more valuable for these sectors[19]. Instead, in industries where output fluctuations have prevalently a transitory character (agriculture and most industrial sectors) inter-temporal consumption smoothing is more likely.

There is substantial heterogeneity in output persistence across geographical areas as well. Graph 3 shows a scatter of regional averages of long-run comovements on the size of the random walk in output. On the basis of disaggregated data, Tuscany is the Italian region where temporary shocks prevail; output fluctuations have a transitory character also in other central regions (Marche, Umbria) where industries with traditional technologies are mainly located (textile, wearing apparel and leather industries; other manufacturing industries; food and beverages). Lazio shows more persistent output patterns, which seems reasonable to ascribe to the presence of Government services and industries with a rela-

[19] On the other hand, if impulses are not easily reversed, in practice a scheme for compensating permanent impulses across sectors or areas would be closer to a transfer system than to an insurance mechanism.

GRAPH 3

OUTPUT PERSISTENCE AND LONG-RUN COMOVEMENT WITH AGGREGATE DATA: REGIONAL AVERAGES



tively low mean-reverting component (constructions, chemicals and pharmaceuticals). The North-Eastern regions (Veneto, Trentino-AA, Friuli-VG, Emilia Romagna) are situated in an intermediate position in the diagram; this suggests that the similarity of economic structure and geographical proximity may have a role in shaping a more uniform variance of output at low frequencies. Instead, the North-Western and Southern regions show ampler differences in output persistence. The permanent component seems to be more important in Piedmont and especially in Lombardy; this could be due to a larger role of technical innovations in these regions and to the presence of labour-intensive advanced tertiary activities with an ample permanent component. Also two Southern regions (Puglia and Campania) show higher than average long-run output uncertainty[20].

Controlling for industry fixed effects (Table 3 and Graph 4),

[20] Besides the role of technical innovation, CONESA J.C. - DIAZ-MORENO C. - GALDON-SANCHEZ J.E. (2002) offer another potential explanation for the Southern

two groups of regions emerge; three Central areas (Tuscany, Marche and Umbria) and Emilia-Romagna, as well as two smaller Northern (Liguria and Trentino-A.A.) and a Southern region (Calabria) show a predominance of temporary shocks, while higher long-run output uncertainty in Lombardy is confirmed also when the main sectoral differences are hold constant. Instead, short-term and long-run comovements are not correlated (there is not a clear-cut association between V[5] and R^2).

Are the observed rejections of perfect consumption risk sharing due to permanent or temporary impulses on output? The testing framework is the following:

$$dC_{rt} = \beta_0 + \beta_1 dC_{ITAt} + \beta_2 dQ_{rst} + n_{rst} \quad (5)$$

$$(\beta_2)_{rs} = \phi_1 + \phi_2 (SIZE)_{rs} + \phi_3 (L/Y)_{rs} + \\ + \phi_4 (BL/Y)_{rs} + \phi_5 (PERSISTENCE)_{rs} + \eta_{rs} \quad (6)$$

Regression *(5)* is a standard time-series test of full insurance and posits the regional consumption growth rate as a function of the Italian annual average dC_{ITAt} and local output dynamics dQ_{rst}. The estimated coefficients β_2 (340 for each consumption category) synthesise the impact of idiosyncratic impulses due to local output growth on regional consumption.

A cross-section regression *(6)* explains the observed departures from full insurance introducing persistence measures computed from the 340 local output growth rates and three control variables, *SIZE*, *L/Y* and *BL/Y*.

SIZE is the relative dimension of each local industry (the ratio of its employment in 1980-1995 to total employment); this longitudinal information control for scale effects and the degree of heterogeneity of the sample. The control variable $(L/Y)_n$ is defined as the ratio of bank loans to nominal value added for each regional economic sector and contributes to hold constant the differences in the availability of outside finance. Instead, $(BL/Y)_n$ are

regions. They observe, in a cross-section of countries, a negative relationship between the ratio of employment to population and the volatility of GDP; in their model, this can be ascribed to the presence of a large underground economic sector, that amplify aggregate productivity shocks and output fluctuations. To some extent, this ratio could also influence the variance of long-run output.

TABLE 3

IDIOSYNCRATIC OUTPUT PATTERNS BY REGION
(OLS ESTIMATES)*

	Regional averages:					Persistence	Dependent variables: Long-run comovement		Short-run c.
	V^5	*DW*	*abs(DF)*	R^2	Regressors:	V^5 (1)	*DW* (2)	*abs(DF)* (3)	R^2 (4)
Piedmont	1.3164	0.8431	2.3219	0.2133	*C*	0.6021	1.5750	3.8747	0.1177
					(t_w)	(5.155)*	(8.839)*	(6.194)*	(3.273)*
Valle d'A.	1.1649	0.9815	2.2083	0.1071	Valle d'A.	–0.1515	0.1384	–0.1135	–0.1063
					(t_w)	(–0.750)	(1.078)	(–0.394)	(–2.239)**
Lombardy	1.7623	0.6226	1.8357	0.2488	Lombardy	0.4459	–0.2205	–0.4862	0.0355
					(t_w)	(2.180)**	(–2.125)**	(–1.720)***	(0.731)
Trentino-AA	0.8954	1.0937	2.7502	0.0853	Trentino-AA	–0.4209	0.2506	0.4283	–0.1280
					(t_w)	(–2.434)**	(1.958)***	(1.400)	(–2.869)*
Veneto	1.0151	1.0165	2.4814	0.1717	Veneto	–0.3012	0.1734	0.1595	–0.0416
					(t_w)	(–1.953)***	(1.520)	(0.524)	(–0.851)
Friuli-VG	1.1794	0.9871	2.7307	0.1508	Friuli-VG	–0.1370	0.1441	0.4089	–0.0626
					(t_w)	(–0.991)	(1.298)	(1.297)	(–1.337)
Liguria	0.8950	1.1296	2.5118	0.1179	Liguria	–0.4214	0.2866	0.1899	–0.0954
					(t_w)	(–3.001)*	(2.476)**	(0.683)	(–2.624)*
Emilia-R.	1.0299	1.1485	2.6977	0.1671	Emilia-R.	–0.2865	0.3054	0.3758	–0.0463
					(t_w)	(–1.722)***	(1.853)***	(1.049)	(–0.964)
Tuscany	0.8603	1.2867	2.8144	0.0737	Tuscany	–0.4561	0.4436	0.4926	–0.1396
					(t_w)	(–3.385)*	(4.077)*	(1.631)	(–3.872)*
Umbria	0.8898	1.1810	2.6345	0.1093	Umbria	–0.4266	0.3380	0.3127	–0.1040
					(t_w)	(–3.344)*	(3.852)*	(1.246)	(–2.365)**

(cont.) TABLE 3

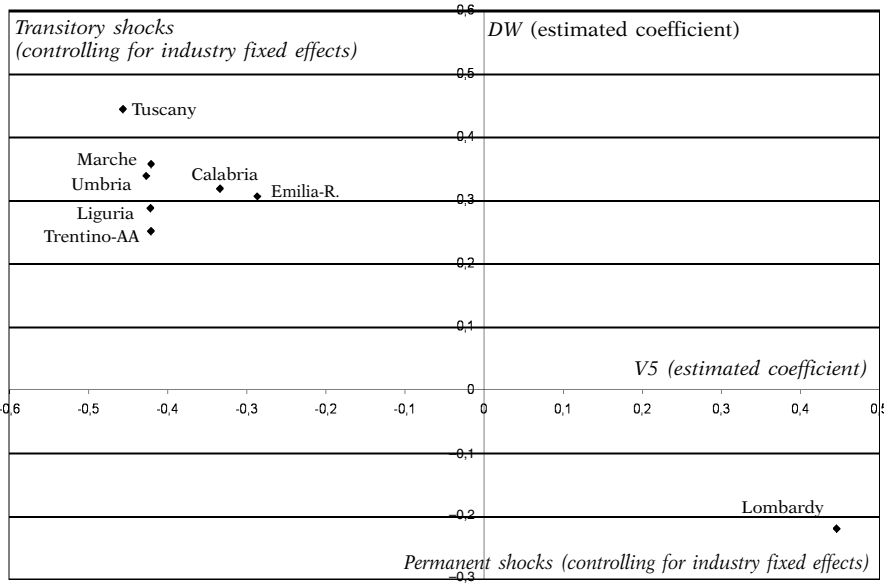
IDIOSYNCRATIC OUTPUT PATTERNS BY REGION
(OLS ESTIMATES)*

	Regional averages:					Persistence	Dependent variables: Long-run comovement		Short-run c.
	V^5	*DW*	*abs(DF)*	R^2	Regressors:	V^5 (1)	*DW* (2)	*abs(DF)* (3)	R^2 (4)
Marche	0.8956	1.1994	2.7441	0.0914	Marche	–0.4207	0.3564	0.4222	–0.1219
					(tw)	(–2.959)*	(3.036)*	(1.493)	(–3.302)*
Lazio	1.3376	1.1385	2.5199	0.0848	Lazio	0.0212	0.2954	0.1980	–0.1286
					(tw)	(0.101)	(2.690)*	(0.698)	(–3.327)*
Abruzzo	1.0726	1.1553	2.8638	0.1315	Abruzzo	–0.2438	0.3123	0.5420	–0.0819
					(tw)	(–1.478)	(2.257)**	(1.603)	(–2.034)**
Molise	1.0860	1.1938	2.8540	0.1240	Molise	–0.2304	0.3507	0.5321	–0.0894
					(tw)	(–1.039)	(2.447)**	(1.618)	(–2.070)**
Campania	1.6946	0.7880	2.0281	0.0808	Campania	0.3782	–0.0551	–0.2938	–0.1325
					(tw)	(1.418)	(–0.402)	(–0.955)	(–3.500)*
Puglia	1.4457	1.0155	2.3394	0.2370	Puglia	0.1293	0.1725	0.0175	0.0237
					(tw)	(0.556)	(1.156)	(0.0489)	(0.478)
Basilicata	1.0117	1.1347	2.5529	0.0733	Basilicata	–0.3046	0.2917	0.2310	–0.1400
					(tw)	(–1.485)	(1.894)***	(0.679)	(–3.229)*
Calabria	0.9829	1.1610	3.2915	0.0631	Calabria	–0.3335	0.3180	0.9696	–0.1502
					(tw)	(–2.046)**	(2.054)**	(1.417)	(–3.405)*
Sicily	1.1632	1.0776	2.4167	0.0892	Sicily	–0.1532	0.2345	0.0949	–0.1241
					(tw)	(–0.356)	(2.132)**	(0.350)	(–3.076)*
Sardinia	1.0702	1.0725	2.4806	0.1103	Sardinia	–0.2461	0.2294	0.1587	–0.1030
					(tw)	(–1.494)	(1.895)***	(0.540)	(–2.349)**
					R^2	0.4764	0.3439	0.2555	0.4299
					SER	0.6240	0.4514	1.055	0.1181
					DW	2.034	1.930	1.960	2.027
					Observations	340	340	340	340

* Heteroskedastic-consistent t_w statistics in parentheses. 1%, 5% and 10% significance levels are denoted by *, **, ***, respectively. Regressions also include 16 industry dummies controlling for fixed effects.

GRAPH 4

PERSISTENCE AND COMOVEMENT ACROSS THE ITALIAN REGIONS: ESTIMATED COEFFICIENTS



non-performing (bad) loans per unit of value added. Due to the matching of cross-sectional data, these ratios are referred to the year 1995; however, the relative size of $(L/Y)_n$ and $(BL/Y)_n$ across economic sectors and local areas is fairly stable over time. Across sectors with a higher incidence of bank loans, local firms, workers and consumers may have less binding financial constraints; shocks to output are more likely to be smoothed and the impact of idiosyncratic impulses to endowments measured by (β_2) goes down; the expected sign of $(L/Y)_n$ is negative. Instead, in presence of a higher ratio of non-performing loans, agents have a greater chance of being financially constrained by risk-sensitive banks; the departures from full insurance are potentially larger and the expected sign of $(BL/Y)_n$ is positive.

Results for these cross-section tests are reported in Table 4, Panel *a)*. They are based on seemingly unrelated regression estimates for the nine consumption categories; regressions follow

specification *(5)* and also include 19 regional dummies (controlling for fixed effects, for instance different wealth levels and varying degrees of market completeness) and 16 industry dummies[21].

The output persistence measure shows a strong positive correlation with the departures from full insurance; it is significant at the 1% level for four consumption categories (food, furniture, transportation, and entertainment), as well as non-food and total consumption. The estimated coefficient is positive and significant at the 5% level also for "tobacco" and at the 10% for "clothes" and "other expenditures" [22].

Ceteris paribus, consumption smoothing is higher for relatively more temporary shocks to output; this result is confirmed also considering a different estimation technique. Since the degree of risk sharing, albeit not complete, is fairly large, it is unlikely that the estimated β_2 coefficients are all different from zero. However, it is possible to focus on the significant departures from full insurance only, by estimating a probit version of regression *(6)*, as in Table 4, Panel *b)*. The dependent variable in this case takes on two values, 1 if estimated β_2 (from auxiliary regression *(5)*) is significant at least at the 10% level (*t-stat*>=1.771), and 0 otherwise. Rejections of full insurance range from 16 (for expenses on furniture and food) to 45 (for total consumption); a probit model can detect the direction of the relationship between lack of risk sharing and persistence.

Results shown in Table 4, Panel *b)* confirm that a higher permanence of local output growth is positively associated with the probability of observing a significant impact of idiosyncratic shocks on total consumption, non-food items and four disaggregated categories. The control variables have the expected signs,

[21] The persistence measures are generated regressors and this would require a 3*SLS* procedure that is precluded, in practice, by the availability of adequate instruments. However, the sample size is large (its dimension is equal to 340 local industries times 9 consumption categories and the *SURE* system is based on a cross-section of 3,060 observations). A positive correlation between the permanence of output shocks and consumption shows up quite clearly in this data set.

[22] The only exceptions are "home" (not significant) and «health» expenditures (that yields a negative coefficient, significant at about the 6% level). The control variables have generally the expected sign.

TABLE 4

OUTPUT PERSISTENCE AND THE REJECTIONS OF FULL CONSUMPTION INSURANCE*

	Total	Non-Food	Food	Tobacco	Clothes	Home	Furniture	Health	Transp	Entertain	Others
Panel *a)* Dependent Variable: β_2 Estimated Coefficients (Departures from full Insurance) *Seemingly Unrelated Regressions Estimates*											
Persistence (*V*5)	0.0234	0.0265	0.0121	0.0255	0.0177	–	0.0441	–0.0558	0.0635	0.0350	0.0350
(t)	(2.80)	(2.88)	(2.90)	(1.95)	(1.87)		(3.82)	(–1.90)	(3.00)	(2.93)	(1.77)
(*p*-value)	(0.005)	(0.004)	(0.004)	(0.051)	(0.062)		(0.000)	(0.058)	(0.003)	(0.003)	(0.076)
Size	–	0.0356	–	0.0820	–	–	–	–0.2438	–	0.0539	0.0821
(t)		(1.68)		(2.72)				(–3.59)		(1.95)	(1.80)
(p-value)		(0.094)		(0.007)				(0.000)		(0.051)	(0.071)
Loans/v.a.	–	–	–	–0.0259	–	–	–	–	–	–0.0212	–
(t)				(–1.89)						(–1.69)	
(*p*-value)				(0.059)						(0.092)	
Bad loans/v.a.	–	–	0.0062	0.0156	–0.0134	–	–	–	–	0.0181	0.0307
(t)			(2.07)	(1.64)	(–1.96)					(2.10)	(2.15)
(*p*-value)			(0.038)	(0.100)	(0.049)					(0.036)	(0.031)
R^2	0.256	0.262	0.170	0.156	0.150	0.133	0.126	0.183	0.176	0.143	0.238
SER	0.090	0.099	0.045	0.141	0.102	0.135	0.124	0.317	0.228	0.129	0.212
Obs	340	340	340	340	340	340	340	340	340	340	340

(cont.) TABLE 4

OUTPUT PERSISTENCE AND THE REJECTIONS OF FULL CONSUMPTION INSURANCE*

	Total	Non-Food	Food	Tobacco	Clothes	Home	Furniture	Health	Transp	Entertain	Others
Panel *b)* Dependent Variable: Binary (1 if β_2 is Significant at the 10% Level, 0 Otherwise) *Probit Estimates*											
Persistence (*V*5)	0.3096	0.2855	–	–	–	0.3130	–	–	0.5755	0.3602	0.2941
(t)	(2.77)	(2.52)				(2.22)			(4.71)	(2.53)	(2.50)
(*p*-value)	(0.006)	(.012)				(0.027)			(0.000)	(0.011)	(0.013)
Size	–	–	–	–	0.5805	–	–	–	–	–	–
(t)					(2.41)						
(*p*-value)					(0.016)						
Loans / v.a.	–	–	–	–	–	–	–	–	–	–	–0.3422
(t)											(–2.31)
(*p*-value)											(0.021)
Bad loans/v.a.	0.1280	–	0.2199	–	–	0.1860	–	–	–	–	0.1790
(t)	(1.67)		(1.67)			(1.76)					(2.06)
(*p*-value)	(0.095)		(0.095)			(0.079)					(0.040)
β_2 with t>=1.771	45	43	16	17	17	25	16	22	34	18	38
R^2	0.065	0.065	0.042	0.057	0.083	0.082	0.027	0.063	0.149	0.097	0.143
Obs	340	340	340	340	340	340	340	340	340	340	340

*(cont.)*TABLE 4

OUTPUT PERSISTENCE AND THE REJECTIONS OF FULL CONSUMPTION INSURANCE*

	Total	Non-Food	Food	Tobacco	Clothes	Home	Furniture	Health	Transp	Entertain	Others
Panel *c)* Dependent Variable: Binary (1 if β_2 is Significant at the 10% Level, 0 Otherwise) *Sensitivity Analysis: Probit Estimates*											
Persistence (*V*8)	0.1992	0.1817	–	–	–	0.2122	–	–	0.4131	0.2641	0.1951
(t)	(2.51)	(2.27)				(2.11)			(4.82)	(2.67)	(2.36)
(*p*-value)	(0.012)	(0.023)				(0.035)			(0.000)	(0.008)	(0.018)
Long t. comov (*DW*)	–0.5556	–0.5320	–	–	–	–0.5785	–	–	–1.234	–	–
(t_w)	(–2.69)	(–2.54)				(–2.17)			(–3.95)		
(*p*-value)	(0.007)	(0.011)				(0.030)			(0.000)		
Short t. comov (R^2)	1.163	1.246	–1.938	–	–	–	–	–	–	–	–
(t_w)	(1.97)	(2.08)	(–1.65)								
(*p*-value)	(0.049)	(2.37)	(0.099)								
Observations	340	340	340	340	340	340	340	340	340	340	340

Panel *a)*: nine categories of consumption (1)-(9) are estimated jointly by *SURE*. "Non-food" is estimated jointly with "Food" also by SURE; results for "Total consumption" are OLS estimates. The same set of explanatory variables is introduced in each equation but only coefficients significant at least at the 10% level are reported. Panel *a)* regressions include a constant, 19 regional and 16 industry dummies controlling for fixed effects. Panel *b*) and Panel *c)*: *PROBIT* estimation. Dummies "South" and "Manufacturing" are introduced (a full set of regional and industry dummies is perfectly linearly correlated with the binary variable and the procedure would not converge). Panel *c)* also includes the control variables *Size*, *Loans* and *Non-performing loans* as a ratio of value added.

and non-performing loans (a proxy for more binding financial constraints) are directly linked to the rejections of full insurance for total consumption and three other categories[23].

A sensitivity analysis (Table 4, Panel *c)*) indicates that persistence measures with a different window width (8 years) yields very similar results. The relationship is robust also when output uncertainty is measured by the long-run comovement with the aggregate (*DW*). A higher *DW* statistics, calculated from regression *(3)* indicates a higher degree of cointegration of local output with the Italian average and less idiosyncratic shocks in the long-run, and shows up in a lower impact[24].

4. - Conclusions

This work has offered a brief survey of the empirical literature on consumption risk-sharing and has examined the sensitivity of consumption growth to region-specific innovations in real per capita GDP growth, employment and real wages. It confirms that the degree of consumption risk sharing is high, especially among the Northern and Central regions, but is far from complete.

On the basis of sectoral and regional observations on output, idiosyncratic risk has been related to the long-run volatility of the impulses and to different degrees of comovement with aggregate data at low and high frequencies. The impact on consumption is positively correlated to the size of the random walk in output and to the lack of equilibrium between local and national output dy-

[23] Instead, a dummy South interacted with the explanatory variables and a sample split with the Northern and Central regions do not consent to ascertain significant differences across areas; a clear North-South dichotomy is not observed.

[24] Cyclical comovement (measured by R^2) proxying for short-term uncertainty shows a wrong (positive) sign (Table 4, panel *c)*) for total and non-food consumption, and the expected negative coefficient on food consumption only. An higher R^2 means a less important idiosyncratic component in the short run but yields a higher rather than a lower impact on consumption in most cases, suggesting that long-run output uncertainty may be a more appropriate determinant of consumption (non)-smoothing in this framework.

namics in the long-run, while the degree of risk sharing is higher for more temporary shocks to endowments. The long-run volatility of output differs across industries and regions but its effects do not show a clear-cut North-South dichotomy.

Due to lack of market completeness, in presence of persistent fluctuations in output consumers diversify away only part of the long-run idiosyncratic risk. This implies that a larger federation of states or regions may reach a higher probability of consumption smoothing across geographical areas in the case of industries where permanent output shocks are more important (the tertiary sector, or chemicals and vehicles, for instance). It is plausible that regions with a prevalence of temporary impulses on output (Tuscany or Marche, according to the results of Section 3) will gain potentially less compared to areas where long-run output uncertainty is higher, as in Lombardy.

Across the Italian regions, short-term and long-run comovements are not necessarily related and the departures from full insurance are mainly associated to the long-run variance of output. For instance, Lombardy, Piedmont and Puglia show a larger incidence of idiosyncratic long-run output uncertainty, but in the short-run output dynamics in these regions is similar to the average; this means that their output growth rates are potentially insurable across regions rather than intertemporally. Output in Campania, Lazio and — to a lesser extent — also in Sicily and Valle d'Aosta has an idiosyncratic component higher than the average. These regions show both long- and short-run uncertainty of output (high persistence and a low correlation with the Italian growth rates); idiosyncratic risks in these areas could be insured both across borders and over time.

These results suggest that more work on these issues is useful. Firstly, it would be interesting to uncover further determinants of the geographical differences in risk sharing (wealth and its composition, portfolios diversification, liquidity constraints, enforcement of contracts, completeness of markets). It must also be considered that a deeper interaction between areas or a larger federation will change the economic structure, as far as risk is concerned. Other things being equal, the finding that the observed

departures from full insurance are correlated with the permanence of output shocks tends to support the recent literature on the advantages of pooling regions or countries for insuring the long-run variance of income, which is not already smoothed.

Furthermore, the relationship between the persistence of output fluctuations and portfolio choices deserves further study. Heaton and Lucas (2000, p. 5) suggest that: «uninsurable background risk can influence portfolio allocations, since it can change people's tolerance for stock market risk». If persistent shocks to endowments are more difficult to smooth, people working in local industries or regions with a higher incidence of long-run risk could be less willing to hold stocks and may present a higher share of bonds or money in their portfolios. Does heterogeneity in the degree of persistence associated to unsystematic risk influence asset allocation? Grande and Ventura (2001, p. 26) find significant effects of asset-holding on consumption on Italian micro data: «evidence supporting the conjecture that the holders of risky assets may be exposed to idiosyncratic shocks conveyed by those assets»; Campbell, Lettau, Mankiel and Xu (2001) indicate that idiosyncratic industry-level and firm-level shocks are important components of US individual stock returns. Does the long-run volatility of assets also influence consumption? These are interesting directions for further research.

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