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Monetary Policy Department

3.6.1997

Incomplete Insurance Market and Its Policy Implications  
within European Monetary Union

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# INCOMPLETE INSURANCE MARKET AND ITS POLICY IMPLICATIONS WITHIN EUROPEAN MONETARY UNION\*

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## ABSTRACT

The purpose of this discussion paper is to consider consumption insurance and its various channels at the level of the individual and at the level of the economy as a whole in the context of the European Monetary Union. First we introduce a theoretical framework to derive implications of international risksharing and review the empirical work on the subject. We conclude that the efficient pooling of consumption risks is not the feature of real world. Second, we discuss of potential market imperfections and the extent to which the current market structure can offer consumption insurance. Finally, we discuss relevant policy implications of incomplete insurance market. Two arrangements are under consideration: fiscal federalism from the point of view of insurance arrangement and a proposition for opening new risksharing markets.

Keywords: Consumption insurance, capital markets, labor mobility, labor contracts, fiscal federalism, financial innovations.

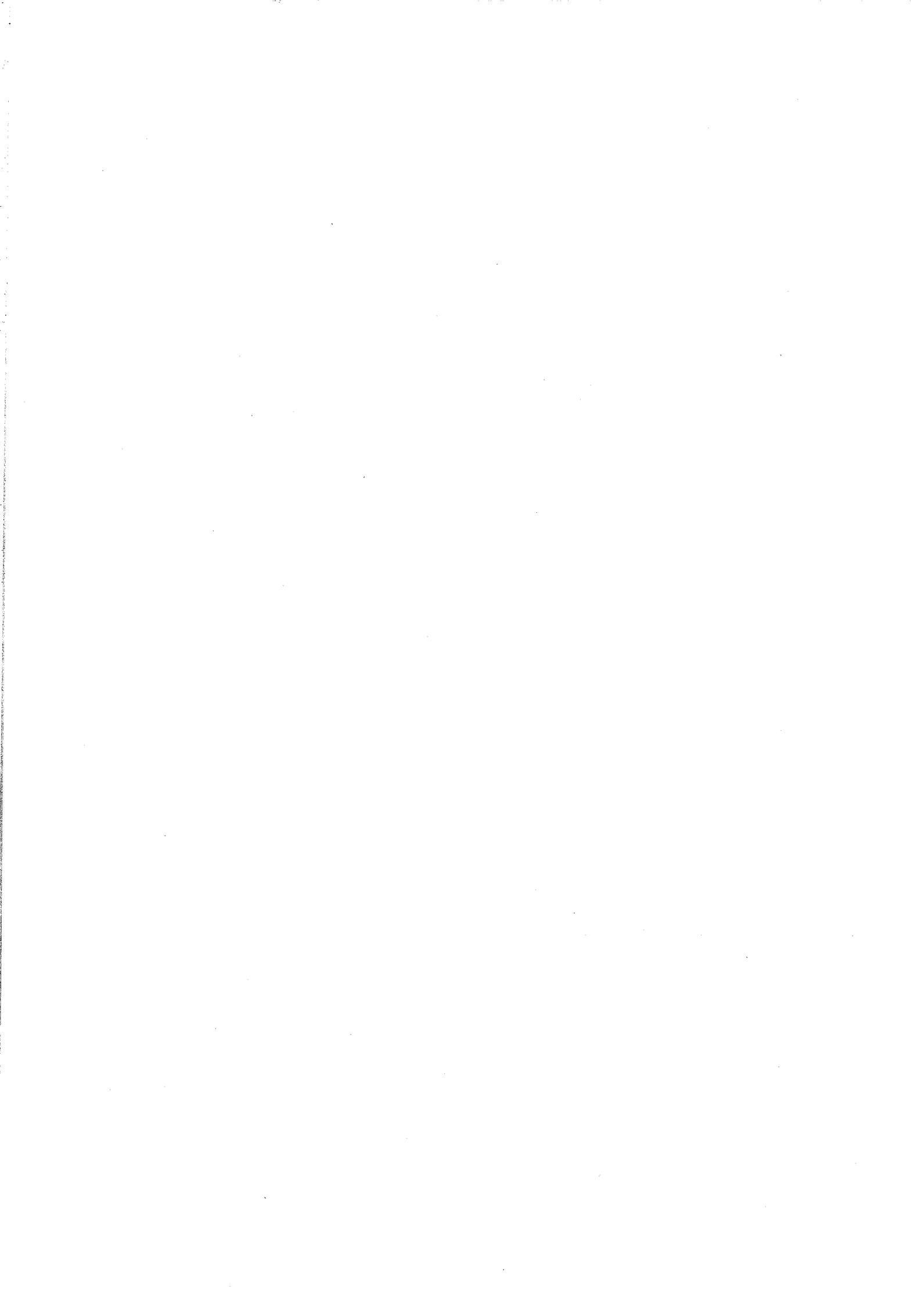
## TIIVISTELMÄ

Tämän keskustelualoitteen tarkoituksena on esitellä kulutusvakuutusta yksilöiden ja koko talouden tasolla Euroopan talous- ja rahaliiton kontekstissä. Ensimmäiseksi tutkimuksessa esitellään kulutusvakuutuksen teoreettinen kehikko ja käydään läpi empiiristä kirjallisuutta. Kulutusriskien tehokas jakaminen ei ole reaali maailman ominaisuus. Toiseksi keskustellaan mahdollisista markkinaepätäydellisyyksistä ja mahdollisuuksista jakaa riskejä nykyisillä markkinoilla. Lopuksi esitellään epätäydellisen vakuutusmarkkinan politiikkasuosituksia, joihin tarkastellaan fiskaalisen federalismin kulutusvakuutusominaisuuksia sekä uusia riskinjakomarkkinoita.

Asiasanat: Kulutusvakuutus, pääomamarkkinat, työvoiman liikkuvuus, palkkasopimukset, fiskaalinen federalismi, rahoitusinnovaatiot.

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## 1 INTRODUCTION

This study is about consumption insurance, at the level of the individual, or at least the household and at the level of the economy as a whole, in the context of the European Monetary Union. The study describes research and a recent literature on financial markets, institutional arrangements, and agent-specific behavior that can be used for insurance purposes, and finally draws conclusions about policy implications of incomplete insurance markets. But before moving on to details some theoretical foundations and concepts are introduced.

The idea that economic units attempt to insure their consumption stream against individual income or wealth fluctuations is one of the most attractive and challenging feature of modern macroeconomics. The appropriate frameworks for analyzing consumption behavior of economic units under uncertainty are life-cycle model of Modigliani and Brumberg (1954) and the permanent income model of Friedman (1957).

The basic idea behind life-cycle model applies the ideas of intertemporal allocation to explain the way in which the consumption evolves with age over the life-span of the unit (in this case individual, or household). In turn, in permanent income model consumption is determined by permanent income, typically defined as average or expected future labor income.

However, these models can not be seen as distinct - each of these approaches is based on explicit utility maximization of an individual economic unit subject to the constraints that the unit faces. The important point shared by these theories is that units form their consumption decisions on the basis of their lifetime income rather than simply their current income as in the Keynesian consumption function. Optimal consumption behavior requires units to forecast their future incomes. Therefore, in responding to a change in consumption possibilities, units must forecast the future course of incomes as well as the current income. Because, there is uncertainty concerning the consumption possibilities in future, or in other words future incomes are, indeed, not perfectly predictable, there is a demand by a risk-averse units for insurance. Indeed, in the absence of uncertainty or actually in the presence of complete insurance arrangements there is no reason for consumption of economic unit to track income. In particular, the response of individual economic units to various changes in consumption possibilities depends on the nature of available insurance arrangements.

Then how does consumption of a completely insured (i.e. under fully functioning insurance markets) economic unit behaves? There are many common features between the theory of complete consumption insurance and theories of early social philosophers. According to the theory of risksharing if risks are largely idiosyncratic or transitory, then risk-averse economic units should group together to pool the risks. Under perfect risksharing, the consumption growth of a representative unit (country) should track aggregate (global) consumption growth, and nothing else. In

other words, movements in average group consumption represent aggregate risk but all other shocks are pooled efficiently through the risksharing mechanism.

What then is meant by insurance? The idealistic socialists described that 'complete consumption insurance' would be possible if there were a new community spirit in society and if there were communities where incomes were pooled. However, the question here is to try to achieve optimal allocation of risks on a voluntary and self-interested basis. A broad definition of insurance will be used in discussing the importance of different arrangements. For purposes of this study, insurance will be defined as any state-contingent arrangement that allows units to mitigate random fluctuations in marginal utility. Indeed, this definition is deliberately general in order to convey the view that insights about insurance can be applied to the problems that at first sight seem to have nothing to do with insurance.

Full consumption insurance can be obtained theoretically when financial markets are complete or when there is a set of institutions which allow units to achieve optimal allocations. It can be stated that perfect consumption insurance, which allow representative units to diversify idiosyncratic risk completely, can be achieved by writing perfect state contingent contracts. At an abstract level these contracts correspond to the Arrow-Debreu notion of state contingent claims. With complete markets agents are able to trade as many independent assets as there are prospective states of nature. The result of this trade is that agents everywhere in the world equalize their marginal rates of substitution of present for future state-contingent consumption.

The development of asset markets is a notable feature of modern private ownership economies. Arrow (1964) and Debreu (1959) extended the economic analysis from static world to stochastic one by introducing a market structure consisting of a system of contingent contracts: for each good and for each date-event in the future there is a contract which promises to deliver one unit of consumption of a specified good at given date and given of the state of the world.<sup>1</sup> The price of the state-contingent claim is determined in competitive markets. Thus the insurance via state contingent claim permits the insured agent to exchange consumption (income) in one state for consumption in other. And actually each unit is then able to make her life-cycle consumption plan at the beginning of life. This 'master-plan' consists of a set of contingency plans, each detailing what consumption will be in each possible state of the world. With complete Arrow-Debreu securities such plans can be efficiently implemented, because consumption in various states of the world will exactly correspond to the initial contingency plan.

In the name of justice it can be claimed that each individual should be able to insure herself against each adverse shock that is beyond one's control. However, in practice

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<sup>1</sup> Following assumptions must be made considering the full information condition: i) All decision taking agents have in their minds the same sets of states of the world, ii) When period  $t+1$  arrives, all agents will be able to recognize which state of the world prevails and agree on it, iii) At period  $t$ , each agent is able to assign a probability to the event that a particular state of the world will occur at period  $t+1$ ; these probabilities may differ for different agents, but all the probability assignments satisfy the basic probability laws.

most of the shocks to agents consumption possibilities are not insurable because of problems of moral hazard and adverse selection, which prevent such diversification of human-capital portfolio. In addition, even if moral hazard and adverse selection are absent an efficient insurance for private economic units against adverse shocks may, however, not be feasible. In general terms used here this is due to problems of verifying which state of the world prevails, and the to problem of lacking knowledge of probabilities among purchasers of insurance. Obviously, these informational handicaps create a problem for writers of insurance policies.

The following assumption is made in order to outline the proceeding discussion easier: An economy can be described in very general and abstract terms as system within which natural resources and the services of capital are combined with human labor to produce consumer goods. Natural resources and capital goods are combined under the single heading - capital. There are three representative agents within individual economy: namely capitalist, worker and government. Government is supposed to maximize a social-welfare function by distributing consumption possibilities available on each date, and in each state among the citizens of the country. A direct distinction between the individual citizens of the country and the government is not made. This assumption allows to discuss risksharing between countries, and yet, on the other hand it is possible to keep in mind risksharing possibilities of an individual agent.

### **1.1 Structure of the Study**

The objective of this study is to consider arrangements, which provide risksharing in real economies. More or less implicitly, then, an attempt is made to challenge the complete risksharing model as a description of these real world arrangements. The rest of the study is organized as follows.

Chapter 2 will introduce a theoretical framework to derive implications of international risksharing for consumption behavior at the global and local (country) level. If world consumption risks are efficiently pooled then the consumption of a representative unit should not respond to idiosyncratic income or wealth shocks and the growth of the discounted marginal utility of consumption is equalized across units. These implications of efficient risksharing could be subjected to empirical testing. Although the arrangements of complete consumption insurance are theoretically very simple, empirical research suggests that the international risksharing is hardly a feature of the real world. In section 2 a review of this empirical research is made. It is found that international consumption correlations are lower than the theory predicts.

These observed international consumption patterns leads to discuss of potential market imperfections and channels of risksharing. In chapter 3 the focus will be on the existing financial institutions alone. It is often stated that if international risksharing occurs capital should be mobile, financial portfolios should be diversified, credit markets should work efficiently, and saving-investment correlations should be low.

Section 1 analyses capital mobility, which is a necessary but not a sufficient condition for economic units to trade their differential consumption risks. It is found out that capital is mobile at least in short-run. Yet, the unexplained puzzle is why risktrading does not occur? Section 2 discusses portfolio compositions among industrial countries. Evidence against complete risksharing is found - the portfolio of developed countries are often composed largely of domestic assets. One problem here is that most individuals are liquidity constrained and financial wealth is largely invested in region-specific real estate. Moreover today's stock markets facilitate direct hedging of only a small part of the risks associated with national income fluctuations (i.e. corporate earnings). Capital markets are, then, incomplete in the sense that most private agents are unable to hedge against adverse shocks. This fact may be used to argue in favor of government intervention in this framework.

Although there is no central fiscal institution at the EU level, there already exists a country-specific insurance system that works as an automatic consumption smoother: namely the market mechanism of world credit markets. If there are complete markets for credit, then income shocks can be smoothed out by borrowing and saving and, hence, transitory shocks should not affect consumption patterns. However, when credit markets are incomplete countries are constrained in their ability to obtain credit, and, hence unable to smooth consumption. Section 3 discusses credit market imperfections. Finally section 4 summarizes the capital market imperfections and focuses on measures of the economic integration of real activity from the perspective of saving-investment correlations. It is concluded that there is small net flow of capital across countries and limited extent of intertemporal trade between countries.

Chapter 4 discusses agent-specific self-insurance arrangements, which might occur both at the level of individual country or at the level of industry. Especially, workers should be able to insure themselves against agent-specific shocks by diversifying their human capital portfolios via efficient labor contracts. However, it seems that these contracts are not a feature of the real world. In addition, labor mobility is discussed in the second section. If the labor force were extremely mobile differences in gross national products would not last for long. However, it is realistic to assume that migration will occur only under asymmetric and permanent disturbances.

Chapter 5 discusses relevant policy implications of incomplete insurance market. It investigates possibilities to construct a European institution or markets, which could induce Pareto improvement risk allocation. The non-existent private insurance market and, on the other hand limited ability of the member countries of the monetary union to smooth consumption under certain conditions makes it more essential to develop political and economical insurance institutions that sustain smooth operation of the economies. In the first section of this chapter the focus is on fiscal federalism. A popular explanation for the tolerance of region-specific shocks of an individual member country in the monetary union is that the federal fiscal system provides regional insurance. Benefits and drawbacks of federal fiscal policy from the point of view of insurance arrangement are discussed. Section 2 then discusses

propositions for opening new financial markets or constructing new risksharing mechanism. Also some notes on the new roles of old institutions are presented.

Chapter 6 concludes.

## 2 THEORY OF INTERNATIONAL RISKSHARING

There is no case for public intervention if all economic units are able to insure themselves against asymmetric adverse shocks and thus avoid a comparatively painful real income adjustment. Complete insurance implies that the consumption of individual economic units (i.e. agents, families, countries)<sup>2</sup> should not vary over time in response to idiosyncratic shocks, while the permanent income hypothesis implies that the consumption of an individual economic unit should not vary over time in response to transitory shocks (Canova and Ravn, 1994). The principal implication of risksharing is that individual consumption responds to symmetric shocks (that is aggregate consumption movements) but not asymmetric ones (e.g. movements in individuals' income). Some possible sources of such insurance scheme are stocks and securities markets, borrowing and lending in credit markets, contracts between employer and employee and so on. With such a complete insurance system there is no need for any public intervention.

### 2.1 Model of Complete Consumption Insurance on Microfoundations

If markets are complete (or if there is some other mechanism or set of institutions) that implement a full-information Pareto optimal allocation, then the consumption of individual should not respond to idiosyncratic income or wealth shocks (Cochrane, 1991). Thus the full insurance model can be seen as an extreme version of PIH. Next a general version of full risksharing model in full information environment is analyzed. More detailed derivation of model is presented for example in Mace (1991).

A full insurance Pareto optimal consumption allocation maximizes the discounted weighted sum of individual units utility functions denoted by  $U$ :

$$(1) \quad \max_{C^j(S^t)} \sum_{j=1}^J \lambda^j \sum_{t=1}^{\infty} \sum_{S^t} (\rho^j)^t \pi(S^t) U[C^j(S^t), \delta^j(S^t)],$$

where  $C^j(S^t)$  is consumption by unit  $j$  at time  $t$  when state of the world is  $S^t$ ;  $\lambda^j$  is the Pareto weight of unit  $j$ , which reflects the initial distribution of wealth;  $(\rho^j)^t$  is the discount factor of unit  $j$  at time  $t$ ;  $\pi(S^t)$  is the probability of state  $S^t$ ; and  $\delta^j(S^t)$  represents all those factors other than consumption which affect the utility of economic unit. Feasibility constraint requires that aggregate consumption must be less than or equal to the aggregate endowment at each date and in each state of the world:

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<sup>2</sup> For the purposes of this study the most interesting economic unit is indeed an individual country.

$$(2) \quad C^A(S^t) \equiv \sum_{j=1}^J C^j(S^t) \leq \sum_{j=1}^J e^j(S^t) \equiv e^A(S^t), \text{ for all } S^t$$

where  $e^j(S^t)$  is endowment of economic unit  $j$  at time  $t$  and  $e^A(S^t)$  is total amount of the consumption good available at time  $t$ ;

The first-order conditions for Pareto optimal consumption allocations are

$$(3) \quad (\rho^j)^t \lambda^j U_{c^j(S^t)} [C^j(S^t), \delta^j(S^t)] = \mu(S^t), \text{ for all } S^t \text{ and } j = 1, \dots, J,$$

where  $\mu(S^t)$  equals Lagrange multiplier associated with feasibility constraint, divided by the probability of state  $S^t$ . The set of first-order conditions given by (3) embody the implications of full insurance for consumption patterns across individual units, time periods and states of nature. Full insurance implies identical growth rates across units in the marginal utility of consumption. This can be seen by looking at multiplier  $\mu(S^t)$ , which varies with aggregate consumption but is constant across units for a particular state and date. Hence given aggregate consumption and Pareto weights, the consumption of individual unit do not vary with their endowments. Second, since the Pareto weights are time invariant, it is possible to use observations at two point in time to remove the unit fixed effects:

$$(4) \quad \rho^j \frac{U_{c^j(S^{t+1})} [C_{t+1}^j, \delta_{t+1}^j]}{U_{c^j(S^t)} [C_t^j, \delta_t^j]} = \frac{\mu_{t+1}}{\mu_t}, j = 1, \dots, J$$

which states that the growth between  $t$  and  $t+1$  in the discounted marginal utility of consumption is same for all units.

However, the linear property of Arrow-Debreu economies of perfectly correlated consumption prevails only if preferences are identical, homothetic and additively-separable.

## 2.2 Evidence Against Full Risksharing

Although the concept of consumption insurance is theoretically quite simple, it has been the focus of empirical research only for a short time. However, to derive observable implications from the basic theory some strong assumptions on national utility functions (on preferences<sup>3</sup>, time and state separability for example) must be imposed. Empirical research suggests that international consumption risksharing is hardly a feature of the real world. It is claimed that aggregate consumption of

<sup>3</sup> Only if preferences are identical, homothetic and separable will consumptions of two separate units will be perfectly correlated. Thus, under theory measured consumption growth can vary across units for only three reasons: (1) Utility functions differ across units, (2) units experience idiosyncratic preference shocks and (3) observed unit consumption contains idiosyncratic measurement error.

individual countries does react to country specific shocks. Insurance market seems to be imperfect or at least partially inaccessible for some agents or there are no institutions implementing the first best solution. Next a review of empirical research, both on macro- and microdata, is made.

### 2.2.1 Evidence on Macrodata

In the empirical work of consumption insurance studied in this section utility functions are specified with isoelastic preferences: First it is studied utility function in which variables are internationally tradeable. Second, non-tradeables are added in to utility function, and finally it is assumed that tradeables and non-tradeables are separable.

Obstfeld (1995) examined the correlation coefficients for changes in the logarithms of annual per capita real private consumption growth rates (denoted by  $\hat{c}_t^j$ ) with the rest of the world per capita private consumption growth rates (denoted by  $\hat{c}_t^w$ )<sup>4</sup> over two periods: 1951 to 1972 and from 1973 to 1988. To test empirically theoretical implications of complete consumption insurance with international consumption data he specified utility function with isoelastic preferences for each country  $j$  (it was assumed that no non-tradeables  $x^j$  were consumed):

$$u^j(c^j, x^j) = \frac{1}{1-R_j} (c^j)^{1-R_j},$$

where  $R_j$  is the coefficient of relative risk aversion of country  $j$ .<sup>5</sup> Then if  $\hat{c}_t \equiv \log c_t - \log c_{t-1}$  then the equation (4) implies

$$\hat{c}_t^j = \left( \frac{R_t}{R_j} \right) \hat{c}_t^t$$

That is logarithmic growth rates of consumption are perfectly correlated *ex post* in all countries. It is assumed that all countries have same rates of time preferences so there is no constant term. Estimated log-difference regression was:

$$\hat{c}_t^j = \alpha_0 + \alpha_1 \hat{c}_t^w + \varepsilon_{jt},$$

where disturbance,  $\varepsilon_{jt}$  is assumed to follow a stationary process.

<sup>4</sup> Looking at correlations with world consumption growth, rather than pairwise consumption growth has some statistical advantages. According to Obstfeld (1994) there is no problem of an *endogenous-regressor* that is world consumption can be stated to be independent variable in explaining the consumption of country  $j$ , even in the presence of significant country-specific preference shocks.

<sup>5</sup> Although CRRA specification was adopted, any member of the HARA utility functions would serve the purposes of the empirical research (see e.g. Brennan and Solnik, 1989).

It was found that all the correlation coefficients are well below the value of 1. For the narrow majority of EU member countries, domestic and world consumption growth rates are relatively strongly correlated (in post 1973 period correlation coefficient for Belgium is 0.49, for Denmark 0.60, for France 0.50, for Germany 0.72, for Ireland 0.48, for Netherlands 0.56 and for the United Kingdom 0.59). Countries that still hold capital controls (Greece, Portugal and Spain) as well as Italy which did so through early 1990 are in minority: correlations with world consumption growth rates are 0.13, 0.06, 0.32 and 0.27, respectively. Correlations for the new member countries Austria, Finland and Sweden seem to be low: 0.29, 0.19 and 0.18, respectively in post 1973 period - all of these countries hold capital controls through 1980. For almost all the EU countries the correlation coefficients rises between the sub-periods, most dramatically for Germany from -0.11 to 0.72.

The rise of correlations is not necessarily due to international asset market integration, but merely the result of common shocks to the world macroeconomy that hit all the industrialized economies simultaneously and with similar effects on consumption growth. Leading source of such shocks in the post 1973 period was the real price of the petroleum. However, multiple regressions proved that this last result hold even when OPEC oil-price shocks were controlled<sup>6</sup> (although the oil variable entered significantly in the regressions for Italy, the UK and the US suggesting that these countries did not fully trade to the rest of the world sample the idiosyncratic consumption risk due to oil-price changes).

However, Obstfeld reported that for industrial countries outside the EU there is tendency that the consumption correlations are lower in the recent period except for Japan and Switzerland. One could argue these countries adopted greater exchange rate flexibility than EU countries in the early 1970s because they desired to decouple their consumption growth from world consumption growth. However, the Japanese example show that these is not necessarily the case.

Obstfeld (1994) studied whether the change in consumption growth rates are more closely correlated with domestic or foreign factors by the following regression:

$$\hat{c}_t^j = \alpha_0 + \alpha_1 \hat{c}_t^w + \alpha_2 \Delta \log(y_t^j - inv_t^j - g_t^j) + \varepsilon_t^j,$$

where  $y^j$  is real per capita GDP of country  $j$ ;  $inv^j$  is real per capita investment;  $g^j$  is real per capita government spending, and  $\varepsilon^j$  is a linear combination of preference shocks. The quantity  $Tr^j \equiv c^j - (y^j - inv^j - g^j)$  measures the net resource transfers from the rest of the world to country  $j$  due to foreign borrowing, interest and dividend earnings and capital gains on assets held abroad plus all other state-contingent payments on foreign wealth. Thus if the international asset market is absent domestic per capita consumption  $c^j$  is limited to  $y^j - inv^j - g^j$  and the specified regression,

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<sup>6</sup> The oil-price shocks were controlled using regression:  $\hat{c}_t^j = \alpha_0 + \alpha_1 \hat{c}_t^w + \alpha_2 \Delta OIL_t + \varepsilon_{jt}$ , where  $\Delta OIL_t$  is the change in the log real oil price between years  $t$  and  $t-1$ .

indeed, indicates whether consumption growth is more strongly associated with global or domestic factors.<sup>7</sup>

The regressions indicated that all  $\alpha_2$  coefficients were insignificantly different from 1 and financial markets did not provide consumption insurance for the years 1951-1972. For the years 1973-1988 results were quite different. For France, Germany, Italy and Japan hypothesis that  $\alpha_1 = 1$  and  $\alpha_2 = 0$  can not be rejected. Germany showed the most strongest characteristics of an economy that is well integrated world financial markets:  $\alpha_1 = 1.07$  (with standard error 0.32) and  $\alpha_2 = 0.02$  (with standard error 0.20).

Obstfeld (1995) reported also correlations between national per capita output growth rates and the rest of the world per capita output growth. For all industrialized countries except Germany and Luxembourg these correlations rise between the two sub-periods. This indeed involves fundamental identification problem from risksharing perspective: any increase over time in the correlation between national and world consumption growth could be due to either increased risksharing mechanism or because of exogenous shifts in output correlations rather than improved risksharing.

According to life-cycle theory, consumption depends on lifetime resources, not on current output or income. However, another alternative explanation for increased consumption growth correlations is a simple Keynesian consumption function in which consumption merely tracks current output. Or richer models such as suggested by Carroll and Summers (1991), which builds on the evidence against life-cycle interpretation of cross-country relationship between growth and saving that comes from cross-country comparisons of cross-sections of consumption and income.<sup>8</sup> The results of Obstfeld (1995) proved that correlations between domestic output and consumption growth are high in most cases and the correlations have actually tendency to increase over time, although they often are well below unity.

In order to resolve this problem Obstfeld (1994) estimated following equation country-by-country:

$$\hat{c}_t^j = \alpha_0 + \alpha_1 \hat{c}_t^w + \alpha_2 \Delta \log GDP_t^w + \varepsilon_{jt},$$

where  $GDP_t^w$  is world per capita outside country  $j$ . Estimates suggested that for G-7 countries other than Italy and the US, it was world consumption growth rather than world output growth that was more closely related to domestic consumption in the

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<sup>7</sup> The regression in this framework is closely related to one developed by Feldstein and Horioka (1980) for estimation of the cross-sectional correlation between domestic saving and investment (see 3.4 for more detailed analysis).

<sup>8</sup> Carroll and Summers calculated age consumption profiles for the US, Canada, the UK, Denmark, Norway and Japan. In spite of differences in growth experiences, the profiles were quite similar from one country to another. For the US and Japan growth rates of real per capita GDP from 1960 to 1985 have been 2.1% (pa) and 5.2% (pa) respectively. In spite of this, the Japanese consumption age-profile, although quite similar to the US, actually peaked slightly later, in contradiction to the theoretical prediction.

post 1973 era. For France, Germany and Japan the reverse of this relationship between the two sample periods was true. Tests suggest that for example high correlation of Japanese with world consumption growth may reflect only the high correlation coefficient between world consumption and Japanese output, coupled with the high correlation of Japanese output and consumption. German output growth also has very high correlation coefficient with world consumption growth, yet adds no significant explanatory power to a regression of German on world consumption growth. These regressions were somewhat analogous to those reported by Campbell and Mankiw (1991) who examined departures from the permanent income hypothesis.

Campbell and Mankiw found that aggregate consumption responds not just to changes in permanent income but also to changes in current income. They measured the effect of current income on consumption by a coefficient  $\lambda$ , which was scaled to zero if all agents consumed their permanent income and one if all agents consumed their current income. Using quarterly data from the US, the UK, Canada, Japan and Sweden they found that variables that predict income growth predict also consumption growth. In Japan it was found that neither income growth nor consumption growth are predictable ( $\lambda$  was unidentified). In other countries they found that predictable income growth and predictable consumption growth moved in proportion with one another. The estimates of  $\lambda$  ranged from 0.2 (Canada) to nearly 1.0 (France), Sweden, the US and the UK were between these two extremes. Countries with better developed credit markets seemed to have lower values of  $\lambda$ . However, authors found no evidence that the coefficient  $\lambda$  had declined during the sample period, which indeed is at odds with financial deregulation and innovation. Possibly, other factors have worked efficiently to offset the effects of financial deregulation.

One should, however, keep in mind the strong assumptions that were imposed (for example that non-tradeables are not consumed) on the econometric specification of Obstfeld (1995) before drawing any firm conclusions of the efficiency of international risksharing.

If some non-tradeables are consumed, national consumptions need not be perfectly correlated: risks relating to the consumption of non-traded goods may be impossible to share (Stockman and Dellas, 1989). At best, consumption of tradeables will display perfectly correlated growth rates if the utility function is separable in tradeables and non-tradeables. However, Tesar (1993) argued that if variables in utility function that are internationally tradeable are not separable from those that are non-tradeable, then the correlations of aggregate consumption growth rates weaker than perfect will prevail despite complete markets.

Several studies have attempted to submit consumption correlations with complete markets and perfect capital mobility by investing stochastic effects of a labor and leisure trade-off as well as tradeables and non-tradeables trade-off.

Backus, Kehoe and Kydland (1992) reported output fluctuations between the US and 12 developed countries as well as cross-country consumption correlations. The output correlations varied in size, but were positive for all countries except for South Africa. The largest correlation was for Canada (0.77), while correlation between the US and European aggregate was 0.70. Cross-country correlations for consumption varied also across countries but were (against real business cycle models) smaller than output correlations. The largest correlation was again for Canada (0.65). The consumption correlation between the US and the European aggregate was 0.46, which was substantially smaller than the output correlation. Obstfeld (1995) reported similar results among 23 industrial countries. After 1973 the correlation between national and world consumption growth rate exceeded the one between national output growth rate and world output growth rate only in Finland (0.19, 0.06), Denmark (0.60, 0.39), Sweden (0.18, 0.04) and Switzerland (0.64, 0.53). The largest consumption as well as output correlation was in Germany (0.72, 0.87).

Backus, Kehoe and Kydland (1992) tried to capture these findings by studying the effects of technology shocks in calibrated two-country real business cycle model with a single homogenous good and internationally immobile labor.

Utility function takes the form:

$$U(c, l) = (c^\mu l^{1-\mu})^\gamma / \gamma,$$

where  $0 < \mu < 1$ ,  $\gamma < 1$  and  $c^i$  denotes consumption of the produced good;  $l^i$  is a distributed lag on leisure. Output in country  $i$  was defined:

$$F(\lambda, k, n, z) = \left[ (\lambda k^\theta n^{1-\theta})^{-\nu} + \sigma z^{-\nu} \right]^{-1/\nu},$$

where  $0 < \theta < 1$ ,  $\nu > -1$ ,  $\sigma > 0$  and  $k$  is capital;  $n$  is labor input;  $z$  is stock of inventories; and  $\lambda$  is technology shock ( $> 0$ ).

World output from two processes is allocated to consumption, fixed investment and inventory accumulation. Technology shock process was specified for the two countries as a bivariate autoregression:

$$\lambda_{t+1} = A\lambda_t + \varepsilon_{t+1},$$

where  $\lambda_t \equiv (\lambda_t^h, \lambda_t^f)$ ,  $A$  is a matrix coefficient; and the innovations,  $\varepsilon_t \equiv (\varepsilon_t^h, \varepsilon_t^f)$ , are serially independent, multivariate, normal random variables with contemporaneous covariance matrix  $V$ , which allow contemporaneous correlation between the home ( $h$ ) and foreign ( $f$ ) innovations.

In their theoretical open economy set-up, consumption was more highly correlated across countries, output was less highly correlated, and investment and the balance of trade were much more volatile than data indicated. In order to capture these real world effects, authors introduced trading frictions into their model. Consumption

correlations still exceeded output correlations, however, in all their experiments, even in those where trading frictions were prohibitive and with several parameter settings - cross-country correlation of consumption remained substantially larger than the output correlation, which indeed is at odds with the data. It seems that consumption correlations are too low to be explained by a model incorporating nonseparable leisure in utility.

Deveraux, Gregory and Smith (1992) constructed a two-country real business cycle model in which preferences are not separable between consumption and labor supply, labor is internationally immobile and two countries share identical production technologies with 100 per cent depreciation (Cobb-Douglas form) but each technique is subjected to an independent, country-specific, productivity shock. The model generates correlations between national consumption rates, which are close to those observed in the US-Canada data. However, their model did not address other shortcomings of business cycle models.

Lewis (1996) carried out a panel study of the growth of non-durable, tradeable consumption, using data<sup>9</sup> from 48 countries sampled at five-year intervals from 1970 to 1985 in order to examine the importance of non-separabilities between tradeables and non-tradeables of non-durables in risksharing. The utility function was specified:

$$u(T_t^j, N_t^j, L_t^j) = b^j \psi(T_t^j, N_t^j)^{1-\gamma} v(L_t^j) / (1-\gamma),$$

where  $T^j$  is tradeable consumption in country  $j$ ;  $N^j$  is non-tradeable consumption;  $L^j$  is leisure in country  $j$ ;  $b^j$  is country-specific shock to preferences that is uninsurable at time 0; and  $\psi(T,N)$  is a linearly homogenous aggregator function.

Tested regression was form of

$$\hat{T}_t^j = \theta_0(t) + \theta_1 \hat{N}_t^j + \theta_2 \hat{L}_t^j + \beta X_t^j + u_t^j,$$

where  $\hat{T}_t^j \equiv \log T_t^j - \log T_{t-1}^j$ ;  $\theta_0(t)$  is a constant at time  $t$ ;  $\theta_1 = (\xi_{TN}^{-1} - \gamma) / (\xi_{TN}^{-1} + (\gamma X_T / (1 - X_T)))$  and where  $\xi_{TN}^{-1}$  is the elasticity of substitution between tradeables and non-tradeables,  $\gamma$  is the parameter of relative risk aversion,  $X_T$  is the expenditure share on tradeables;  $\theta_2 = c \delta_L$  and where  $c \equiv (\gamma X_T + (1 - X_T) / \delta_{TN})^{-1}$  and  $\delta_{TN}$  is the elasticity of marginal utility of the tradeables and non-tradeables. Movements in  $X_t^j$  are insurable so if risksharing occurs one should find that  $\beta=0$ .

Lewis started her analysis by assuming that all goods are tradeable and non-durable, i.e.  $\psi(T,N) \equiv T$ . Therefore econometric specification can be written

$$\hat{T}_t^j = \theta_0(t) + \theta_2 \hat{L}_t^j + \beta X_t^j + u_t^j,$$

<sup>9</sup> Penn World Tables data set version 5.6 was used. Description of data can be found in Summers and Heston (1991)

$X_t^j$  is deviation of domestic output from the global average in each period  $t$ . Following results were obtained with pooled time-series cross-section regressions correcting the standard errors for conditional heteroskedasticity when considering non-separabilities: The percent of cross-sectional consumption variation that is explained by leisure was small indeed, less than one tenth of a percent. However, under consumption-leisure separability, idiosyncratic variations in output explained about 57% of the variation in idiosyncratic consumption movements. So domestic output is a strong and significant determinant of *total* consumption growth.

To test risksharing by using disaggregated data following modification was used:

$$\hat{T}_t^j = \theta_0 + \theta_1 \hat{N}_t^j + \beta X_t^j + u_t^j$$

This equation, where leisure is treated as separable, results by setting  $\theta_2$  equal to zero in the original equation. The evidence on risksharing was similar to the case of consumption aggregates. However, when tradeables and non-tradeables were assumed separable the consumption of non-durable tradeable was significantly related to the domestic output of tradeables. Furthermore, the percentage of variation in consumption explained by output is even higher than that of the consumption aggregates. When non-tradeables were allowed for the coefficient  $\theta_1$  was insignificantly different from zero and the variation in non-tradeables explained only 0.1% of the variation in tradeables. Since consumption growth of tradeables was significantly correlated with domestic output growth, the evidence rejected risksharing. To summarize Lewis (1996) the consumption of non-durable tradeables is significantly related to output, the explanatory power of non-separabilities does not appear to be high. However, Lewis did not look at idiosyncratic sources on consumption variability other than income growth so her results do not fully explain why consumption correlations remained low even after attention is restricted to non-durable tradeables. In addition, panel methodology used may contain large measurement errors.

It seems that equilibrium complete market models with perfect capital mobility can not provide a satisfactory explanation of the observed low international consumption correlations not even after accounting for tradeables and non-tradeables in the models. However, unobserved preference shocks may contain useful explanatory power. Yet, most of the modeling work still remains to be done, so at this point it is not possible to judge whether these extensions are useful.

Canova and Ravn (1994) allowed for preference shocks in their formal test of consumption risksharing models. In tests using quarterly data from nine OECD countries they found that domestic consumption seems to be well insured against domestic shocks which are cyclical in nature but that it tends to covary with demographic and labor market variables. They did, however, rejected long-run implications of the model.

Soerensen et al. (1995) developed a framework for quantifying the amount of interstate risksharing achieved via several channels in the US. The basic idea of

Soerensen et al. is to consider three institutional arrangements, which provide risksharing in the real economy: capital markets, federal tax-transfer system and loan markets, and to estimate the effective amount of risksharing or smoothing at each level. The basis for their empirical analysis comes from the necessary condition of an intertemporal maximization program of a representative expected utility maximizing citizen of state  $i$  (of the federal state), whose utility function is of the constant relative risk aversion (CRRA). This condition can compactly written as

$$c_t^i = k^i GDP,$$

where  $GDP$  denotes aggregate (federal) gross domestic product and  $c_t^i$  the per capita amount of the good available for consumption in period  $t$  by agents in state  $i$ ;  $k^i$  captures the strength of state  $i$ 's claim to output in risksharing and it in general depends on the state's endowment and degree of relative riskaversion (RRA). In the important case of log-utility (RRA=1),  $k^i$  reduces to state  $i$ 's expected share in present and future aggregate output.

Before specifying the empirical equations the authors discuss the three levels (or channels) of smoothing, each giving rise to a different interpretation of the preceding equation or, more precisely, the left hand side variable of equation. At the first level risks in (state specific) consumption possibilities could be hedged via securities (capital) markets, so that in the case of full risksharing (i.e. complete markets) each state would consume its pre federal state income<sup>10</sup>,  $pfsi_t^i$ , defined as resources available for consumption by the residents of state  $i$  if no fiscal intervention by the federal government occurs. Under less than complete securities markets, there is a risksharing role for the federal tax-transfer system. In the event that this system completes securities, thus resulting in full risksharing, then fully hedged consumption resources at the state level consists of the sum of  $pfsi$  and federal net transfers, called the state income<sup>11</sup>,  $si^i$  for short. Finally, loan markets gain a role in smoothing, if capital markets coupled with the federal tax-transfer system do not achieve it fully. If loan markets sustain full risksharing, the above equation holds for state consumption<sup>12</sup>,  $c^i$ .

Let  $x_t^i$  be a generic variable representing  $pfsi$ ,  $si$  or  $c$  depending which of the channels for smoothing consumption possibilities is under consideration. The authors specified estimate deviations from full risksharing with a panel regression of the form:

$$\log x_t^i = \log k^i + \log \lambda_t + \log GDP_t + \beta_x \log gsp_t^i + \varepsilon_t^i,$$

<sup>10</sup> Pre federal state income consists of per capita resources for consumption after dividends, interest and rental income have been distributed to securities holders.

<sup>11</sup> State income is defined as per capita resources for consumption after including net transfers from the federal government.

<sup>12</sup> State consumption equals the sum of private and state consumption, the latter net of state transfers. Hence borrowing and lending on national credit markets has been accounted for this measure.

where  $gsp^i$  denotes the gross national product of state  $i$  and  $\lambda$  is the fraction of distributed profits assumed constant across states  $i$  (i.e.  $\lambda_t^i = \lambda_t$ ). The presence of  $\lambda$  in the regression equation signifies smoothing via retained profits (a fraction  $1-\lambda^i$  of gross state product). In order to avoid complications from unit roots and potentially spurious regression results, the authors considered time differenced panel regressions for each level of smoothing  $x^i$ :

$$\Delta \log x_t^i = v_{x,t} + \beta_x \Delta \log gsp_t^i + u_{x,t}^i,$$

where  $\Delta$  is the time difference operator; and  $v_{x,t}$  captures the time fixed effects, defined as the time difference of the time specific variables  $\lambda$ , GDP and  $\pi$  (aggregate price level). Aggregate price level,  $\pi$ , enters the equation after deflating the state specific and aggregate variables by the corresponding price indices ( $\pi_t^i$  and  $\pi_t$  respectively) and assuming that  $\pi_t^i = \pi_t \pi_t^i$ .

Following equation measures smoothing accomplished at each level:

$$I = \eta_{gsp-pfsi} + \eta_{pfsi-si} + \eta_{si-c} + \beta_c$$

where  $\eta_{x-y}$  is the OLS estimate of the slope in the regression of  $\Delta \log x - \Delta \log y$  on  $\Delta \log gsp$ . The first component of the right-hand side measures the amount of smoothing achieved via capital markets, second the amount achieved by the federal government, third via credit markets, and the fourth coefficient measures the extent to which full risksharing has been achieved.

It was found that 40% of the shocks were smoothed by the capital markets, 14% by the federal government, 24 % by credit markets, and 22% are were not smoothed for the period 1963-1990.

The analysis was repeated for two sub-periods from 1964 to 1978 and from 1979 to 1990. It was found that capital markets smoothing was 29% in the period 1964-1978 and 50% in the latter period. Credit market smoothing indicated large change between two sub-periods: 51% for 1964-1978 and 11% in the second period. The amount of smoothing by the federal government was very stable over time: 12% for 1964-1978 and 14% for 1979-1990. Increase in capital market smoothing can be explained by financial innovations and liberalization of capital movements during the latter period of analysis.

Although, there has been an increase in smoothing via capital market the results indicate that 22 percent of a shock to gross state product remains uninsured. In addition 25% of an income shock during the 1979-1990 period remained unsmoothed, whereas the corresponding estimate for the first subperiod was 8%. These findings of less than full risksharing are consistent with other related empirical research on the US data.

However, Obstfeld (1995) demonstrates that increased international trade in broader range of assets has taken place after 1973. Soerensen et al. (1995) also provide

evidence on this point within the US. Yet, the puzzle is why the degree of international risksharing still appears to be so low.

### 2.2.2 Evidence on Microdata

An alternative approach is to study whether consumers within communities, countries or states respond only to symmetric but not asymmetric ones.

Mace (1991) tested the strongest proposition of all, that is whether complete markets exist, and that for the US economy as a whole using the US panel microeconomic data. She employed a number of individual characteristics to represent idiosyncratic shocks to test the complete insurance proposition<sup>13</sup> using cross sectional regressions. With observations on consumption and income for 10 695 households from the Consumer Expenditure Survey she ran regressions using both the change of consumption and the rate of growth of consumption. For the latter, there were some cases where idiosyncratic income growth mattered, but in the majority of her tests, she failed to reject the prediction of the complete market models. However, it seems that there are some sources of individual-specific risks which can not be insured privately.

Townsend (1991) examined risksharing on somewhat smaller scale than Mace, using panel microdata for households in three poor villages in south India. He argued that such villages are often stable over time, that the agricultural and weather-based sources of risk are both stationary and well-understood, and that the broad common knowledge of the residents about one another is able to control problems of moral hazard. The data consisted of observations on the time-period 1975-1984 on samples of 33, 34 and 36 households in each of the three villages. Townsend found that the co-movement of individual consumptions with the average consumption of each village is stronger than the similar co-movement of income. These results are consistent with the risksharing proposition, but perhaps also with autarkic consumption smoothing by each household separately. However, in line with Mace (1991) he found evidence that consumption changes respond to idiosyncratic income shocks. Although it should be kept in mind (as with all of studies examined) that the measurement error in income may certainly be important factor.

The optimality condition for Pareto optimal allocations in an N-household economy, derived from a planning problem, where a weighted sum of household's time separable utilities is maximized, states that discounted growth of marginal utility is constant across households, and given aggregate consumption, individual households' endowments do not enter into the determination of discounted marginal utility growth. That is, under appropriate conditions on the period utility function, consumption growth should be cross-sectionally independent of idiosyncratic variables that are exogenous to consumers. Cochrane (1991) used Panel Study on Income Dynamics (PSID) over the period 1980-1983 to test whether the cross-sectional variation of the growth rate of individual household food consumption was

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<sup>13</sup> The changes in individual consumption are determined by changes in aggregate consumption rates rather than by changes in idiosyncratic variables.

independent of various reported exogenous shocks to the households using following empirical specification:

$$\log\left(\frac{C_{t+1}^j}{C_t^j}\right) = \alpha + \beta X_{t+1}^j + \varepsilon_{t+1}^j, j = 1, 2, \dots, M \leq N,$$

where  $C_{t+1}^j / C_t^j$  is the non-durable consumption growth of household  $j$ ; and  $X_{t+1}^j$  is an idiosyncratic (i.e. household specific) shock variable, which is under full consumption insurance statistically independent of an individual households consumption allocations. If consumption growth is cross-sectionally independent of idiosyncratic variables coefficient  $\beta$  should equal zero in regression.

Cochrane found that consumption changes are strongly related to income changes (a bit contradictory to results of Mace and Townsend results). Consumption falls in response to long illness and to involuntary job losses, though not to employment spells, strike-related work loss, or involuntary moves.

These results of Cochrane (1991) (and to some extent Mace (1991) and Townsend (1991)) question the existence of a complete markets and also indicate that there are many individual-specific risks that apparently cannot be insured privately. However, competitive markets in explicit contingent claims are not necessary to implement consumption-insured allocations at individual level if there are other institutions that can provide such consumption insurance (for example governmental fiscal or intergenerational transfers). Indeed it seems that there is a role for public smoothing of regional and individual-specific fluctuations.

Atkeson and Bayoumi (1993) used individual income as a proxy to measure asymmetric shocks and investigated the consumption insurance hypothesis using cross-sectional regressions. They found some evidence of pooling idiosyncratic shocks.

*To summarize*, it seems that the assumption of complete asset markets is at odds with the facts of real world. Quite generally, one can argue that labor income against all contingencies cannot be privately insured; some of the shocks cannot be foreseen in order to provide sufficient contracts. Thus, even with free and costless trade in assets there is no reason to expect high correlations even between tradeable-goods of consumptions of different countries and therefore conditions weaker than perfect correlation will characterize the relation between countries' *ex post* intertemporal marginal rates of substitution. However, evidence in Obstfeld (1995) and Soerensen et al. (1995) indicate that there has been increased trade in broader range of financial assets and it is increasing all the time.

Eventually, research on consumption insurance should try to isolate the alternatives rather than simply reject the null hypothesis of complete insurance. Ideally, lack of insurance should be tied to problems of imperfect enforceability of contracts, irrational behavior of economic units, informational asymmetries, and so forth. Following two chapters are devoted to puzzles that may help to explain violations of

international consumption insurance and potential gains that are unexploited even in the presence of existing imperfect asset market structure.

### 3 CAPITAL MARKET IMPERFECTIONS

The main conclusion of the previous chapter is the low degree of risksharing among countries. That is fluctuations in national consumption are highly correlated with fluctuations in national income but not highly correlated with fluctuations in the world economy as a whole, which indeed is against the theory of international consumption insurance.

It is often argued in the literature that when risksharing occurs capital mobility should be high, portfolios should be diversified, credit markets should be efficient and correlations between domestic savings and investments should be low. This chapter focuses on capital markets alone, and on the imperfections in the existing, 'outside insurance' market structure that may explain explicitly observed weaker than perfect correlations between *ex post* intertemporal marginal rates of substitution.

#### 3.1 Capital Mobility

The perfect capital mobility can be seen as necessary but not sufficient condition of international risksharing: capital mobility allows economic units to trade differential consumption risks. In this sub-chapter it is studied whether the lack of perfect consumption insurance is due to an extreme form of capital market imperfection: that is immobile capital.

*Law of One Price approach:* The most basic implication of perfect capital mobility is that the price of the asset must be the same wherever it is traded. A popular method to test the capital mobility is to test whether interest parity conditions hold.

Covered Interest Parity (CIP)<sup>14</sup> states that capital flows equalize interest rates across countries and this should be fully reflected in forward rate discount:

$$i - i^* = fd,$$

where  $i$  is domestic and  $i^*$  is foreign nominal interest rate,  $fd$  is the forward rate discount on the domestic currency. Since the exchange risk has been eliminated, there is a presumption that any departure from CIP must owe to 'country' or 'political' risk factors (i.e. transaction costs, information costs, capital controls and country-specific laws).

Empirical tests ( see e.g. Frankel (1991, 1992)) have found by that CIP holds relatively well. It is worth of noting that departures from CIP were on average smaller during the 1980s than during the 1970s. This naturally implies increasing trend towards international integration of capital markets. Secondly departures from

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<sup>14</sup> Risk aversion assumed, so there is demand for insurance.

CIP were generally smaller for industrial countries than developing ones. In other words capital markets in industrial countries are more integrated than in developing countries.

It can be concluded that capital is mobile at least in short-run (i.e. asset and money markets are well integrated). Since the on-shore and off-shore interest rates are equalized so that there is no arbitrage, one is tempted to conclude that there are no barriers to trade agent specific risks. Against this background the unexplained puzzle seems to be why the observed degree of risksharing is so low. It may be that imperfect consumption insurance among the industrial-countries to a large extent reflects incompleteness of international asset-market rather than simple phenomenon of low international capital mobility or market segmentation.

### **3.2 Portfolio Diversification**

Intuition behind international portfolio diversification is that risk-averse units try to diversify regional risk away by purchasing financial assets. Assets, indeed, provide insurance - they differ in yields, riskiness and in the ease with which they can be liquidated. Especially, they have different pay-offs in different states of the world. If asset transactions are not restricted, purchases and sales of assets allow economic units to tailor the time-path of consumption to their needs and preferences, unconstrained by the time path of their unit-specific incomes. Intuitively international diversification of asset positions would presumably form one principal means of insulating national income and consumption from fluctuations in national production.

Over the last two decades deregulations of financial markets and relaxation of capital controls have brought about increased opportunities for international investment and risksharing. In the EU area capital markets are integrated by the 'Common Market 1992' making it easier for economic units to insure themselves against temporary shocks. The potential gains of risksharing from diversification of investment portfolios across national markets have been recognized for some time. Existing models of international portfolio choice predict that foreign investors should hold national market portfolios or portfolios tilted towards high expected return stocks.

Since the late 1960s it is well-known that investing abroad reduces the variance of a portfolio because foreign shares display low correlation with domestic shares. This literature focuses on the variance reduction resulting from international diversification and this unambiguously improves the performance of the portfolio of an investor who ranks portfolios according to their mean and variance of return.

Even in the presence of barriers to international investment, it is possible to reduce the variance of a portfolio's return and to reduce its mean return as well. Implication is thus that the studies that focus on the variance reduction benefits of international diversification are not sufficient to make the case for international diversification. To make this case it has to be argued that expected return are such that the variance reduction benefit of international diversification is not offset by lower expected return.

Various authors have noticed that investors can reap gains from holding a global portfolio instead of local one. Grubel (1968) and Levy and Sarnat (1970), for example, point out that the optimal portfolio for the US investor is very different from the portfolio just consisting of the US stocks. Solnik (1974) in turn found that a global portfolio would be half as risky as the portfolio consisting only of the US stocks.

### 3.2.1 Evidence on Portfolio Diversification

Although, as stated above, comparable assets seem to be well arbitrated across borders, recent evidence on portfolio diversification appears to go earlier findings. Despite potential gains from investing internationally, there is obviously only limited international portfolio diversification. This phenomenon is called home bias.

Recent research has also put much effort to measure gains from international portfolio diversification under very limited barriers to asset trade. Tesar and Werner (1992) calculated the share of each of the five countries' equity and bond markets from of the five-country aggregate (Canada, Germany, Japan, United Kingdom, USA). According to the simplest view of portfolio diversification, an investor choosing a well-diversified portfolio in 1990 would hold roughly 40% in Japanese equities, 39% in the US equities, 13% in British equities, 5% in German equities and 3% in Canadian stocks. Another way to make a case for international diversification is to show that the domestic market portfolio is an inefficient portfolio when agents are allowed to hold foreign as well as domestic assets.

Tesar and Werner (1992) calculated the historical means and standard deviations of US dollar-denominated returns on equity and bond investments using FT-Actuaries indices<sup>15</sup> in five, already mentioned, countries and the value-weighted World portfolio. The US market has the lowest standard deviation during the 1980s relative to other four countries; only the world portfolio was less risky. Tesar and Werner found that Canadian and US equity and bond markets are highly correlated, 0.78 and 0.79, respectively. Canadian and US equity returns are also highly correlated with British stock returns. However, it was found that US and Canadian residents invest heavily in each other's markets: over 25% of US foreign investment is held in Canadian stocks, while 71% of Canadian foreign equity investment is placed in the USA. The correlations between expected excess returns across five markets are indicate that there are benefits from diversification. The data also indicated that that excess returns in Canada, the UK and the US were more highly positively correlated with each other than returns in any of these three countries were with Japan and Germany. Thus, it could predicted that, *ceteris paribus*, investors in the US should prefer investing in German and Japanese equity to investing in Canadian and the British equity. Low correlations between bond returns in turn suggest that there are

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<sup>15</sup> The FT-Actuaries Indices are jointly compiled by the Financial Times Ltd., Goldman and Sachs &Co, and County NatWest Securities in conjunction with the Institute of Actuaries and Faculty of Actuaries. The indices are available for 24 countries and 12 regions. Each index is representative of the market structure covered and captures approximately 75% of market capitalization.

likely to be substantial gains from diversification across bond as well as equity markets.

Perhaps the most widely cited estimate, presented by French and Poterba (1991), states that in December 1989, US investors held 94% of their stock market wealth in domestic equities; Japanese investors 98%; and UK investors 82%. Tesar and Werner (1995)<sup>16</sup> in turn reported the stock-value of aggregate portfolio investment abroad as a percentage of the domestic stock and bond market capitalization values. The figures indicate that the level of portfolio investment in most countries has increased since early to mid-1970s. In 1990 foreign security holdings amounted to 32% in the UK, 11% in Japan and 10% in Germany 4% in Canada and only 3% in the US. Further decomposition of the US investment position shows that there has been a doubling of the investment position (from 1975 to 1990) in foreign equities, US investment in foreign bonds has remained at a fairly constant level of 3%. Yet, it should be kept in mind that the share of the US stock equity market in the sample of Tesar and Werner has roughly halved since the mid-1970's while the USA's share of bond markets has remained nearly constant over period. This implies that this increase is smaller than the rate implied by a buy-and-hold strategy with continual reinvestment of capital gains. In turn, Canadian holdings of foreign equity have remained nearly constant over time. Yet, in all cases the actual investment positions are still substantially lower than the limits implied by foreign investment restrictions.

Investors considering diversification across national securities markets are concerned with both changes in the underlying security values and changes in exchange rates. Tesar and Werner (1995) considered also investment portfolios that were fully hedged against currency risk. Authors assumed that the hedging strategy of an investor is to enter into a forward contract at the beginning of each month to sell the current foreign currency value of the foreign security index. Thus the return on the portfolio of foreign securities investment plus a forward contract (from a perspective of a US investor) is:

$$R_t^{FX} + s_{t+1} - s_t + (f_{t,t+1} - s_{t+1}) - r_t^{USD} = R_t^{FX} - r_t^{FX}$$

where  $R_t^{FX}$  is the local currency return of a foreign security index over the period from  $t$  to  $t+1$ ;  $s_t$  is natural logarithm of the exchange rate expressed as US dollars per unit of foreign currency;  $f_{t,t+1}$  is logarithm of the one-month forward exchange rate; and  $r_t^{USD}$  ( $r_t^{FX}$ ) is the US (foreign) short-term interest rate.

Calculated Sharpe ratios<sup>17</sup> of a portfolio of domestic securities in each of the five countries, the market portfolio denominated in each of the five currencies and the market portfolio hedged against exchange rate risk indicated for example that British investor holding a portfolio of the UK equities in the 1980-1990 earned Sharpe ratio 0.019. By diversifying across national equity markets, the return-risk ratio increased to 0.129. If the market portfolio was hedged against exchange rate risk, the

<sup>16</sup> See also Tesar and Werner (1992)

<sup>17</sup> The Sharpe ratio is defined as the mean return divided by the standard deviation.

compensation for risk increased further to 0.132. However, hedging exchange rate risk improved the Sharpe ratio in only two of the five countries.

Finally, perhaps the most striking example of incomplete risk diversification is tendency for most households to invest in undiversifiable, region-specific real estate.

### **3.2.2 What Explains Home Bias**

Although it is quite impossible to quantify how far observed portfolios are from an optimal portfolio, there are number of potential explanations for the home bias, however none of them is very convincing. The reasons could range from transaction costs to internationally asymmetric information (Gehrig, 1993) to differential tax treatment of domestic and foreign investors (Gordon and Varian, 1989) to irrational expectations concerning the relative returns on domestic and foreign investments (French and Poterba, 1990,1991). Each of these explanations is now briefly discussed.

First, there is the exchange rate risk. But foreign exchange risk can be eliminated via hedging for holdings of securities from the equity markets. However, it should be remembered that it may not always be beneficial to fully hedge exchange risks, because of hedging costs. Hence, if foreign exchange risk is an obstacle of international diversification, one would expect for example investors to invest in mutual funds hedged against foreign exchange risk.

Second, there may exist tax differences. Investors are typically subject to foreign withholding taxes on dividends from foreign investments. Yet, domestic residents receive tax credits on foreign withholding taxes. There seems to be a greater tax advantage to holding foreign than domestic assets since it is easier to underreport foreign investment income.

Third, transaction costs may be large when investing in foreign markets. According to French and Poterba (1990) costs of trading may be lower in more liquid markets and this should incline all investors toward the most liquid markets, not toward their 'home-market'. Since all shares must be held by someone, differences in transaction costs should be reflected in differences in expected returns. Cole and Obstfeld (1991) argued that even small transaction barriers could substantially discourage international diversification. Backus et al. (1992) confirmed in an empirically calibrated representative-agent model that introducing small transaction cost could lead to an equilibrium very close to the autarky allocation. However, the large equity flows across borders (for example for the United States in 1989, gross foreign equity purchases were fifty times net purchases) suggests that transaction costs are not able to explain home-bias. The importance of transaction costs remains, however, unclear.

Fourth, there is a risk of expropriation associated with investing abroad. If investors think that there is some probability that they might have trouble repatriating their holdings, the expected return on their foreign shares would be lower than the expected return for residents. As long as this political risk does not materialize,

investors will look like they are insufficiently diversified internationally. A problem with this argument is that money markets seem well-integrated at short maturities and hence do not reflect potential political risks (Kang and Stultz, 1995). To make political risk convincing it must be rationalized why foreign investors would be more at risk with equities than with short-term money market instruments.

Fifth, capital controls may be binding and could have effects on portfolio holdings, although only few of them appear to bind at present. By now it should be clear that the current level of international portfolio investment seems to be well below any institutional feasibility constraints.

According to French and Poterba (1991) barriers to international investments would have to be more substantial than most observers seem to think they are and thus it is not convincing to argue that the limited international diversification of portfolios is due only to observable barriers to international investment. Tesar and Werner (1995) followed this line of explanation and suggested that investors primarily do not seek portfolio diversification by choosing foreign markets which have low correlation with the domestic market. Rather other factors such as geographic proximity, strong trade linkages or the lack of language barrier may matter potentially even more than the diversification motive *per se* for international portfolio choice.

Different predictive distributions (or even irrational expectations) for stock returns could also be one way to explain the home bias. French and Poterba (1990, 1991) report that differences in expectations among investors judging the same market are striking. Estimates of French and Poterba suggest that Japanese investors, for example, expect returns from Japanese stocks which are more than 300 basis points greater than the returns US investors expect. Similar differences can be seen in the expectations of foreign and domestic investors in both the US and the UK equity markets. Overall these results suggest that investors expect domestic returns that are systematically higher than those implied by diversified portfolio. Investors may impute some extra risk to foreign investments because they know less about foreign markets, institutions and firms.<sup>18</sup> If investors feel that they need to expend greater resources when investing abroad relative to the cost of analyzing domestic stocks, which they are familiar with, then this may explain why they do not diversify abroad. This suggests that further research on the analysis of portfolio choice with different information gathering costs for domestic and foreign securities is needed.

It seems obvious that investors do not rank portfolios according to mean and variance of return. Investors might tailor their asset holding to hedge against changes in variables that matter to them. Stultz (1981) argues that investors' desire to hedge against unanticipated changes in their consumption and investment opportunities might lead to home bias. It is possible to consider many variables that affect the expected utility of an investor and hence also the diversification of his or her portfolio. Thus, in a setting where investors insure themselves against unanticipated

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<sup>18</sup> Psychologists have studied this pattern of behaviour and presented evidence that households behave as though unfamiliar gambles are riskier than familiar ones, even though both of the games would have identical probability distribution (see Gatti and Tversky, 1990).

changes in state variables, it may well be that limited diversification is optimal even though markets are fully integrated internationally. Kang and Stulz (1995) followed this line of explanation and argued that hedging against state variables often seems to imply that investors should have portfolios overweighted in foreign securities rather than in domestic securities.

Investors might also want to hold a portfolio that has a return negatively correlated with the return to their human capital and income streams. However, it would be seem more likely that foreign securities have returns negatively correlated with the returns to human capital. Stockman and Dellas (1989) argued that indeed if variables in the utility function that are internationally tradeable are not separable from those that are non-tradeable there may be exists a significant home-asset bias in investors' portfolio decisions.<sup>19</sup> Baxter, Jerman and King (1994) argued that taking the return to human capital into account (which is largely non-tradeable) should lead the US investors to be short in the US market portfolio of traded securities and long in foreign securities because the return to human capital are so highly correlated with the return to the US market portfolio of traded securities. However, further research on international and domestic correlations among returns to human and physical capital is necessarily needed. For example, Golub (1991) showed that corporate profits and labor income were negatively correlated in Japan, which may explain Japanese portfolio home bias.

*To summarize*, home portfolio bias can be seen as a piece of evidence against international risksharing - that is many of the industrialized countries are not diversified nearly to the extent that standard variance reduction models of global portfolio choice would predict. Therefore from the point of view of these simple models there are unexploited risksharing gains associated with reduced consumption variability both on national and individual level. Although the derivation of optimal portfolios that are consistent with the observed the past consumption behavior may prove to be a difficult, if not an impossible task.

What is the message of the home bias from the perspective of risksharing? In the beginning of the section it was stated that international diversification of investment portfolios provide a sharing of income risks across countries. In addition, it was found out *in 2.2* that correlations between domestic output and consumption growth rates are high. This failure has two sources: If it is assumed that transactions in capital markets are presented by the net exchange of financial assets for current consumption, then this failure indicates that such exchanges were undone by forcing individuals to consume each period an amount equal to sum of the income from human and non-human capital. There are two explanations for this: One may be liquidity constrained or much of the financial wealth is tied up in region-specific assets. In reality both explanations seem to be relevant for individual agents: Most individuals are liquidity constrained and much of the financial wealth is invested in region-specific real estate.

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<sup>19</sup> Similar points can be found from studies of already discussed international consumption comovements. Tesar (1993) argued that in the presence of tradeable and non-tradeable goods the correlation of aggregate consumption growth rates need not to be high.

However, more careful analysis of the correlation between domestic returns to physical capital and domestic human capital, real estate and bulk of other relevant national income components must be done. In addition, careful attention to information or 'search costs' must be paid. Actually, what is needed is a general-equilibrium model assuming imperfect asset market and some form of 'segmentation' to judge whether there are aggregate losses from imperfect portfolio diversification.<sup>20</sup>

The most severe limitation of the discussion above is that it concentrated on assets traded in securities markets. An important question in this context is to which extent existing asset markets can actually facilitate risksharing against contingencies relevant for different units and whether risks associated with non-traded assets (e.g. human capital) is hedgeable at all. Limitation in the existing financial markets are especially associated with risks related to physical capital, while modern stock markets facilitate direct hedging of only small part of the risks associated with national income fluctuations (i.e. corporate earnings).

Generalizing, then, one could conclude that most private agents seem to be unable to hedge against adverse shocks. If insurance cannot be provided by the markets there is indeed a role for government intervention.

### **3.3 Credit Market Imperfections: Asymmetric Information**

Risk averse economic units should be able to smooth out the effects of temporary asymmetric shocks by borrowing (and lending) via credit markets for the purpose of the consumption smoothing in the case that the shock is realized. When outside insurance opportunities are used only to a limited extent (i.e. investment decisions on insurance are not made in advance), debt contracts written will in general play two roles: allocation of resources and allocation of risks. With perfect capital markets agents can dissave and borrow within the bounds of solvency at the same interest rate at which they can save and lend. In practice, however, there is a bunch of well-known reasons - from adverse selection to imperfect monitoring of outcomes - why such insurance schemes might not be viable. And therefore units are unable to borrow against uncertain future incomes. Similarly, it might be hard for two (or more) governments to implement a direct system of insurance through inter-regional transfers.

#### **3.3.1 Credit Markets and Sovereign Nations**

Although there is no central fiscal institution at the community level, there already exists a country-specific insurance system that works as an automatic consumption

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<sup>20</sup> Asset prices appear to be too volatile from the perspective of theoretical literature on asset pricing and can give rise to divergent estimates of international diversification gains. Mankiw and Zeldes (1991) found from the data of 1984 Panel Study of Income Dynamics that the standard deviation of consumption growth of stockholders as a group is about 50 percent higher than that of non-stockholders as a group. However, even this finding does not enable one to reject aggregate gains from international riskpooling.

smoother: namely world credit markets. There is a scope particularly for the borrowing of sovereign nations because it is obvious enough that governments have better and cheaper access to credit markets than private agents. In cases of adverse shock governments can reallocate consumption possibilities to 'unlucky' individuals via transfers: A positive transfer represents subsidy and a negative transfer represents a tax.<sup>21</sup>

Finance is provided by the surplus countries, which are not hit by the negative shocks, at least not so large ones. Yet, the complete consumption insurance is possible only under perfect information conditions. In this section informational asymmetries are taken account so that first best contracts cannot be written.<sup>22</sup>

Recent theoretical research shows how rational lenders may respond to imperfect information about the borrowers by rationing credit them.<sup>23</sup> Quite naturally, credit rationing can result from a market imperfection and if binding it can make consumption smoothing by an individual country difficult, if not impossible, particularly in the presence of severe adverse shock (this may explain high, precautionary saving-investment correlations, see next section).

In the case of assets subject to default, the expected return is determined by the promised interest rate and the probability and consequences of default. The situation can be characterized simply in the following way:

In the case where there is positive probability of complete default,  $1-\pi$ , the relationship between the promised interest rate,  $R$ , and the expected interest rate,  $E$ , is given by

$$E = (1+R)\pi - 1 = R - (1-\pi)(1+R) < R$$

Because of the probability of default  $(1-\pi)$ , the expected interest rate is less than the promised interest rate. Therefore, the promised interest rate on these contracts must

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<sup>21</sup> Typically, such an optimal rule of redistribution derives from a set-up, where there are  $N$  agents (citizens) and fixed individual welfare weights  $\omega^j, j=1,2,\dots,N$ . The local social planner maximizes the social-welfare function of the form  $W_0 = \sum_{j=1}^N \omega^j U_0^j$  by distributing consumption possibilities

on each date and in each state of the world, among the  $N$  agents. If  $C_t^N$  is national consumption possibilities on date  $t$ , a necessary condition for distributing it efficiently among the agents is  $\omega^j U_{0,c}^j = \omega^l U_{0,c}^l$  (for all agents  $j$  and  $l$ ), where  $U_{0,c}$  is the partial derivative of the agent's utility function with respect to  $c$  (consumption). Thus the marginal rates of substitution across states of the world are equalized locally in an efficient, first-best allocation.

<sup>22</sup> The absence of efficient risksharing in debt contracts is usually explained by different types of informational asymmetries. With complete contracting repayment would be contingent, a function of the prevailing state of the world.

<sup>23</sup> For example Jaffee and Russell (1976), Stiglitz and Weiss (1981), Eaton and Gersovitz (1981) and Metcalf (1990). However, an open question is to what extent the specific reasons to credit rationing drawn from adverse selection models of Stiglitz and Weiss (1981) sense are valid also for international debt (see discussion on Guesnerie, 1986).

be higher than the interest rate on safe assets, which bear risk free rate  $R_F$ .<sup>24</sup> With no risk premia, the expected interest rate (with default risk) is equal to risk free rate, or

$$I + E = (I+R)\pi = I + R_F$$

The relationship between default risk and the rate on risky debt can be written:

$$R - R_F = \frac{(1 + R_F)(1 - \pi)}{\pi}$$

This shows that as the probability of default increases, the spread between the interest rate on risky asset and the risk free rate also increases. However, it should be kept in mind that the spread may, in fact, reflect some other factors just that the probability of default.

A specific aspect of international credit contracts originates from the legal situation of the lender. That is a country can more easily default on its debt than a private agent. However, private creditors are able to take number of retaliatory actions to penalize defaulting debtors. Among the most important of these penalties is the exclusion from future borrowing (and consumption smoothing), because most of the typical countries are likely to be multi-time borrowers. Thus governments choose to repay because they assume that at some time in the future they may be faced with another adverse shock during which it will again desire to smooth its consumption. Next this feature of debt contracts is considered more carefully.

Eaton and Gersovitz (1981) constructed a theoretical model to analyze situations where repayment of sovereign debt is in doubt. Penalty, in the case of a default and implied credit ceiling were particularly important aspect of their model. Borrowers who repudiate face future exclusion from credit markets. In their model borrowers will not pay the price (which are adjusted to allocate finite resources among consumers) if they default. Desired borrowing depends positively on the growth rate and the standard deviation of income. The borrower is more likely to default the more he has borrowed.<sup>25</sup> Thus a non-price allocation mechanism, that is credit rationing<sup>26</sup>, may arise. The size of the ceiling is determined the by lenders' perception of the borrowers' disutility of exclusion. It was shown that the credit ceiling is an increasing function of the income variance but an increase in the growth rate of income has an ambiguous effect on the credit ceiling: A negative effect of growth on the ceiling is more likely the more risk averse the country is. The empirical results from a sample of poor countries accords fairly well with the theory. Estimated coefficients indicate that both credit ceilings and willingness to borrow rise with increases in the percent variability of exports. However, the level of demand does not vary with income.

<sup>24</sup> Finance theory implies that default premia must be positive in the presence of a default risk, but risk premia may be zero even with a default risk.

<sup>25</sup> In the model the probability of default in period  $t$  increases monotonically with current debt service obligations,  $d_t$ .

<sup>26</sup> At some critical interest rate ( $R_C$ ) and critical level of borrowing ( $B_C$ ), the credit supply curve becomes vertical.

In contrast to the model discussed above, Bulow and Rogoff (1989) argue, also on theoretical grounds that reputational effects are not sufficient to induce countries to repay their debts. The authors also argue that foreign creditors should be able to impose direct sanctions in order to induce repayment. They suggest that trade embargoes may serve such a purpose.

However, the models discussed above do not recognize how the penalty originates and what are its incentive effects. Eaton et al. (1986) focused on the incentives for borrowers to repay and, on the other hand, for lenders to continue supplying capital. The penalty of exclusion from future borrowing makes sense only in models with infinite horizon. Even in an infinite horizon models exclusion penalty would be ineffective if the model ever predicts that a point will be reached after which the flow will always be from debtor to creditor.

If demand for loans derives from consumption smoothing the cost of not being able to access international credit markets is that countries must obtain other sources to sustain consumption smoothing or it must accept greater fluctuations in its consumption patterns. These costs of exclusion from credit markets are higher: the greater the borrower's elasticity of marginal utility, the more variable the income, the lower the world interest rate (i.e. the lower the cost of smoothing via international credit markets), and the more limited domestically available options for consumption smoothing are. It seems that uncertainty for possibilities of smoothing consumption in the future plays a crucial role in forcing countries to repay their debts and that reputational effects may work as an effective enforcement mechanism.

However, danger of unenforceability of contracts can imply credit rationing, and that lending is probably too low relative to what would be optimal if contracts were enforceable.

### **3.3.3 Evidence on Credit Rationing and Discussion of Further Implications**

English (1996) studied the defaults and repudiations of US states in the 1840s and argued on this basis that direct sanctions are not needed to induce repayment of sovereign debts.<sup>27</sup> States that defaulted or repudiated were considerably more indebted than other states. The defaulted states had debts of more than 20 percent of annual state income, while states that had debts but did not default had debt only 9 percent of state income on average. However, the states that repudiated completely had somewhat lower debt burdens than the states that repudiated partially. In addition, some heavily indebted states did not default (e.g. debt to income ratio of Alabama was over 35) while, in turn, some relatively lightly indebted states did (debt to income ratio of Mississippi was 16).

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<sup>27</sup> Debts of US states can be seen as a sovereign debts because the US constitution precludes suits against states to enforce the payment of debts. However, the US states were insulated from direct sanctions that could have been imposed on individual countries because they were part of a powerful union of states.

Despite lack of sanctions most defaulted states eventually repaid their debts in full. It appears that the cost of default is the prospect of loss of access to new loans and actually rather than direct sanctions, i.e. states repaid in order to maintain their access to international credit markets. The loss of access appears to have resulted from the of damage to the reputation of defaulting states in credit markets. The states that serviced their debts were able to borrow again in the 1840s and 50s while those that repudiated found it difficult to do so. Of the eleven states that repaid without interruption in the early 1840s all were able to borrow. In contrast, the states that repudiated all of their debts were not able to borrow significant sums in the period before the Civil War. The experience of states that partially defaulted was more varied. Some states could not borrow until after the war. Surprisingly, some states that repudiated their debts were able to regain access to credit markets by repaying only a fraction of their debts. This evidence supports the implications of the reputational models (i.e. models by Eaton and Gersovitz and Eaton et al.) discussed above.

Bayoumi et al. (1995), by specifying a non-linear supply curve, studied the question whether credit markets impose sufficient default premia to restrain irresponsible borrowing. Following supply equation was estimated:

$$s_{it} = \text{const} + \delta_i * \text{DUM}_{it} + \frac{\alpha_1 * B_{it} + \alpha_3 * \text{TAXR}_{it} + \alpha_4 * \text{UN}_{it-1} + \alpha_5 \text{FISC}_i}{1 - \alpha_2 * B_{it}} + e_{it},$$

where  $\text{DUM}_{it}$  are annual dummy variables;  $B$  is the ratio of debt to gross state product;  $\text{TAXR}$  is the highest marginal state tax rate for states that tax in-state and out-of-state bonds differently;  $\text{UN}$  is the level of unemployment in state  $i$  lagged one period; and  $\text{FISC}$  is an index of the strength of constitutional controls on state borrowing. Coefficient  $\alpha_1$  measures the level effect of yields and  $\alpha_2$  measures the nonlinearity in the estimating equation caused by the interaction between yields and interest payments. The literature on interest rates of state bonds has shown that the probability of default is affected by cyclical factors and constitutional constraints on borrowing (see Liu and Thakor, 1984). Thus the econometric specification included a measure of the strength of controls on state borrowing as well as the lagged unemployment rate. Their survey data covered municipal bond yields for US states. The supply equation was estimated on data for 38 states over period 1981-1990 using non-linear, two-stage least squares. The point estimates implied a highly non-linear supply curve. At the mean values of sample, each percentage point increase in debt raises the promised yield by 23 basis points, and increased to over 35 basis points at debt levels one standard deviation above the mean of the sample. The backward bend in the credit supply curve occurred at a level of debt equal to  $1/\alpha_2$ , at which point the market stops supplying debt. This point was reached at a debt level of 8.7 percent of gross state product.

Results reported by Bayoumi et al. indicate that credit markets do appear to provide incentives for sovereign borrowers to restrain borrowing. These incentives appear to be imposed gradually at first, but eventually yield spreads rise in a steep, non-linear way.

However, at this point one is tempted to follow Grossman and van Huyck (1988)<sup>28</sup> and regard the current reschedulings reported by English (1996) as a substitute for risksharing arrangements that were absent from the original debt contracts. Further, it could also be argued that under commitment hypothesis<sup>29</sup> credit markets are working somehow imperfectly in trying to smooth consumption. That is sovereign nations are not able to smooth their consumption perfectly after, first and foremost, severe adverse shock.

Thus irrespective of whether credit rationing reflects market imperfection or more positive form of fiscal discipline there obviously is an insurance demand from some source after a severe negative shock or after series of shocks. It is possible to speculate that EU countries, partly because of the restrictions to use the inflation tax, are not able to self-insure themselves against severe macroeconomic shocks, if financial markets do not allow governments to borrow to the extent they do now. Also one should keep in mind that the Maastricht Treaty has imposed constraints on the flexibility of the national fiscal policies. Indeed suggestions have been presented that there would be direct monetary sanctions if the deficit ceiling of 3 percent is exceeded. Arguments presented above might increase the calls for looser monetary policy or raise the issue whether 'federal insurance arrangements' at the EU level are necessary.

Indeed, in the presence of binding liquidity constraints some countries will be unable to smooth their consumption over time<sup>30</sup> and therefore the marginal propensity to consume out of available current resources would be higher than predicted by the permanent income-life cycle model. This has obvious effects for changes in taxation in order to offset fluctuations (see chapter 4). According to Carroll (1992) agents with a strong precautionary motive might even be given an additional incentive to save by the impossibility to borrow in the event of a negative income shock sometime in the future. In addition as Jappelli and Pagano (1994) showed in an overlapping generation model the presence of liquidity constraints may increase the steady state aggregate saving rate (see next section for further analysis).

Moreover, it is always possible that even with temporary shocks credit financed 'self-insurance' policies are not successful. If consumers are Ricardian or ultrarational in the sense of Barro (1974) this is always the case. According to 'Ricardian equivalence' theorem private consumers 'see through the public sector veil' and include all future tax payments that are needed to service and repay debt in their own balance sheets. In this case higher public demand would be offset by lower

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<sup>28</sup> Authors constructed a model of debt as a contingent claim that both finance investment and facilitate risk-sharing. In this sense their model is in contrast to reputational theories of sovereign debt, which do not recognize debt as contingent-claim and hence do not distinguish excusable default from unjustifiable repudiation.

<sup>29</sup> Commitment hypothesis states that principal (P) is assumed to be Stackelberg leader, in sense that she is committed to the contract, which she formulates and offers to the agent (A). There will be no renegotiation *ex post*, after A has made his choices given contract, and when P have acquired more information. (Gravelle and Rees, 1992)

<sup>30</sup> Among the first it was Flemming (1973) who argued that the inability to borrow against future income might cause consumption at least in the short-run to depend on current disposable income.

private demand and, hence, there would be no expansionary effects on aggregate economic activity. However, it is questionable whether the strict form of the Ricardian equivalence actually holds. Yet if private agents are even partially Ricardian then more efficient insurance policy can be achieved at the EU level, since *ex ante* it is impossible to know which country will suffer from negative shock.

Another interesting question is if reputational effects sustain foreign debt markets, then exactly whose reputation matters. Indeed, English (1996) suggests that the reputation of the federal government in European capital markets was temporarily affected by the states default. Based on this argument it can be asked is it possible that 'errant' borrowing of a single member country of EMU could endanger the whole union. Spillovers (monetizing, interest rates) from excessive deficits may endanger the whole union, that is the reputation of whole monetary union is indeed at stake. However, in EU a simple and cheap candidate solution has already been created: no-bail-out-clause.

It is likely that national fiscal policies lose much of their power to control national output and employment even in the short run. Greater level of openness sustains longer aggregate demand spillovers between the economies and, hence, reduces government spending multipliers.

### **3.4 International Allocation of Investments**

In this section saving-investment correlations are discussed. The question is not only whether capital markets are integrated, but also more generally whether workable insurance markets against idiosyncratic shocks do exist.

Intuition suggests that aggregate capital flows (and private capital flows in particular) offer significant welfare gains by permitting sharing of national (as well as agent-specific) consumption risks. The reduction in national welfare due to a temporary negative shock is much less pronounced if the economy can borrow resources from abroad in order to tide itself over the initial period of adjustment. Actually, the net capital flows in the balance of payments is a measure of the exchange of net foreign assets for current consumption. It is worth of noting that this aspect of consumption risksharing is not distinct from, but complementary to the risksharing arising from the holding of internationally diversified portfolios, which provides sharing of income risk across countries.

However, as noted limited extent of international risksharing is evident in the data on current account as well as cross and net asset positions which, as stressed by Deaton (1991), may indicate precautionary saving motives and inefficient allocation of funds from surplus countries to deficit ones. The implication of this is that consumption of individual agent is more closely correlated with individual rather than aggregate income, in contradiction to the complete insurance hypothesis.

Yet, again the distinction between easily adjustable portfolio investments and real, foreign direct investments should be kept in mind. Portfolio investments are likely to be a risksharing tool for short-run fluctuations and real investments in turn may be

seen as an instrument for long-run buffer against idiosyncratic, permanent shocks. Differences in short-, medium and long-run saving-investment correlations may be helpful in deciding which level of public intervention should indeed be aimed at. Allocation of investments within a common currency area is an especially interesting case, because it will illuminate the possibilities of risksharing of country-specific shocks in a monetary union.

### 3.4.1 Theoretical Aspects of Capital Flows

Well-functioning capital markets should allocate investments toward its most productive and efficient uses. An indirect approach is based on an examination of saving and investment patterns originally proposed by Feldstein and Horioka (1980).

If capital is internationally mobile perfectly or if agents are able to perfectly insure themselves against idiosyncratic shocks then the following strong Feldstein-Horioka condition holds: Exogenous changes in national saving rates have no effect on investment rates or, in other words, current account imbalances are a possibility. Therefore, from the point of view of risksharing, current account can vary systematically over the cycle. The cyclical properties of current account are determined by two forces: the desire and ability of agents to smooth consumption using international markets and the cyclical variability of investment that international capital flows permit.

According to Frankel's (1992) classification of capital mobility criteria Feldstein-Horioka condition requires that Real Interest Parity (RIP)<sup>31</sup> holds, which in turn requires that Uncovered Interest Parity (UIP) as well as Covered Interest Parity (CIP) holds.

So if national saving declined, it should not necessarily 'crowd out' domestic investment if the current account were able to take up the slack through capital inflows.

This crowding-out property in the intertemporal context can be characterized using two components of aggregate demand: investment,  $I$ , and national saving,  $S$ . In per capita terms let  $A_{t+1}$  denote the stock of net foreign claims of the economy at the end of period  $t$ ,  $r_t$  net interest between periods  $t+1$  and  $t$ ,  $Y_t$  net domestic product in period  $t$ ,  $C_t$  private consumption,  $G_t$  public consumption; and  $I_t$  net investment. The identity linking current account ( $CA_t$ ) to the saving investment balance is  $CA_t = A_{t+1} - A_t = rA_t + Y_t - C_t - G_t - I_t$ . Crowding out suggests the following functional relationship  $F(S,I,X)=0$  between saving and investment relative to the GDP, here denoted by  $S$  and  $I$  respectively, while  $X$  signifies other variables. If the exact functional form of  $F$  is known the slope of the saving-investment relationship in

<sup>31</sup> RIP is defined:  $r - r^* = (i - \Delta p^e) - (i^* - \Delta p^{e*})$ , where  $r$  ( $r^*$ ) is domestic (foreign) real interest rate;  $i$  ( $i^*$ ) is domestic (foreign) nominal interest rate; and  $\Delta p^e$  ( $\Delta p^{e*}$ ) is expected domestic (foreign) inflation. RIP can be decomposed further  $r - r^* = (i - i^* - fd) + (fd - \Delta s^e) + (\Delta s^e - \Delta p^e + \Delta p^{e*})$ , where  $fd$  is forward rate discount on domestic currency;  $\Delta s^e$  is expected depreciation of domestic currency. The first term of right hand side is CIP, the second term is exchange risk premium. These two terms define UIP. The third term is ex-ante purchasing power parity.

(S,I)-space,  $\beta = \partial S / \partial \bar{X}$ , would also be known where the derivative is evaluated along the curve, holding other variables ( $X$ ) fixed.

An intertemporal approach to the current account (see e.g. Sachs, 1981; Frenkel and Razin, 1987 and Obstfeld and Rogoff, 1994) in the context of integrated capital markets owes to modern intertemporal consumption and saving theory for the behavior of individual to the economy as a whole. In an ideal world the economy is assumed to be able to freely borrow (or lend) from other economies. This is the paradigm of perfect consumption smoothing alluded to earlier. In the absence of liquidity constraints<sup>32</sup>, individual agents smooth their consumption path relative to their lumpy income stream. Indeed, the same logic can be applied also at the level of nations. The intertemporal approach views the current account balance as the outcome of forward-looking dynamic saving investment decisions. As Brennan and Solnik (1989) argued net capital flow in the balance of payments is a measure of the exchange of net foreign assets for current consumption, holding constant domestic investment, and one should expect that the distribution of state contingent consumption resulting from net capital flow would Pareto dominate the distribution that would result if each nation were forced to finance the whole of its domestic investment for future consumption internally. Indeed it can be seen that key theme emerging from the discussion is that the current account response to various shocks depends on whether markets exist for insuring against the shocks' effects.

The following example will illustrate the idea of trading consumption risk in current account framework: When all agents are able to trade their risks in insurance markets<sup>33</sup>, some local economic shocks effectively become global ones and their current account affects are diminished or even eliminated. A situation where economy faces a temporary negative (positive) asymmetric output shock is considered. Absent insurance market, the country would run a current account deficit (surplus), decumulating (accumulating) some foreign assets to smooth the negative effects of the shock. However, under complete markets the economy has already traded much of its output risk to foreigners and purchased, in turn, claims on their risky output processes. Thus, the negative (positive) output shock of the home economy will cause small synchronized decrease (increase) in consumption of every country under complete insurance markets.<sup>34</sup> But the shock will cause also a shift in income of each country as dividend payments flow to (from) the home country from (to) its foreign investors. Now it can be seen that no current account imbalances result.

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<sup>32</sup> There are two possible definitions of liquidity constraints: According to the first, an individual or a household is unable, for whatever reason, to borrow against future earnings beyond a certain limit (which can be positive or zero). The second definition considers liquidity constrained individuals who face a difference between borrowing and lending interest rates, or more generally, individuals for whom interest rates are not independent of their net asset position. (Attanasio, 1994)

<sup>33</sup> If set of state-contingent claims is sufficiently rich, perfect capital mobility leads to optimal allocation of investments. However, as it was stated in 3.2 required "state-contingent assets" does not exist, then there is no automatic presumption that consumption is smoothed efficiently. This section continues the discussion and offers further evidence.

<sup>34</sup> See equation (4) in section 2.1.

Temporary shocks will have different effects from permanent ones. A temporary decline in income will be covered by an increase in the deficit (decline in surplus) to support consumption, while a permanent decline in income necessitates a complete readjustment of consumption. The opening up of new investment opportunities that generate excess returns can be shown to lead to an increase in the current account deficit (decrease in the surplus) that is somewhat larger than investment itself (the excess reflect the larger expected returns) (Artis and Bayoumi, 1989). But that deficit will reflect an influx of savings from abroad to share in ownership of incremental investment. The deficit does not reflect consumption smoothing effects, because all countries' income profiles are rising in proportion. Despite the deficit the intertemporal wealth distribution does not change.

### 3.4.2 Evidence

The intertemporal approach to the current account has been subjected to extensive formal testing. A empirical methodology was pioneered by Feldstein and Horioka (1980) who investigated the coefficient  $\beta$  in the following regression equation:

$$\left(\frac{I}{Y}\right)_i = \alpha + \beta \left(\frac{S}{Y}\right)_i + v_i$$

where  $(I/Y)_i$  is the ratio of gross domestic investment to gross domestic product in country  $i$ ;  $(S/Y)_i$  is the corresponding ratio of gross domestic saving to gross domestic product; and  $v_i$  is random disturbance. To interpret the equation note that with perfect capital mobility, an increase in the saving country  $i$  would cause an increase in investment in all countries; the distribution of the incremental capital among countries would vary positively with initial capital stock of each country and inversely with the elasticity of the country's marginal product of capital schedule. In the extreme case of an infinitesimally small country relative to the world economy, the value of  $\beta$  implied by perfect consumption smoothing (or originally perfect capital mobility) would be zero. On the other hand for a relatively large country, the value of  $\beta$  would be of the order of magnitude of its share of total world capital. In principle in the case of perfectly mobile capital the true value of  $\beta$  would on average be less than 0.10.

Feldstein and Horioka used the of 21 OECD countries for years between 1960 and 1974. It was shown first that there are substantial differences in domestic saving rates among these countries: Saving rate varied from 0.37 in Japan to 0.184 in the UK, the standard deviation was 0.045 and the differences have remained quite stable over time. The estimates overwhelmingly rejected the implication of perfect consumption smoothing. The relation between the investment ratio and the saving ratio was significantly different from zero in every sample period. The estimate of  $\beta$  for the entire 15-year sample was 0.89 (with standard error 0.07) when gross saving and investment were used and 0.94 (with standard error 0.09) when net saving and investment were used. The sample period was also split into the intervals 1960-64, 1965-69 and 1970-74 and the regression was repeated for each of the subsample. In each of the tests the coefficient was found to be in the range of 0.85 - 0.95,

insignificantly different from unity. In short, the evidence strongly contradicted both the hypothesis of perfect consumption smoothing and capital mobility. Also the evidence suggests that most of any incremental saving tends to remain, both over medium and long run, in the country that generates those savings.

If saving-investment regressions were a good test of international capital mobility, one would expect to see the beta-coefficients to fall over time. However, until recently this prediction has not been supported by the evidence. Feldstein (1983) extending the cross-section<sup>35</sup> study of Feldstein and Horioka (1980) to the end of the 1970s found that countries that increased their saving in the period 1960-1973 also increased their investment on average by an equal amount in the period 1973-1979. In other words these findings reconfirmed the earlier FH puzzle. Feldstein and Bacchetta (1991) updated with quite similar results for a 1960-1986 sample of 23 OECD countries: For the full period the estimated coefficient for gross saving and investment was 0.79. The evidence suggested that correlations between gross savings and investments had fallen over time. However, when net saving and investment were used the estimates showed no decline over time. Obstfeld (1994) updated further cross-sectional estimation using data for 22 OECD countries over five sub-periods from 1974 to 1990. Saving and investment rates were gross nominal flows divided by nominal GDP or GNP. Estimates of  $\beta$  are lower than Feldstein and Horioka (1980) reported and on the whole somewhat lower than estimates reported by Feldstein and Bacchetta (1991). Obstfeld's results indicate a decade-to-decade downward trend in  $\beta$ : over 1974-1980, 0.867; over 1981-1990, 0.636. Yet, the 1986-1990 estimated  $\beta$  is 0.636 whereas 1981-1985 is 0.567. However, the coefficient differences are not significant in statistical terms, so the results cannot be taken as a evidence of a decreasing degree of international consumption smoothing.

The intertemporal budget constraint of the economy (i.e. the Current Account  $\equiv$  S-I) implies that in the long run CA should be in balance. Therefore, the possibility of short-run consumption smoothing can not be ruled out on *a priori* grounds even in the international context. Since saving and investment shares are approximately equal if long run averages of saving and investment shares are used then the correlation coefficient calculated from these long run averages is likely to be high. High correlations would erroneously signal low degree of international consumption smoothing because net capital flows in the mirror image of consumption over income during the period over which averages are taken, are ignored.

Using alternative method in pooled cross-section of time series Feldstein (1983) concluded that even year to year increases in saving tend, on average, to be associated with increases in domestic investment in the same country by

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<sup>35</sup> Obstfeld (1994) makes point that cross-sectional estimation attempts to capture the relationship between long-run saving and investment rates. For this to succeed, each country's saving and investment rates must averaged over a sufficient interval to eliminate the influence of short-run fluctuations around long-run means. In turn, time-series estimation strategy attempts to capture the short-run relation between national saving and investment. However, national saving rates are highly correlated with national investment rates, both in time series analyses of individual countries and in cross-section in which each country is treated as a single data point.

approximately an equal amounts. Tesar (1991) reported that the cross-country correlation between saving and investment is indeed robust to changes in the length of the interval over the which the average is taken. Her sample consisted of 23 OECD countries during the time period of 1960-86. For data averaged over five-year intervals the coefficient ranged from 0.73 to 0.92, depending naturally on the five-year interval. For three year averages, estimates ranged from 0.61 to 0.90, and for one-year averages the coefficient ranged from 0.60 to 0.92. Sinn (1992) also tested hypothesis for 23 OECD countries based on the annual observations over the period 1960-88. The  $\beta$  coefficient varied from 0.41 to 0.83. He also reported decade averages of 0.87, 0.82 and 0.68.

It seems that non-trivial saving-investment correlations do exist over the short as well as long run phenomenon in cross-section samples and that these correlations are not an artifact of averaging over time intervals. This indeed is a puzzle from the point of view of intertemporal trade between countries.

### **3.4.2.1 Econometric Critique**

The FH finding that  $\beta$  is closer to 1 than 0 has been reproduced many times. Several researchers have not been willing to, however, draw the conclusion that financial markets are not highly integrated, although they have accepted the close correlation between savings and investment shares as a robust empirical regularity. Actually, the econometric specification of Feldstein and Horioka has been under severe criticism. The econometric critique falls in to two categories: First, do regressions of investment on saving actually measure the investment effect of an exogenous change in the saving rate (or in present cross-section terms is saving uncorrelated with  $v_i$ )? Second econometric critique concerns the size of the country. Each of these arguments presented may bias saving investment correlations, and are each now discussed in turn.

#### **3.4.2.1.1 Endogeneity Problem**

Difficulties in interpreting saving-investment correlations arise because national saving and investment ratios are endogenous. National saving is endogenous if for example national saving and investment are both procyclical, as they are claimed to be, or if they both respond to the population or productivity growth rates. Another possible explanation for the simultaneity bias in the FH regression is the so called 'policy reaction argument', according to which governments respond endogeneously to incipient current account imbalances with policies to change public saving in such way as to reduce the imbalances.

Feldstein and Horioka themselves addressed the potential simultaneity of saving and investment shares by instrumental variable analysis. The set of instruments included a transformation of the growth of private income, the number of retirees and dependent as a share of the total population, the benefit-earnings ratio of the social security program, and the labor force participation rate. The results were unchanged from the original ones. Dooley et al. (1987) addressed also the potential simultaneity

of saving and investment shares by instrumental variables. Two instruments were used: the ratio of military expenditure to GNP and the ratio of dependents to working-age population. Surprisingly, the  $\beta$  coefficient for industrial countries increased somewhat from the original OLS regressions. The OLS coefficients over the periods 1960-73 and 1974-84 were 0.746 (with s.e. 0.104) and 0.736 (with s.e. 0.173), respectively.

Although, even post-1973 governments have sometimes adjusted fiscal or monetary policies in order to avoid large and protracted current account imbalances. Obstfeld and Rogoff (1994) argue that the evidence on this current account targeting hypothesis is mostly anecdotal. However, the implications of these macroeconomic policies in the present context deserve further comments. Given that in the long-run CA should balance even under high capital mobility, government policies that systematically target the CA tend to produce strong cross-sectional saving investment association (Summers, 1988). It is argued that governments impose constraints on cross-border capital flows whenever the deficit (or surplus) in the current account exceeds a predetermined level. Controls may be imposed for example by rising tax rates on incremental foreign borrowing. With such controls,  $r = r^* + f(CA)$ ,  $f' < 0$  and  $r$  and  $CA$  are determined simultaneously.

Bayoumi (1990) tested the policy reaction argument by regressing time-series private sector saving on private sector investment. He found lower correlation coefficients for private sector saving and investment than corresponding coefficient on national level. Therefore he argued that the policy reaction is supported by the evidence.

Sachs (1981, 1983) examined fluctuations in the current account balances of LCD and OECD countries since 1960s. He approached the saving-investment relationship from a different perspective as compared to Feldstein and Horioka. Sachs regressed a cross-section of current account ratios on a cross-section of investment ratios and found that slope coefficient was negative and significantly different from zero. In addition he found significant inverse relationship between cross-section of changes in average current account balances and changes in investment rates over various sample periods from 1968 through 1979. Based on these findings he concluded that investments are more closely correlated with changes in current account (i.e. implied foreign capital inflows) than with changes in savings.

The investment-current account linkage reported by Sachs encouraged number of researchers to study the relationship between savings, investment and the current account. Caprio and Howard (1984) focused on medium run data instead of averaging the data over long period. The medium run was defined as a period from one business cycle to another. Observations of saving, investment and the balance on the current account for 23 OECD countries were averaged of four business cycles in the period of 1963-81 (subsamples were 1963-66, 1967-70, 1971-74, 1975-81). Following equation was analyzed in order to avoid endogeneity problems;

$$\frac{\Delta(CA/Y)}{\Delta(S/Y)} = \mu + e,$$

where CA is current account; S is the level of national savings; Y is the level of GDP; and  $e$  is error term with  $\Delta$  denoting the difference from cycle to cycle. The estimate of the coefficient  $\mu$  for the sample of all countries was 0.45 (with s.e. 0.115). They concluded that only about half of any change in domestic savings was matched by changes in domestic investment in the medium run. Contrary to the conclusions of Feldstein and Horioka and others, there is a large degree of net medium term consumption smoothing in the world economy. Caprio and Howard repeated the regressions using the ratio of changes in the current account as a share of GDP to changes in the investment rate. In contrast to the results of Sachs they concluded that fluctuations in savings were more systematically associated with current account developments than were variations in domestic investment rates. However, Caprio and Howard were careful to point out that their conclusions differed from the Feldstein and Horioka study due to the use of changes in savings and investment over time.

Penati and Dooley (1984) confirmed the Feldstein and Horioka results. They also argued that the regression coefficients reported by Sachs were heavily dependent on one or two outlying observations and the coefficients were sensitive to the choice of time periods. When Sach's equation was re-estimated without these outliers, an estimate of the slope coefficient was not significantly different from zero. The period after World War II was divided in their study into 5 subperiods. It was found that correlation between the cross-section of changes in saving and investment rates appear to be high throughout the years. By contrast it was reported that the negative correlation between the investment and current account takes a large value only between 1968 and 1979, which indeed was the sample period used by Sachs.

It seems that the endogeneity problem is not the explanation for the high correlations since similar results are found when instrumental variables are used. This evidence is consistent with the view that changes in the propensity of the residents of an individual country to save is highly correlated with the country's investments. As a result this indicates low intertemporal trade between countries and, hence, potentially less than fully efficient consumption smoothing. In other words, an increase in investment opportunities will be financed less by foreign capital inflows and more by domestic saving induced by an increase in home interest rates.

#### **3.4.2.1.2 Country Size Problem**

Econometric critique has also pointed out so called large country argument, according to which the inclusion of large industrialized countries in the sample may cause an upward bias in the estimated correlations between saving and investment. Tobin (1983) stated that Feldstein and Horioka one country tests implicitly assume that the country concerned is small.

There are two versions of the country size effect. Harberger (1980) argued that as countries become larger, they become more diversified and therefore the need to borrow abroad declines in the case of asymmetric shock. Similarly, a regression of saving on investment for large state would probably reveal that most saving

remained within state borders. Atkeson (1989) provides some evidence on this point. He examined the regional behavior of consumption and output in the US. Atkeson concluded that in the time span of 3 to 7 years, there is a significant divergence between the growth rates of consumption and output reflecting intertemporal trade across regions. However, the growth rates of output and consumption tended to convergence in the long run.

If domestic country is large enough in the global financial markets then foreign nominal interest rate,  $r^*$ , is not exogenous with respect to saving and investment. In other words, an increase in national saving would lower the world interest rate and increase investment in that country. Saving and investment would thus be correlated although perfect capital mobility may prevail. However, this argument can not explain the high  $\beta$  in cross-section studies since it refers to two points in time whereas in a cross-section study only the observations from one point in time are used (Dooley et al., 1987). Obstfeld (1986) examines the large country case in a time series context and found some evidence supporting it. However, it can be argued that there is only one country that is large enough to affect on the world interest rates; namely the US.

It appears that high correlations between national saving and investment are robust to the econometric critique raised in this section.

### 3.4.2.2 Other Explanations

There are also some conditions, under which the current account constraint alone implies that saving-investment ratios averaged over sufficiently long periods must be close despite capital mobility.<sup>36</sup> In principle, the former identity alone places no constraints on the average difference between saving and investment rates. Yet Obstfeld (1994) considered the case in which there is steady-state ratio of net foreign assets to income from which the economy does not greatly diverge between the start and end of the sample period. Then if nominal income growth is moderate, the identity in the footnote 36, implies that the average difference between saving and investments rates may be small. Mature economies may have attained a stationary distribution of the foreign assets/GDP ratio; the intertemporal gains that arise between mature economies generally will be transitory and their distribution symmetrical. However, even this explanation does not shed much light on the

<sup>36</sup> To appreciate this point: If  $A_t$  is a country's nominal net foreign assets at the end of period  $t$ , the current account is  $A_t - A_{t-1} = S_t - I_t$ . Define  $a_t = A_t/Y_t$  as the ratio of external assets to income ( $Y$ ), and  $g_t = (Y_t - Y_{t-1})/Y_t$  as the growth rate of nominal income. The difference between the averaged saving and investment rates is:

$$\frac{1}{T} \sum_{t=1}^T \frac{S_t - I_t}{Y_t} = \frac{1}{T} \sum_{t=1}^T \frac{A_t - A_{t-1}}{Y_t} = \frac{1}{T} \left[ a_t + \left( 1 - \frac{Y_{t-1}}{Y_t} \right) a_{t-1} + \dots - \left( \frac{Y_0}{Y_1} \right) a_0 \right] =$$

$$\frac{1}{T} (a_T - a_0 + g_T a_{T-1} + \dots + g_2 a_1 + g_1 a_0)$$

observed short run links between saving and investment, because it is based on the very long run co-movements of saving and investment.

One easy way to explain the findings of saving and investment correlations over time is to argue that Real Interest Parity does not hold any better nowadays than it did in the past. Frankel (1991) notes that the failure of the FH condition should be no surprise given the failure of the Real Interest Parity condition to hold. He studied real interest differentials in the 1980s for a panel of 25 countries: five closed LDC's constituted the group with persistently high differentials whereas for five open Atlantic countries the differentials were much more modest. Indeed no country had a real interest differential close to zero. However, according to Obstfeld (1995) this RIP mechanism may help us to understand the measured time series correlations but its value in cross-section regressions is less obvious. This raises the interesting question if barriers to capital mobility are so low among major industrialized countries, why does it not show in real interest differentials? Frankel (1992) offers answer to the question: Even for those countries that exhibit no substantial country premia, as reflected in covered interest parities, there is still potentially substantial currency premia that drive real interest differentials away from zero.

If the failure of the Feldstein-Horioka condition is a consequence of persistent 'currency premia' will it hold within a common currency area? Recent research supports this idea. Bayoumi and Rose (1993) and Sinn (1992) computed the correlation of saving and investment across intranational regions. Sinn used data for all forty-eight US federal states and Alaska in years 1953 and 1957. Bayoumi and Rose used the UK data from 1971 to 1985. Neither study found positive correlation between saving and investment rates. Sinn found a negative cross-sectional relationship between saving and investment rates. Similarly, Bayoumi (1990) found no correlation among a set of countries during the gold-standard period. These all display those circumstances in which geographical units essentially share a common currency, suggesting that exchange-rate variability may be the source of high saving-investment correlations across the countries in the post-1973 period. These results indicate positive trade effects within the potential EMU area and may be seen as a argument for the common currency.

Another attractive explanation for saving-investment correlations is provided by Tesar (1991). She noted that disturbances to productivity are not only positively correlated over time, but also across countries. If the shocks were in fact aggregate individual units could not rely on international capital markets to smooth their consumption levels. Therefore savings and investment rates for individual countries as well as for the system as a whole would be positively correlated.

*To summarize*, this section has focused on the measures of economic integration of real activity. It seems that international financial markets provide less than fully efficient risksharing. The discussion of saving-investment correlations support the earlier findings *in 2.2* that national markets for physical capital are not highly integrated and the degree of intertemporal trade is still persistently low. Although national markets for some types of financial capital are integrated they alone are not,

sufficient to sustain integration of national markets for physical capital and consumption patterns.

Implications for the discussion of risksharing: The lack of intertemporal trade is associated with weakened consumption smoothing possibilities. The high saving-investment correlations seem to indicate that risks are not shared efficiently in the face of temporary country-specific shocks. On the other hand high saving-investment correlations imply that the marginal productivity of capital is not equalized internationally. This evidence is consistent with the view that changes in the propensity to save of residents of an individual country are highly correlated with the country's investments. In other words, an increase in investment opportunities will be financed less by foreign capital inflows and more by the domestic saving, which may indicate inefficient allocation of international investment resources.

In the end of the day, the evidence from regional saving-investment regressions may be an indication that the prime suspect behind the cross-sectional saving-investment correlations is the policy of current account targeting. Several open questions in the EMU context will then rise. What is the effect of the renunciation of the CA targeting within Europe: in particular are investments allocated and risks shared more efficiently?

## **4 ALTERNATIVE INSURANCE ARRANGEMENTS**

In this chapter potential insurance arrangements that serve as substitutes for non-existent private insurance markets are discussed in the context of the literature on incomplete contracts. The discussion moves towards the 'self-insurance' arrangements of individual agents (worker and capitalist). Two arrangements are under discussion: Labor contracts and labor mobility.

### **4.1 Insurance via Contracts and Institutions**

Although the outside insurance opportunities are limited and may be even inaccessible to some agents, as noted in the previous section, there are still risksharing opportunities left. When the state of the world in the future is uncertain and thus the consumption possibilities are also uncertain, contracts written will play two roles: allocation of resources from surplus agents to deficit ones (or from agents hit by a positive shock to the units that suffer a negative shock) and allocation of risks. In this sense labor contracts could function as a risksharing device and, as a consequence, even workers binding constraints in obtaining credit and insurance could potentially be able to maintain smooth consumption levels. However, 'perfect hedging' via labor contracts is possible only under perfect information conditions. Different forms of labor contracts and reasons for the absence of efficient labor contracts are discussed next.

#### 4.1.1 Labor Contracts

The intuition underlying risksharing in labor market is the following: whenever risk-averse workers face uncertainty concerning their consumption possibilities which is due to the uncertainty about the future state of the world ( $S^t$ ) and they are not able to self-insure against such income risks via capital markets<sup>37</sup> (or migration costs prohibitively high) then there obviously is an incentive for insurance. The wage contracts could then be written in *ex ante* to improve upon (in the Pareto sense) the spot market (according to standard neoclassical perspective any departure from competitive productivity-based wage structure is bound to create welfare losses). Spot market contracts would leave individual workers to bear themselves risk attached to their human-capital - risks which are notoriously difficult to diversify via 'outside' insurance market. However, in real world the private market is less likely to accommodate this demand for human-capital-related risksharing. This is a fact that is often attributed to problems of informational asymmetries or of writing and enforcing long-term contracts. In what follows, two types of labor contracts are discussed as potential insurance devices. Throughout the discussion it is assumed that capital markets are not performing their insurance function efficiently.

##### 4.1.1.1 Rent-Sharing Labor Contracts

A situation in which demand shocks occur randomly is considered. The firm will design a remuneration package that will both make it money and attract enough employees. If the firm is risk averse, it will wish the wage to rise in good times and to fall in bad times. In the situation of positive demand shock (boom) many workers are employed. In a slump some are laid off. Therefore from the basis of macroeconomic indicators there is a basis for the contractual agreement in which earnings and unemployment are negatively related. These assumptions are consistent with a family of models that draw on the concept of rent-sharing in which rents are divided between the employer and the workers. Next a *profit sharing* contract is considered, which is a special case of rent-sharing contracts.

The macroeconomic case for the profit sharing has been dominated by the works of Martin Weitzman (see e.g. Weitzman, 1983, 1985). He argued that when workers are paid fixed wages the economy automatically behaves inadequately. That is changes in demand as well as in world prices generate large fluctuations in employment. According to Weitzman this can be avoided by switching to a world in which workers' wages are tied explicitly and substantially to the profit levels of employers. Then exogenous disturbances would merely alter wages and prices.

<sup>37</sup> Atkeson and Bayoumi (1993) estimated to which extent labor income fluctuations are insurable in existing capital markets. They estimated the following time-series regression  $\Delta I_{Kit} = \alpha_i + \lambda^1 \Delta I_{Knt} - \beta \lambda^2 \Delta I_{Lit} + (1 - \lambda^1 - \lambda^2) \Delta P_{Kit}$ , where  $I_{Kit}$  is real per capita income from dividends, interests, and rents for state  $i$  in period  $t$ ;  $L_{it}$  is income from labor; and  $P_{Kit}$  is state product accruing to capital. In the data on the States of the US of 1966-86, the estimated coefficient of the change in per capita income from labor ( $-\beta \lambda^2$ ) was -0.013. When the regions were six members of the EU (Germany, France, the UK, Belgium, the Netherlands and Greece) 1970-87, the coefficient of the change in per capita income from labor was -0.045. Both coefficients are far from minus one - indicating a near-total failure of insuring income risk in existing markets.

The Weitzman solution is to make the payment of the employee the sum of two components. First there is a base wage as paid under the normal remuneration system and second there is a profit-related component, which is some fraction of the per capita profit earned by the company. The idea underlying the sharing economy is to ensure that base wage is low enough that firms will be unable to find as many workers as they would like - in this kind of world unemployment disappears and indeed if the contingent remuneration system is efficient, firms would have much less incentive to sack workers in a slump.

Although there are macroeconomic benefits generated by the profit sharing scheme there are also microeconomic losses, if workers are supposed to be risk averse:<sup>38</sup> Sharing programs expose workers to a significant amount of income risk (Blanchflower and Oswald, 1987). The worker's aversion to risk may make fixed contracts optimal because risk averse workers may not be willing to accept wage fluctuations and employed workers actually represent insiders who, in normal times, have relatively secure jobs and little interest in the level of employment.

However, profit sharing contracts are not necessarily ruled out as risksharing device: Gottfries and Sjöström (1995) considered profit sharing contract between risk neutral firm (or the owners are assumed to be able to diversify fully their risks in the capital markets) and risk averse worker under product demand uncertainty. Indeed their solution is a profit sharing mechanism that avoids inefficient layoffs while at the same time stabilizing incomes of the workers (i.e. the efficient distribution of risk).

The authors considered a non-linear profit sharing contract, in which the wage was given by:

$$w = B + H(\pi)/l,$$

where  $B$  is the base wage;  $H(\pi)$  is the total bonus component distributed to the workers;  $\pi$  denotes profits before payments to shareholders ( $\pi = R - Bl$  where  $R$  is revenue; and  $l$  is employment). It was proved that the allocation resulting from an efficient state contingent contract (studied in 2.1) can be replicated also by an incentive-compatible contract with a profit sharing clause as defined above. Next efficient state contingent contracts between labor and capital owners will be analyzed more thoroughly.

Their analysis of profit sharing is useful if the following assumptions hold:

i) Workers have bargaining power, so that the wage exceeds the reservation wage, ii) employed workers are threatened by layoffs, iii) unemployment insurance is imperfect, iv) demand or productivity is uncertain and workers are risk averse and v) profits are observable and highly correlated with shocks to the marginal product of labor. Each of these conditions is not only sufficient but also necessary. If one of the conditions i) - v) does not hold then there is clearly incentives for fixed-wage contract.

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<sup>38</sup> Actually, it was originally assumed in 2.1 that agents are risk averse.

However, Gottfries and Sjöström (1995) did not discuss the effects on workers' incentives nor those of profit sharing schemes on investments. However, a sharing system affects firm's investments. As Wadhvani (1987) pointed out the firm would be forced to surrender a proportion of the resulting value added to the wage earners and would therefore be less likely to invest.<sup>39</sup> In addition this could cause a conflict of interest between employers and employees, with workers being in favor of any investment that would add anything to the value of the output of the firm. On the other hand there are doubts of the effects of profit sharing on the level of employment, because insiders may resist the employing additional workers if it means income cuts for them.

Existing empirical literature on profit sharing provides some, albeit a diverse picture of the feasibility of profit sharing. Some authors have tried to estimate employment effects of profit sharing:

Blanchflower and Oswald (1988) found that in the UK, profit sharing is relatively common in the highly volatile mineral and chemical industries. Their observations support the idea that profit sharing contracts are used to protect jobs when workers are worried about layoffs. Estrin and Wilson (1986) studied 52 firms in the UK engineering and metal industries over the period 1978-1982. The geographic concentration of these industries is in the West Midlands and West Yorkshire. They found that the introduction of profit sharing increased employment in their sample of firms by approximately 13 percent. In addition, total remuneration in firms with profit sharing was found on average to be 4 per cent lower than in firms without profit sharing. However, as warned by the authors themselves their results were only preliminary. Jones and Pliskin (1989) examined a sample of British firms with diverse sharing arrangements in order to study the effects of profit sharing on employment levels. When profit sharing was captured by a dummy variable the results indicated that profit sharing firms had significantly lower employment levels than conventional fixed-wage firms. When the participation variable was omitted, the results indicated that employment is 33 percent lower in profit sharing firms in the long run. When continuous measure of profit sharing was used, the employment effects typically ranged from -6 per cent to 6 per cent, which are much modest than those obtained by Estrin and Wilson (1986).

In general, theoretical implications as well some empirical results suggest that profit sharing schemes may be applicable to many (not only worker-firm) buyer-seller relationships, where one or both parties are risk averse. Although, there may be observability, agency and incentive problems profit sharing contracts are sometimes feasible.

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<sup>39</sup> To appreciate this: Profit sharing firm maximizes  $\max_{K,L} [F(K,L) - \theta L - \rho K] - s[F(K,L) - \theta L - iD]$ ,

where  $F(K, L)$  is standard production function;  $K$  is capital stock;  $L$  is labour;  $\theta$  is base wage;  $\rho$  is average cost of capital;  $s$  is a share of accounting profits (after interest);  $i$  is rate of interest on debt; and  $D$  is debt. It assumed that  $i = \rho$ . Maximizing yields:  $F_L(K, L) = \theta$  and  $F_K(K, L) = \rho / (1 - s)$ . Since, under profit sharing  $F_K > \rho = MP_K$  (in the absence of profit sharing) the level of the capital stock is reduced.

#### 4.1.1.2 Implicit Labor Contracts

Eichengreen (1990) noted that owners of human capital cannot diversify their human capital portfolios because of bilocation and because adverse selection and moral hazard problems make efficient contracts between individuals of different region infeasible. However, Drèze and Gollier (1993) pointed out that, in particular, close contracts<sup>40</sup> and vested interests entailed by the employment relationship offer prospects for overcoming the obstacles (transaction costs, information asymmetries and moral hazard) which stand in the way of 'anonymous and outside' insurance market. Still, in real world workers are not (yet) covered by long-term contracts and they bear their own risks fully. This is actually the starting point of the theory of implicit labor contracts (see Rosen, 1985 for survey on the topic).

A Pareto-efficient labor contract arrangement, which replicates the allocation with a complete set of insurance arrangements is studied next. The analysis follows the presentation of Drèze and Gollier (1993) and is actually only one variant of complete consumption insurance, which was studied in 2.1. However, it permits a discussion of long-term risksharing and implementation of risksharing contracts between the owners of physical capital and workers within given efficient risksharing arrangements do not necessarily respect national boundaries.

There are  $S^t$  mutually exclusive states of the world at time  $t$  and the production possibilities are state dependent  $f_{S^t}(L_{S^t})$ ,  $L_{S^t}$  is labor input in state  $S^t$ . The probability of state  $S^t$  is  $\pi(S^t)$ . The labor demand in state  $S$  from first order condition is:

$$f'_s(L_s) = W_s$$

There is a homogeneous population of  $N$  workers each of which supplies one unit of labor at all wages  $W_s \geq m$ , where  $m$  denotes the opportunity cost of employment. The competitive wage is then defined by

$$W_s^* = \max[f'_s(N), m]$$

Unrestricted risksharing possibilities are introduced via state-dependent lump-sum transfers<sup>41</sup>: to capitalist ( $A_s$ ), employed worker ( $a_s$ ) or unemployed worker ( $b_s$ ). Consumption possibilities of agents are thus defined by:

(i) aggregate net profits:  $\pi_s = f_s(L_s) - W_s L_s + A_s$

(ii) income of an employed worker:  $W_s + a_s$

<sup>40</sup> However, Deaton (1992) pointed out that there is monitoring problem even in small families in which there are problems associated with protecting everyone against all the consequences of their own actions.

<sup>41</sup> It is worth of noting that all the taxes, transfers or allowances under consideration are instruments of risksharing, not of redistribution.

(iii) benefits of an unemployed worker:  $b_s$

Following budget identity must be satisfied:

$$A_s + L_s a_s + (N - L_s) b_s = 0$$

It is assumed that state-distribution of net profits  $P$ , taking the value  $P_s$  in state  $s$  is valued uniquely in asset markets and this value can be represented as

$$V(P_1, \dots, P_S) = \sum_s \pi_s g(P_s) = E_S g(P), \quad g' > 0, g'' < 0$$

Hence, the formal statement of the problem of *ex ante* Pareto efficiency is <sup>42</sup>

$$\max_{L_{s^t}, W_{s^t}, a_{s^t}, b_{s^t}, A_{s^t}} E_S \left\{ \frac{L_S}{N} u(W_S - m + a_S) + \frac{N - L}{N} u(b_S) \right\}$$

subject to

$$E_{s^t} g(f_{s^t}(L_{s^t}) - W_{s^t} L_{s^t} + A_{s^t}) \geq \bar{V}$$

Pareto efficient allocation  $(L_{s^t}, W_{s^t}, a_{s^t}, b_{s^t}, A_{s^t})_{s^t}$  for this problem is a feasible allocation that satisfies the following conditions

- (i) for each  $S^t$ ,  $W_{S^t} = W_{S^t}^*$
- (ii) for each  $S^t$  with  $L_{S^t} < N$ ,  $b_{S^t} = a_{S^t}$
- (iii) for each pair  $S^t, S^{t+1}$ :  $\frac{u'(W_{S^t} - m + a_{S^t})}{u'(W_{S^{t+1}} - m + a_{S^{t+1}})} = \frac{g'(P_{S^t})}{g'(P_{S^{t+1}})}$

In short risksharing arrangement between workers and capitalists discussed above sustain similar conclusions that were drawn in section 2.1 (i.e. risksharing efficiency requires that the marginal rate of substitution between any pair of state contingent payoffs be equal for all members of a group) and lump-sum transfers are used as a tool to arrange efficient risksharing between workers and firms characterized by a common marginal rate of substitution between consumption in states  $t$  and  $t+1$ . However, it should be kept in mind that when shocks are aggregate the rationale for insurance disappears, and the adjustment at the macrolevel is called for.

How to implement? It may be difficult (yet not necessarily impossible) for an individual region or an individual 'firm' to offer this type of insurance to workers; states of the world may obtain in which it is not incentive-compatible to comply the terms of the contract. Indeed, one of the most pervasive criticism of implicit contracts is the possibility of *ex post* renegotiation. *Ex post*, parties to the contract may perceive they are paying more than their actuarially fair share or may find it opportune to skip out on the system. As is well-known from the principal-agent literature optimal incentive contracts tend to be too complicated to be applied to

<sup>42</sup> Workers are endowed with the cardinal utility function for net income.

real-world problems. Regarding the properties an optimal transfer payment should possess, even such a simple property as monotonicity cannot be guaranteed without very strong assumptions (see Grossman and Hart, 1983).

And is it even possible to discuss institutions which might be able to enforce the terms of contracts *ex post*? Actually, there is need for a social planner (government), or a labor union in some cases, to organize state-dependent transfers. However, this requires acceptance of instruments that are not commonly used (like negative tax on wage income).

Another source of discrepancy between the model and reality is imperfect information. Wages should react to systematic disturbances, but it may be impossible to identify systematic shocks exactly because of their inherently random nature. Additional information is needed to infer the exact nature of the shocks before necessary steps are taken. A more intriguing variation on this theme appears when information is asymmetric. It may be the case that the shock itself is private information. Consider a situation where there are two states of the world: 'good' and 'bad'. Shock can be systematic or idiosyncratic. In the case of 'bad' shocks individuals have an incentive to represent shocks as idiosyncratic ones in order to obtain compensation. Good shocks will always be represented as systematic, possibly leading to wage increases .

Actually, it seems that first best contracts are not a feature of the real world and, especially in Europe, second best Pareto efficient 'wage rigidity insurance models' hold in the solidaristic Rawlsian spirit.<sup>43</sup> However, the standard interpretation is that wage rigidities are due to labor union activities aimed at increasing either the labor share in national income (Drèze and Bean, 1990) or the income of employed workers (Lindbeck and Snower, 1988). However, one problem with rigid wages in most actual labor contracts is the short length, usually from one to three years, of these contracts. This contract length is, indeed, extremely short, and, hence, these contracts are not effective in reducing long-run risks. In addition, with rigid wages adjustment to market conditions comes through layoffs.

In addition, Attanasio and Davis (1994) carried out formal tests of consumption insurance and characterized the impact of systematic relative wage movements on consumption distribution in the US during the 1980s. Their results on the magnitude of the covariance between relative wages and consumption can be considered as a sharp rejection of consumption insurance hypothesis. This can be seen as extreme evidence of the non-existence of suitable mechanisms for enforcing risksharing agreements that are Pareto improving *ex ante*, and the infeasibility of characterizing complete risksharing contracts.

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<sup>43</sup> The wage insurance function of unions can be interpreted as attributing *ex post* income and wage inequality to *ex ante* insurable risk (see Rawls (1971) who defined justice by reference to preferences given unknown initial endowments).

## 4.2 Self-Insurance Mechanism of Labor Mobility

Labor mobility is often involved as an adjustment tool for asymmetric shocks. It is often stated that if workers were extremely mobile, migrating or changing occupational status whenever shocks hit their region of residence, or industry differences in regional gross domestic product per capita would not last for long. On the other hand labor mobility should also be considered as an agent-specific self-insurance arrangement and in the world of perfect mobility there would not be any 'external' insurance demand. However, the real world is not as straightforward as one would like to think. The relevance of labor mobility as an adjustment mechanism against idiosyncratic shocks is the topic of this section.

### 4.2.1 Labor Migration

Recent efforts to create the Single European Market have reduced barriers to international (or indeed inter-regional) labor mobility in Europe. Citizens of the European Union are now granted residency and work permits to all members states. Although a home market bias in the locational preferences is surely easier to detect than the corresponding bias in consumption patterns and in portfolio allocation policy-makers in European countries, however, typically have complained about the low level of labor mobility within Europe because enhanced factor mobility has been seen as an essential precondition for European regions to adjust to idiosyncratic shocks.

Decressin and Fatás (1995) investigated regional labor market dynamics both in Europe and in the US in similar framework as was originally done by Blanchard and Katz (1992).<sup>44</sup> They focused on regions in Europe<sup>45</sup> instead of countries in order to analyze regional dynamics caused by idiosyncratic shocks. First, the extent to which employment growth rates are idiosyncratic in European regions and in the US was studied. The following regression equation was estimated in order to analyze this question:

$$\Delta \log(N_{it}) = \alpha_i + \beta_i \Delta \log(N_{et}) + \eta_{it},$$

where  $N_{it}$  is employment in region (state)  $i$  in period  $t$ ;  $N_{et}$  is aggregate employment in Europe (the US). It was found that in the US 40 percent of the dynamics in employment growth rates are state-specific, whereas in Europe region-specific effect amount to 80 percent. Even after controlling for different country-specific macroeconomic policies using country-specific time dummies still about 50 percent of employment growth rates were region-specific.

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<sup>44</sup> Blanchard and Katz concluded that in the US employment typically bears the task of regional adjustment. A negative disturbance that lowers employment in a given state produces relatively little real wage response, but the labour market regains equilibrium as the excess labour moves to new location within the US.

<sup>45</sup> Sample contained total of 51 regions: 8 for France, 8 for Germany, 11 for Italy, 7 for Spain, 11 for the UK. Belgium, Denmark, Greece, Ireland, the Netherlands and Portugal were treated as single regions.

Next it was studied how quickly the employment rate in a region returned to its mean level once the region had experienced an adverse shock. Authors concluded that deviations of regional relative unemployment rates from their long-term means are not persistent in Europe or in the US. The differences in relative unemployment rates between regions seemed to be more persistent in Europe than in the US. This in turn implies that regional employment shocks may not be absorbed by changes in regional unemployment rates. However, as far as the magnitude of the long-run effects of the shocks and the short-run adjustment mechanism those shocks triggered, the evidence for Europe and the US differed noticeably.

The joint behavior of regional relative employment, relative unemployment and relative participation rates was analyzed in order to capture how shocks were absorbed in Europe; to the extent that regional labor demand shocks are not reflected in unemployment or labor force participation rates they must be absorbed by inter-regional migration. The estimated system was following:

$$\Delta n_{it} = \lambda_{i10} + \lambda_{i11}(L)\Delta n_{it-1} + \lambda_{i12}(L)e_{it-1} + \lambda_{i13}(L)p_{it-1} + \varepsilon_{i1t}$$

$$e_{it} = \lambda_{i20} + \lambda_{i21}(L)\Delta n_{it} + \lambda_{i22}(L)e_{it-1} + \lambda_{i23}(L)p_{it-1} + \varepsilon_{i2t}$$

$$p_{it} = \lambda_{i30} + \lambda_{i31}(L)\Delta n_{it} + \lambda_{i32}(L)e_{it-1} + \lambda_{i33}(L)p_{it-1} + \varepsilon_{i3t}$$

where  $n_{it} = \log(n_{it}) - \beta_i \log(N_{et})$ ;  $e_{it} = \log(E_{it}) - \delta_i \log(E_e)$ ; and  $p_{it} = \log(P_{it}) - \xi_i \log(P_e)$ . Where  $n_{it}$  is regional relative to EEC wide employment,  $e_{it}$  is regional relative to EEC wide employment rate,  $E_i$  is regional employment rate and  $E_e$  is European employment rate;  $p_{it}$  is regional relative to EEC wide labor force participation rate,  $P_i$  is regional labor force participation rate and  $P_e$  is European labor force participation rate.

The results indicated that in response to a positive regional labor demand shock in Europe it takes roughly 3 years for the effect on the labor force participation rate and 4 years for the effect on the unemployment rate to disappear. In the first year virtually 100 percent of the increase in employment in response to the initial shocks is reflected in an increase of the participation and employment rates, in second year 73 percent, in third 55 percent and in fourth 20 percent. Thus after the third year net immigration amounts to a substantial insurance device to the shock. In the US immigration plays the most important role in the adjustment from the first year onwards when net immigration accounts for 52 percent of the increase in regional employment. Reverse holds for regional labor force participation: in Europe its increase accounts for 78 percent of the rise in employment in the first year and 50 percent in the second whereas for the US figures are 18 percent and 17 percent, respectively. These US results are consistent with the findings of Blachard and Katz (1992) that the rapid return occurs because labor force participants migrate into states which have experienced a favorable demand shock.

In addition, Bayoumi and Prasad (1995) studied, both in the US and in 8 European countries, labor market adjustment regional shocks (i.e. shocks that affect all industries within a given region or country), industrial shocks (i.e. shocks that affect

industries across all regions or countries) and aggregate shocks (i.e. shocks that affect all regions or countries and all industries simultaneously). European countries were Austria, Belgium, Denmark, Germany, Greece, Italy, Netherlands and the United Kingdom. The US data was from the Bureau of Economic Analysis (BEA) regional data bank and the European data was taken from OECD National Accounts. Real output data was converted into US dollars using 1985 purchasing power parities.

Authors focused on the degree of integration and nature of labor market adjustment by considering the determinants of long-term trends in output, employment and productivity. These trends were decomposed into sectoral and regional components. Productivity regressions can be seen as a measure of integration of labor markets, because if the labor markets are highly integrated across regions (countries) then the levels of productivity should be independent of regional effects and reflect instead industry-specific effects. The employment regressions, on the other hand can be seen as a measure of how the labor market adjustment that does occur is indeed achieved. The relative importance of regional and industrial disturbances in employment trends indicate the degree to which labor market equilibrate through firms moving to regions of excess labor supply (region(country)-specific effects) or labor moving to expanding industries (industry-specific effects).

The econometric approach was to estimate the following equation for each of the relevant variables (level of productivity and rate of growth of output, employment, and productivity):

$$\Delta \ln(z_{i,j}) = \alpha_i + \beta_j + \varepsilon_{i,j},$$

where  $\Delta \ln z_{i,j}$  is the change in the logarithm of output in industry  $i$  in region (country)  $j$ ;  $\alpha_i$  represents the effects of a shock to industry  $i$  relative to the shock to the industry which was excluded from the estimation;  $\beta_j$  represents the effects of a shock to region (country)  $j$  relative to the excluded region (country); and  $\varepsilon_{i,j}$  is an error term. Since the empirical specification assumes that industry-specific and region (country)-specific dummies are orthogonal, the explanatory power of these variables can be calculated from the reduction in the  $R^2$  statistic caused by excluding them from original regression.

The results of Bayoumi and Prasad also indicate that there is major difference in labor market adjustment between the US and the European countries. In the US productivity trends are dominated by industry-specific factors. Of the 97 percent of variation explained by the regression for productivity levels, industrial dummy variables accounted for 94 percentage points, regional dummy variables only 2 percentage points, with remaining 1 percentage point being unallocatable; Of the 89 percent explained by the regression for productivity growth, the contribution of the industry and regional dummy was 83 percentage points and 1 percentage point respectively. In Europe productivity trends are more dominated by country-specific

factors.<sup>46</sup> Of the 75 percent of variation explained by the regression for productivity levels, the industry dummy accounted for only 50 percentage points and country dummy variable for 25 percentage points; Of the 83 percent explained by the regression of productivity growth, the contributions of the industrial and country dummy was 19 percentage points and 64 percentage point respectively. This in turn says that the US labor market is more integrated than the European labor market - potentially because of single currency.

The employment growth regressions in the US indicated an increasing (yet still secondary) role for regional factors. Of the 89 percent explained by the regression for employment, the contribution of the industry and regional dummy was 63 percentage points and 24 percentage point respectively. One implication of these regressions is that for most part economic adjustment comes from movements of labor to regions with expanding industries, rather than movements of expanding industries to regions with excess labor force. This result is consistent with those of Blanchard and Katz (1992) and it appears to be the predominant form of regional adjustment in the US.

The employment regressions in European countries, on the other hand, indicated that country-specific factors play a very small role in explaining differences in long-term employment growth (of the 69 percent of explained by the employment regression, the contribution of the industry and regional dummy was 61 percentage points and 8 percentage points respectively). However, because the productivity regressions in Europe indicated a low degree of labor market integration, the interpretation of these results is that, from the point of view of insurance, inter-sectoral reallocation of labor appears to be quite important within but not, however, across European countries.

*To sum up:* Original findings of Blanchard and Katz (1992) indicated that inter-regional labor flows are important an adjustment mechanism in the US labor market; these results were confirmed by both Decressin and Fatás (1995) and Bayoumi and Prasad (1995). Although labor mobility in the US is considerable it indeed involves long lags, so that labor mobility alone cannot be seen as an effective self-insurance device against temporary adverse shocks. In addition the results of Decressin and Fatás (1995) indicated that the lag in Europe is indeed longer than in the US and especially region-specific shocks in particular are met by changes in labor force participation.

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<sup>46</sup> There is no clear consensus between economists whether the country- or industry-specific shocks will be the dominant ones in Europe. Krugman (1993) argued that EMU could lead to regional specialization and hence there would be more regional unemployment problems. However, it is possible to argue that the common market lets the EU countries become more similar. Hence, future shocks in a monetary union should be symmetric rather than asymmetric (Cohen and Wyplosz, 1989). Ahonen and Pyyhtiä (1996) and also Kajaste (1993) found tendencies in the Finnish economy that support this view. One such tendency is the increasing convergence of the structure of Finnish exports to that of other EU countries. Another important factor reducing the traditional asymmetry of the Finnish economy is diversification of the structure of output key sectors of the economy (forest and the metal and engineering industries).

It seems obvious that the introduction of the common currency will contribute to labor mobility in Europe in response to asymmetric shocks: it will be easier to compare real wage differentials and thus influence migration.<sup>47</sup> However, some open question appear immediately: is migration socially efficient i.e. do private and social costs and benefits from migration balance. This question may even explain the observed lags in migration: as was argued in 3.2 there is a tendency for households to invest in real estates, so that if housing markets are not sufficient liquid there is an incentive for owners to stay (assuming of course that the unit is not liquidity constrained and therefore not forced to leave region). One should also keep in mind that there may be households whose single adult belongs to labor force.

Actually, Burda (1993) studied the determinants of East-West German migration using the concept of the 'option value of waiting', in which the decision to be taken is characterized by i) a fixed cost that is to some extent unrecoverable, ii) underlying uninsurable uncertainty that is revealed over time and iii) an option to wait, that is, to postpone the decision and fixed cost incurred to some later date. Under conditions of certainty<sup>48</sup> a worker migrates when

$$\omega_t / (\delta + \mu) > f,$$

where  $\delta$  is the discount rate;  $\mu$  is the drift term (expected rate of wage convergence); and  $f$  is the net one-time cost of migration.

Preliminary results suggested that the age (captured largely by the discount rate  $\delta$ ) was strongly negatively associated with the desire to migrate. Second, wage increases did not appear to affect migration decisions implying that migration costs ( $f$ ) are substantial<sup>49</sup> and perceived future uncertainty is high. Another significant predictor of migration intention was the level of rents - lower rents implied less mobility. Migration intentions of the inhabitants of small towns and medium sized cities potentially implied relatively gloomy prospects available there. However, the role of uncertainty seems to be two-sided: while increases in uncertainty raise the option value of waiting (or the opportunity cost of exercising the option), risk aversion on the part of the agents may encourage migration as a risk reduction measure.

An important related issue here is whether labor mobility will be sufficient to promote competition among jurisdictions and lead to local public goods financed solely by benefit taxation or user charges (Tiebout, 1956). As noted by Burda and

<sup>47</sup> Economic theory predicts that labour flows are affected by differences in marginal productivity. Fischer and Parviainen (1994) studied this pattern in European labour markets in 1970s and 1980s. They concluded that the explanatory power of marginal productivity differentials is very limited and that labor mobility within Europe has remained low. Similarly Faini and Venturi (1994) pointed out that often in the presence of large and persistent wage differentials, the rate of migration can be very low. However, the theory of option value of waiting can contribute to explaining the persistence of large wage differences across regions.

<sup>48</sup> Wage differential  $\omega_t = (W^W - W^E) / W^W$  follows the process  $\Delta\omega_t = -\mu + v_t$  (for  $W^W_t > W^E_t$ ) under conditions of certainty  $v_t = 0$  for  $t \geq 0$ .

<sup>49</sup> Not only monetary costs but also psychological and social ones.

Wyplosz (1992) in the East-West European context the most likely migrants are young, educated, and mobile workers; similar evidence on the effects of migration in the US labor markets was found by Greenwood (1975). In addition, economic and demographic studies indicate that, well into the next century, Europe may not suffer from aggregate labor shortage but that growth in labor demand will be biased toward relatively high skills (Faini and Venturi, 1993). Thus migration can be considered beneficial for the receiving country - because of the positive selection of qualities necessary to succeed abroad. This 'brain drain' migration in turn may have negative effects for capital formation and economic development on the country losing skilled workers. From the perspective of this argument migration may constrain taxing potential of local governments and induce some pressure on the harmonization of the income taxes in order to avoid fiscal competition and disadvantageous 'brain flows'. Hence, if these considerations should be taken seriously, there are further restrictions on the effectiveness of local fiscal policy.

#### **4.2.1.1 Inter-relationship Between Mobility of Labor, Capital and Trade**

Interesting question here is whether there are in Europe, some other insurance mechanism, like that potentially provided by inter-regional capital mobility, which might substitute adequately for limited labor mobility in Europe in order to bring regional unemployment rates back into line. Fischer and Parviainen (1994) studied the relationship between labor and capital flows by comparing signs of long, 10-years, averages of capital account balances and net migration. It was found that in the 1970s the capital and labor flows were complementary, but in the 1980s the relationship seem to have changed: In Belgium, Germany, Ireland, Luxembourg, Portugal, and Switzerland the data suggests substitution, with Ireland and Switzerland experiencing the strongest change. Only in Finland an opposite shift to complementarity took place. In Austria, Denmark, France, Greece, Norway, and Sweden net balances of labor and capital flows showed the same signs.

#### **4.2.2 Occupational Mobility**

Occupational mobility is an insurance device against sector-specific as well as agent-specific disturbances and therefore mobility across regions is not necessarily needed in order to cushion the effects of adverse shock. McGoldrick and Robst (1996) estimated a simultaneous equations system in which both wages and worker mobility were endogenous to examine whether workers facing greater uncertainty were susceptible to greater mobility. The data was from the Panel Study of Income Dynamics covered the period 1979-1984. Income risk was measured as the coefficient variation in annual income, where the numerator equaled the standard error of the residual from regressing income on time for each individual. Mobility was measured as the predicted value of a probit model where the probability of changing jobs measured over the 1979-1984 time period was the dependent variable.

While risk averse workers were assumed to prefer stable income growth, the extent to which they will accept income uncertainty can be offset by worker mobility. Workers were assumed to maximize utility  $U = U(W,R,M,X)$ , where  $W$  is worker's

wages over time;  $R$  is the measure of uncertainty;  $M$  is the degree of mobility; and  $X$  is a vector of non-wage job characteristics.

It was found that the probability of moving decreases with experience and length of time with the same employer. Both men and women with union status jobs were less likely to change jobs. When compared across categories of education it was found that the average predicted probability of changing jobs increased with education up to the highest education classes. Indeed, results indicated that workers facing more uncertainty displayed higher mobility, which is consistent with conventional model predictions.

De New and Zimmermann (1996) studied the effects of trade and migration on occupational mobility. The data used the first 9 waves (for 1984 - 1992) of the German Socio-economic Panel (SOEP) for west Germany. Mobility was measured in terms of occupational changes of at the level corresponding to one-digit ISCO (International Standard Classification of Occupations from the ILO) code and at a more disaggregated three-digit level, for intra-firm and inter-firm changes of the workplace. The Probit model<sup>50</sup> was estimated to derive probability estimate of individual mobility.

Authors found that age had a negative effect on occupational and inter-firm mobility, and education displayed *U*-shaped relationship. Somehow surprisingly, regional unemployment and industry growth were hardly significant at all, but the union density had a negative effect on occupational mobility and inter-firm changes. An increase in trade deficit ratio<sup>51</sup> implied an increase in inter-firm mobility for skilled worker except for low-experienced workers. Occupational mobility was influenced more negatively for less-skilled workers and longer experience.

Indeed it seems that young and those with average education are more willing to insure themselves by the means of occupational and inter-firm mobility if it is assumed that increase in trade deficit (relative increase in imports) indicates increased competition or more strongly negative demand shock for industry within Germany.

*To summarize*, it seems that the importance of labor mobility as an insurance arrangement against temporary, short-run fluctuations is either negligible or economically fairly unimportant in Europe and the US.<sup>52</sup> Especially in culturally diversified Europe it is difficult to imagine massive labor flows although the legal restrictions are removed and, hence, regional labor market segmentation can be persistent. Indeed, if increased labor mobility is a desirable feature of a monetary union to cope with permanent, long run shocks, then investments in education is needed in order to promote interregional labor mobility. On the other hand, one problem with job mobility is one's ability to change occupational status or from the

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<sup>50</sup> The Probit model has a dichotomous variables as the dependent variable (change/ no change).

<sup>51</sup> The 'Trade Deficit Ratio' was calculated as (Imports - Exports) / Output, where the real Deutschmark value of exports, imports and gross value added out by industry and year were used.

<sup>52</sup> Fact that is confused badly in the literature on 'optimum currency areas'.

perspective of firm, matching of individual worker to specific tasks. In short, neither labor migration nor occupational mobility appear to be efficient insurance arrangements in large scale, although they may well be welfare improving arrangements at an individual level.

## 5 POLICY IMPLICATIONS

So far it has been concluded that the conditions for complete consumption insurance are in reality often not fulfilled. In the international context the main implication of this conclusion is that individuals are unable to diversify their income risks via existing capital markets and other arrangements. This means that agents cannot protect themselves from regional, country-specific shocks. On the other hand - as the discussion so far has emphasized - the various member countries of the European Union are generally severely restricted in their pursuit of independent fiscal policies. This implies limitations to their potential to protect individual citizens from country-specific or other idiosyncratic income fluctuations. This is the basic motivation for the discussion of policy implications of prevailing incomplete insurance mechanism in this chapter, first in the EMU context and then in the more general 'world-wide frame'.

### 5.1 Discussion on Fiscal Federalism

A long tradition in the existing literature on fiscal federalism has presented several arguments in favor of relatively large jurisdictions (or nations, countries). Two arguments rely on the public good aspect: there are economics of scale in the production of public goods in large jurisdictions (see e.g. Casella and Feinstein, 1990) and externalities that lead to tax competition can be internalized (see e.g. Epple and Romer, 1991). The literature on public redistribution presents two additional arguments: A large redistributive system can offer insurance against region- or country-specific shocks and if redistribution has a public good aspect then there will be too little of it in fragmented jurisdictions (assuming that taxpayers care about welfare of each others) (see e.g. Brown and Oates, 1987). However, the purpose here is not to provide survey of issues concerning the fiscal dimension of EMU, but instead provide some selective views from the point of view of the insurance arrangements.

Role for federal government intervention through the federal transfer system can be justified if insurance cannot be provided by the market or if insurance provided by the federal government is more efficient than market-based insurance, or if central governments has better and more efficient access to insurance markets than local government.<sup>53</sup> As argued above in 3.3 the flexibility of national fiscal policies is likely to be restricted by debt and deficit criteria as well as by market based fiscal discipline in the context of the series of adverse shocks or permanent shock, which implies that EU countries may not be able to self-insure themselves against severe

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<sup>53</sup> So called Subsidiarity Principle: Policy decision should not be taken centrally if it can be carried out equally efficiently at a local level. However, when a particular task is allocated to a particular level it is also necessary to consider spillover effects to other regions and other areas of policy.

macroeconomic shocks. Thus a lack of insurance can contribute to increased aggregate volatility, which seems to aggravate problems of macroeconomic misalignments. This provides the motivation for the discussion on advantages and disadvantages of federal fiscal policy.

### 5.1.1 Insurance Mechanism of Federal Fiscal Policy

Some authors have argued strongly that EU-wide tax and transfer system would be desirable in order to cushion regional shocks. Proponents of this point of view agree that any Union mechanism would have to be as automatic and invisible as possible that its purpose would not be to equalize income levels but rather provide insurance against country-specific shocks. Federal fiscal insurance that sustain improved risk-sharing in an equilibrium under asymmetric regional shocks can be achieved through a union wide tax and transfer system. The system would have to be designed in a way that distributes lower taxes to relatively depressed regions and higher to booming ones<sup>54</sup> (e.g. progressive income taxation). However, it should keep in mind that the degree of risksharing arrangement achieved by taxes and transfers is not generally optimal: tax component represents incomplete risksharing and the transfer component is limited to extreme cases (Shiller, 1993).

It is possible to argue that a federal stabilization policy is more effective than a regional one, if consumers are partially Ricardian (see the discussion in 3.3). For this to correspond to insurance, the shocks should be as likely to affect one country as another, so that *ex ante* there is no presumption of being gainer or loser (Masson, 1996).

#### 5.1.1.1 Evidence from Existing Federations

It is argued that a comparison of fiscal transfers within the existing federations (the US and Canada) provide interesting lessons for the potential role of 'federal insurance' within EU states. However, it should be kept in mind that there is no particular reason to assume that the existing 'models' provide the appropriate 'blueprint' for an integrated Europe.

Sala-i-Martin and Sachs (1992) pointed out that the US is a currency union where the system of federal taxes and transfers provides a effective shock-absorber for variations in regional incomes. Sala-i-Martin and Sachs investigated the extent of federal insurance in the nine census regions of the US over the period 1970-88. They calculated the contribution of the tax and transfer system using the following estimated 'regional' elasticities:

$$\beta_{TX} = \frac{\Delta TX / TX}{\Delta Y / Y} \text{ and } \beta_{TR} = \frac{\Delta TR / TR}{\Delta Y / Y},$$

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<sup>54</sup> That is federal tax rate, indeed, is non-state contingent but the tax revenues that encompass redistribution are state contingent.

where  $TX$  are taxes paid to federal government;  $TR$  are transfers received from federal government; and  $Y$  is GDP. It was found that the shock absorbing mechanism of federal taxes and transfers operates mainly through federal taxes: When an average region suffers from an unanticipated one dollar decline in its personal income, its federal taxes are reduced on average by 33 to 37 cents and the transfers received increase from one to eight cents.

Von Hagen (1992) and Bayoumi and Masson (1995), however, questioned the size of the estimated shock-absorbing capacity in the United States by distinguishing between stabilization and redistribution.

Von Hagen (1992) regressed the growth of federal expenditure and taxes (in per capita terms) on real GSP (Gross State Product) growth in pooled cross-section time-series data over the period 1981-86. It was found that the combined stabilizing effect of federal taxes and transfers is only 10 cents per one dollar fall in GSP; 8 cents comes from lower tax payments and 2 cents from financial transfers.

Bayoumi and Masson (1995) estimated the role of the redistribution in the US and Canada using the following cross-section regression:

$$\Delta \frac{(Y - TX + TR)_i}{Y - TX + TR} = \alpha_i + \beta_i \Delta \frac{Y_i}{Y} + \varepsilon_i,$$

where  $Y$  is per capita personal income,  $TX$  and  $TR$  are per capita federal taxes and transfers; and  $i$  refers to state. The level of stabilization was measured using a time series version of equation above. It was found that in the US the short-run stabilization effect of taxes, personal transfers and grants is 30 cents per one dollar and the redistributive flows from all federal sources amount 22 cents in the dollar. In Canada the redistribution flows are about twice as large as those in the US (39 cents) but the stabilization flows are smaller (17 cents in the dollar).

Soerensen et al. (1995) found that the income smoothing provided by the federal government in the US accounted for 14% of shocks to GSP.

One problem with these estimates is that they all capture only the economic benefits that accrue to the members in centralized regime; it ignores, in particular, those effects of endogenous fiscal policy that result from the process that aggregates the preferences of diverse individuals. Next section discusses some of these politico-economic reasons why democratic governments might not choose to join in a centralized risksharing arrangement between governments.

### 5.1.2 Is Fiscal Federalism Possible in Europe?

Centralization in large jurisdictions with a social planner facilitates risksharing: Redistributive schemes transfer income from units (regions, countries, individuals) hit by positive shocks to units hit by negative shocks. Region-specific macroeconomic shocks are considered here. In this context, then, two or more regions may be able to share country-specific shocks by centralizing their

redistributive systems: when the region-specific shocks are not perfectly correlated a move towards centralized fiscal policy is indeed Pareto improvement.

Alesina and Perotti (1994) considered whether this implication holds in models in which the decisions on fiscal policy are reached by majority voting. Their one period model consisted of two countries with fiscal policies that redistribute income to different income classes via lump-sum transfers. Immobile individuals were divided into three income classes ( $A$ ,  $B$ ,  $C$ ) characterized by endowments of labor  $n_a$ ,  $n_b$ ,  $n_c$  respectively. The source of uncertainty in the model was a country-specific productivity shock, which was assumed to affect all individuals alike in a country. However, the proportional income tax rate was decided by the majority voting after the shock occurred so that the endogeneity of the tax rate is an additional source of uncertainty.

Under the assumptions made of the equilibrium fiscal policies, the following characterization holds. In the decentralized regime there are two important characteristics of the fiscal policy: on the one hand there is no uncertainty about policy (i.e. the tax rate is constant across all states of the world). On the other hand fiscal policy cannot by its very nature provide insurance against country-specific shock. In the centralized regime the tax base is constant, while the tax rate is stochastic (i.e. there is political uncertainty).

Even though the centralized regime reduces the economic uncertainty it may increase the political uncertainty. Since the citizens of both countries vote on the same policy instrument, for any given shock there is more polarized income distribution over the population. Thus highly polarized income leads to high uncertainty over the policy instrument in centralized regime and as a result everybody may be worse off, and may therefore tip the balance in favor of decentralized regime.

Alesina and Perotti calculated, under the assumption that individuals have a CRRA utility function over consumption, some numerical solutions to their model. They showed that the majority of individuals prefers the centralized regime because of lower political risk but the more polarized is the distribution of income within the regime the greater is the incentive to choose decentralized fiscal policy.

The basic intuition underlying insurance arrangements is closely related to that of public goods. An increase in the size of the country implies a trade-off between the common good (i.e. public insurance offered to the citizens or simply the public good) and the increase in heterogeneity (realized income or cultural diversity). Next section is devoted to this trade-off.

#### **5.1.2.1 Critical Trade-Off**

In their analysis of country formations Alesina and Spolaore (1994) studied the trade-off between the benefits of large countries and the cost of heterogeneity in large populations. The cost of any non rival public good (i.e. insurance) decreases with the number of people who finance it. However, at the certain point economies of scale may come only at a 'political cost'. Authors assumed that the geographical

distance (i.e. realized income difference) and preference distance are perfectly correlated that is if two immobile individuals are geographically far from each other they are also far in terms of preferences.

In their model a 'government' (i.e. public insurance arrangement) is a nonrival public good. Each insurance scheme comes with a cost of  $k$  per unit of consumption. Every individual has the same, exogenous real income  $y$ , and pays a lump-sum tax  $t_i$ . Thus the utility of individual  $i$  is:

$$U_i = g(1 - al_i) + y - t_i,$$

where  $g$  and  $a$  are positive parameters; and  $l_i$  is the preference distance from individual to his government (i.e. offered public insurance scheme). The parameter  $a$  measures the loss of utility which individual faces when the type of insurance offered is far from her preferred type. The parameter  $g$  measures the maximum utility from the insurance (public good) i.e. when the individual  $i$  "lives next door to the government" ( $l_i = 0$ ).

As far as the discussion on insurance is concerned the results can be summarized as follows: Socially optimal number and size of countries (i.e. those that the social planner chooses to optimize the trade-off between economies of scale and population diversity) involves compensating individuals who are far from the 'government'. The following tax transfer scheme would ensure the same utility to each citizen:

$$t_i = ga(s^*/4 - l_i) + k/s^*,$$

where  $s^*$  is the size of the country ( $s^* = 1/N^*$  in which  $N^*$  is the efficient number of nations). However, in a democratic equilibrium in which unilateral secessions are permitted and a majority of citizens of each country has decide upon its borders, countries are smaller and more numerous than a social planner would optimally choose. In other words, a redistributive arrangement can sustain large political jurisdictions, but it may prove practically impossible to implement such a scheme.

The second result concerns the relationship between country size and economic integration. To this end, the authors conclude that further economic integration and increasingly free trade will be accompanied by political separatism.

Bolton and Roland (1995) focused on the secession by the means of majority voting in countries with different levels of income. Two regions A and B were considered. Total population and capital in region  $i$  are denoted by  $L_i$  and  $K_i$ . Regional output is given by  $Y_i = K_i^\beta L_i^{1-\beta}$ , where  $0 < \beta < 1$ . Per capita regional output is defined as  $y_i = \frac{Y_i}{L_i} = k_i^\beta$ . Aggregate per capita output<sup>55</sup> is denoted by  $y = l_A y_A + l_B y_B$

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<sup>55</sup> Actually,  $y = \frac{Y_A + Y_B}{L_A + L_B} = \frac{L_A}{L_A + L_B} y_A + \frac{L_B}{L_A + L_B} y_B = l_A y_A + l_B y_B$

Utility function of an individual is:

$$U(c_v, g) = U(c_v + g) = c_v + g,$$

where  $c_v$  is private consumption and  $g$  is consumption of public good. Tax rate on individual's income is  $t$ . Private and public consumption are:

$$c_v = (1-t)w_v; g = \left(t - \frac{t^2}{2}\right)y,$$

where  $\frac{t^2}{2}y$  is 'cost of public funds' and  $w_v$  is the income of the individual. The utility maximizing tax rate for an individual  $v$  with income  $w_v$  in the unified nation is

$$t^*(w_v) = \frac{y - w_v}{y}$$

Under this equilibrium tax, the median voter's utility is given by:

$$U_m = w_m + \frac{1}{2} \frac{(y - w_m)^2}{y}$$

Any other agent with income  $w_v$  has the following utility under the median voter's most preferred tax rate:

$$U(w_v) = w_v + \frac{1}{2} \frac{(y - w_m)}{y} [(y - w_v) + (w_m - w_v)]$$

It is assumed that capital is perfectly mobile between regions while labor is not. Under separatism the median voter in region  $i$  has the following payoff given the tax rate preferred by the median voter:

$$U_i(w_{mi}) = \alpha \left[ w_{mi} + \frac{1}{2} \frac{(y_i - w_{mi})^2}{y_i} \right],$$

where  $\alpha$  is the efficiency loss associated with separation. Median voter's payoff under unification<sup>56</sup> is

$$U(w_{mi}) = w_{mi} + \frac{1}{2} \frac{(y - w_m)}{y} [(y - w_{mi}) + (w_m - w_{mi})]$$

Hence the median voter in region  $i$  prefers separation to unification whenever

<sup>56</sup> Median voter in region  $i$  is not necessarily the same as the median voter in the unified nation.

$$\Delta = U_i(w_{mi}) - U(w_{mi}) > 0$$

If it assumed that  $\alpha < 1$  (i.e. efficiency losses from separation) separation arises in equilibrium whenever:

$$\Delta = \frac{1}{2} \frac{(w_m - w_{mi})^2}{y} + \frac{1}{2} \left[ \left( \alpha y_i - \frac{w_{mi}^2}{y} \right) - \left( y - \frac{\alpha w_{mi}^2}{y_i} \right) \right] > 0,$$

That is, separatism essentially arises whenever the income distributions are such that their medians differ.

*To summarize* discussion above: The process of European integration toward common fiscal policy may be endangered if there is greater divergence in income per capita in different member countries and also if there are great differences in income distribution across countries.

### 5.1.3 Summary

Evidence suggests that EU-wide stabilization policy acting as insurance against regional-specific shocks may be desirable although insurance against income fluctuations is only partial and in the case of symmetric shock the insurance effect of federal fiscal policy disappears. However, a number of problems concerning the design of such a scheme must be resolved. For instance the introduction of a federal system may increase political uncertainty, open the doors for free riding in federal spending, and even moral hazard. A risksharing arrangement between countries can induce national governments to implement national policies that increase national risk or that worsen the effects of national shocks on the economy (Persson and Tabellini, 1992). Furthermore one of the most important problems is the so called democratic deficit: it seems that the public is less enthusiastic than political leaders of European integration.

However, it is difficult to see how the Union could provide insurance against permanent (series of negative) country-specific shocks without addressing directly the issue of income redistribution. At present the idea of large scale redistribution at the EU level is even less popular than the support for stabilization schemes. EU's budget receipts were 1.1 percent of EU's aggregate GDP in 1992, compared to the typical share of federal government expenditure of 15-30 percent in most federations. The Structural Funds provide grants to poorer regions, and the Maastricht Treaty founded the Cohesion Fund to make monetary union easier for the poorer regions. It is difficult to say whether the implied redistribution of funds achieved by these special arrangements have also provided increasingly efficient insurance against bad income draws. Needless to say, no such evaluation is attempted in this study. Instead, next section introduces more a efficient solution to the lack of the complete insurance market.

## 5.2 Shiller Solution

Robert Shiller (1993) proposed in his book *Macro Markets* a new class of markets where claims on aggregate income and service flows could be established. These markets would help people to insure themselves against longer-run macroeconomic risks that really matter to individuals. As the discussion in this far has concluded existing financial markets do not provide instruments to manage such risks. The Shiller solution would include markets for indices of national incomes, components and aggregates of national income, and real estate. Because units have no control over these aggregate indices there is no moral hazard problem in insuring against the risks related to incomes.

Appropriate hedging instruments and the total income risks are discussed first. Then hedging the risks of income fluctuations in other areas are discussed, since the relevant income aggregate for hedging purposes need not be confined to national boundaries.

### 5.2.1 Market Design: Perpetual Claims

The risk under consideration comes from fluctuations in *market present values* of long streams of aggregate income flows. The notion of macro markets means hedging markets that allow hedging of the capital value of a stream of income, not the income itself, and, thus, markets that price capital values of those streams.

Thus, instruments that pay the holder each period an amount proportional to an income measure (index) must be created. It is natural to create a market in perpetual claims, because prices of perpetual claims show no tendency to decline with time. Indeed, the if instrument is perpetual its price represents a claim on all future income payments and therefore represents the entire capital value of the cash flow.

Perpetual futures markets are futures markets in perpetual claims that are so constructed as not to require any instrument promising to pay the income stream forever; thus no cash market is required. Indeed, future markets could be used to create perpetual instruments without requiring of anyone more than a day's participation in the markets. Those with short positions would pay the income index to longs each day they are in the contract. Shorts would also have to pay a capital gain to longs, so that time periods are linked and the contract is effectively perpetual.

With perpetual futures, there would be, every day, a cash settlement, total flow paid from shorts to longs; at time  $t$  the settlement  $s_t$  is given by:

$$s_t = (f_t - f_{t-1}) + (d_t - r_{t-1}f_{t-1}),$$

where  $f_t$  and  $f_{t-1}$  are perpetual futures prices at days  $t$  and  $t-1$  respectively so that  $f_t - f_{t-1}$  is the capital gain from  $t$  to  $t-1$ ;  $d_t$  is the income index for day  $t$  (represents dividends on the perpetual claim); and  $r_{t-1}$  is the return on an alternative asset between days  $t-1$  and  $t$ .

There are two interpretations of the cash settlement above: First, in contrast to conventional futures markets, both the daily resettlement and the final cash settlement may be regarded to occur every day. By this interpretation the term  $(f_t - f_{t-1})$  corresponds to the usual daily resettlement, and the term  $(d_t - r_{t-1}f_{t-1})$  corresponds to the final cash settlement. By the second interpretation, the settlement  $s_t$  is just the excess return from  $t-1$  to  $t$  between an asset whose price at time  $t-1$  is  $f_{t-1}$  (pays dividend  $d_t$  at time  $t$ ) and an alternative asset that pays return  $r_{t-1}$  between  $t-1$  and  $t$ .

*Rational Speculative Bubbles:* Speculations might introduce some randomness in the price that is not related to the value of the item to be priced. Thus to keep perpetual futures price informative of the present value of the stream  $d_t$ , some price limits may be needed. In order to avoid negative bubbles it is natural to prohibit negative prices. Futures prices could also be limited to some range around the dividend stream, so as to rule out infinite rational bubbles.

*Positions in macro markets:* The basic intuition in risksharing is that the losers (holders of short positions whose incomes increased) transfer wealth to the winners (those who hedged and whose income declined) in these markets.

At time  $t$  an economic agent (it is assumed that the agent's income correlates perfectly with a macroeconomic aggregate represented by the futures market) sells short one contract. At period  $t+1$  the unit receives  $r_t f_t + f_t - f_{t+1}$ . This provides the unit to the option to consume the amount  $r_t f_t$  and investing the proceeds  $f_t - f_{t+1}$  in the asset that yields the return  $r$ . Next period  $t+2$  the unit receives  $r_{t+1} f_t + f_{t+1} - f_{t+2}$ . Then it can consume  $r_{t+1} f_t$  and reinvest the proceeds. Thus the unit has exchanged its income for an income equal to the rate  $r$  times the value at time  $t$  of its claim on future income. Thus the fact that agents may want to exchange the income stream for some other has been neglected. There is reason to expect that an incentive to do so exists, since only short-side demand for macro market contracts is described

For perpetual futures contracts the term backwardation means a tendency for the settlement  $s_t$  to have positive mean if the alternative asset is the risk free rate, or to have a mean which is greater than minus the risk premium of the alternative asset if this alternative asset is risky. Thus backwardation is tendency for longs to earn a risk premium over the risk free rate when invested in alternative asset and taken long position in the perpetual futures market. However, the *average* unit may be unaffected by backwardation. If the average agent is long in the world macro futures market as much as it is short in its own market then premiums are offset. Although agents whose own income present value is a relatively high part of world uncertainty may expect to see more backwardation in their own market, and thus pay a net positive insurance premium to reduce their income uncertainty. On other hand units whose income present value is a relatively low part of world uncertainty may be expected to be beneficiaries of backwardation.

If each agent who is short in a local futures market desires to be long in the world futures market, it might be advantageous to use the world macro futures market return as the alternative asset return in the settlement formula. Then each futures

contract would be in effect a swap of the return on a specific claim on income for the return on a claim on world income.

### **5.2.2 GDP Markets**

If futures market is to prove successful there must be enough noise in price to interest traders and enough uncertainty to concern hedgers. If there is little uncertainty of future values of aggregate income, then there is obviously little incentive to hedge, and moreover, the price of the asset will not be very volatile.

The standard deviations of these theoretical returns in real gross domestic markets for perpetual claims was estimated over the period 1950-1990. Estimates are based on the time series data on real gross domestic products.

For almost all industrialized countries under consideration the standard deviation of returns was at least a few percent a year (Austria 3.18, Denmark 3.56, Finland 3.43, Germany 4.39, Spain 6.60, Sweden 3.75, United Kingdom 1.14, United States 1.62). However, even risks of this magnitude can, if not hedged, accumulate into quite substantial variations in individual countries' incomes over the years.

These results suggest then that there is indeed fundamental income uncertainty that could potentially be hedged and, hence, that such a GDP market seems to have an economic foundation.

### **5.2.3 Other Important Markets**

Since national aggregates (i.e. national incomes, GDPs) do not in all cases provide one with best possible aggregates for hedging purposes global markets should also be established for aggregate income flows associated with human capital and with investments in human capital as well as real estate.

#### **5.2.3.1 Labor Income Markets**

Reich (1992) claimed that jobs can be categorized into three groups: routine production services, in-person services, and symbolic-analytic services. He further argued that in today's world economy one's job category that determines income prospects rather than one's home country. On the basis of this argument labor income indices should be considered in hedging income flows rather than national income indices.

As noted in chapter 4 that because of the absence of efficient first best wage contracts observed wage rigidity in labor markets can at best be of the second best. Indeed, Fischer (1985) pointed out that existing contracts that require the firm to pay employees a constant real wage or income for a long time are suboptimal because the contract allows no adjustment to market conditions. However, in general it is impossible for such labor contracts to a guarantee a given real income far into the future since the contracting firms simply may lack sufficient resources to sustain such a commitment. In such contracts adjustment to market conditions typically takes place through layoffs.

It should be noted that there aggregate labor income markets might provide some benefits beyond the riskmanagement function. Business cycle theories, in particular, have emphasized the importance of rigidities, either in the form of information lags or temporary inflexibility of prices and wages as sources of macroeconomic fluctuations. Taylor (1980) studied a stationary economy with staggered overlapping wage contracts and rational expectations, in which wage contracts were the only source of rigidity. It was found that staggered wage contracts of one-year (or longer) are capable of generating of persistence to macroeconomic fluctuations.

However, if there were futures markets in labor incomes (as well as in aggregate incomes) then the incentive to create rigid contracts would be removed, and a fundamental alteration in the tendency for persistence in macroeconomic fluctuations might occur. Workers could allow wages to fluctuate with the market and hedge their risk against wage changes.

#### **5.2.3.2 Real Estate Markets**

In 2.2 it was pointed out that most individuals have only few financial assets. Portfolios of real estate, on the other hand tend to be highly undiversified and concentrated in small regions. In spite of this fact there is no liquid market to hedge aggregate real estate risk, and therefore the owners of the real estate are subject to substantial risks of local real estate price fluctuations. Fluctuations, which can wipe out lifetime savings, or on the other hand, generate massive gains.

Uncertainty associated with real estate prices can, indeed, have serious negative effects on the economic activity on the whole. However, all of these hazards on real estate incomes could be avoided if well functioning perpetual markets, based on the relevant real estate price indices, were available. There could be price indices for different categories of price and size for each area, so the owners of real estate could be insured against the drop in the index that correlates best with their property.

#### **5.2.4 Obstacles to Construct Macro Markets**

Existing aggregate income, earnings indices may not be ideal for the purpose of cash settling of macro market contracts. The problem is that these existing measures may not accurately represent the path through time of individual endowments (of labor, human capital, etc.) that people want to hedge. The first step in the creation of macro markets is to develop, and make available, relevant indices.

However, technical problems of constructing indices can be solved but there are some psychological barriers to overcome. The most discouraging fact is that people do not routinely buy many riskmanagement products, and it, indeed, seems that the general public has at best an imperfect understanding of risk management. In addition the general public does not properly understand hedging - it tends to view the participation in futures market as a form of gambling.

Another obstacle is that under current institutional arrangements individuals are not permitted to participate directly in futures markets. However, this problem can be

dealt by using retailers who provide riskmanagement products to individuals, and who hedge the implied aggregate risk in macro markets.

*Summary and Discussion:* Macro markets as proposed by Shiller are, indeed, a big step towards the original idea of establishing a complete set of contingent claims and, hence, a big step towards more efficient markets for risksharing.<sup>57</sup>

The rigidities inherent in the insurance offered by the federal fiscal policy should be kept in mind. Stabilization policy of the traditional Keynesian type (i.e. automatically received fiscal transfer component) constitutes second-best policy. It reduces the adjustment capacity of the economy because it contributes to making relative prices less flexible and production factors less mobile (Berthold, 1994). A first-best policy would directly reduce the incompleteness of goods and factor markets.

Discussion surrounding the fulfillment of the EMU criteria has put forward arguments that the most serious fiscal problems are high tax-burdens and too generous social transfers. These arguments (whether they are fair or not ) really imply that the maintenance of local and partial insurance mechanism provided by local taxes and transfers imposes too heavy costs on the economies and, hence, new insurance arrangements against income fluctuations are needed. The interesting point here is that the process of the European integration obviously seems to limit the ability to use existing insurance systems (not only exchange rate and monetary policies but also national fiscal policies) to hedge against country-specific macro shocks. However, the discussion on policy implications has mainly concentrated on the creation of new European-wide horizontal/vertical 'political' institutions but not on the creation of efficient risksharing markets. Well, then, how to create 'European-wide macro markets'? Shiller himself proposed that the development of new markets would plausibly take place in two stages. First users of markets could be professionals of financial markets who are already aware of the advantages and the use of available instruments. In second stage markets would be used by the general public. However, in the first stage individuals should be able to buy insurance from private insurance companies, who act as a retailers. The central idea in the implementation of macro markets is that it is based on the private activity. The role of government is not necessarily needed and it is possibly restricted to supervision and development of system.

In addition more efficient use of existing riskmanagement devices should be encouraged. For example, pension funds might alter their business to include some hedging of income risks from domestic fluctuations. This is possible in international stock markets because wealthy funds are able to reap benefits from international portfolio diversification efficiently. Haaparanta and Sorjonen (1996) estimated the income benefits of portfolio diversification of Finnish pension funds. They concluded that in period from 1987 to 1996, when changes in exchange rates were taken

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<sup>57</sup> Capital account transactions contribute to the international consumption risksharing: individual countries are permitted to smooth their consumption over time by issuing claims to overcome transient shortfalls in domestic output or transient increases in domestic investment.

account, diversification reduced the risk of portfolio returns about 40% and also the average monthly returns were higher than those of pure home portfolio.

## 6 CONCLUSIONS

In this study consumption insurance and its various channels were studied.

In chapter 2 a theoretical model of international consumption insurance was derived. If world consumption risks are efficiently pooled then the consumption of agents should not respond to idiosyncratic income or wealth shocks and the growth in the discounted marginal utility of consumption is the same for all agents.

The empirical implication of complete consumption insurance is that consumption correlations for any pair of individuals should be perfect. A review of the empirical research on consumption insurance was given. It was concluded that efficient pooling of consumption risks is not the feature of the real world: Fluctuations in national consumptions are highly correlated with fluctuations in national production and not highly correlated with fluctuations in the world economy as a whole, which indeed is against the theory of efficient international consumption insurance. This empirical observation suggested an analysis of the current market structure and the extent to which it can actually offer consumption insurance. A number of observations comes out of this analysis.

Firstly, it was found out that national markets for financial capital are integrated which, however, seemed to be irrelevant for evaluating the degree of integration of national markets for physical capital and consumption patterns. The discussion of saving-investment correlations confirmed that national boundaries are an important impediment to international net capital flows, which means that there is lack of intertemporal trade between countries.

Secondly, it was argued that imperfect consumption insurance among industrialized countries is in large measure likely to be the result of asset market incompleteness. Further analysis of portfolio compositions of the industrialized countries revealed that there is a home bias in portfolios - that is many of the industrialized countries are not even nearly diversified to the extent that standard models of global portfolio choice would predict. Although it is quite obvious that further integration of European capital markets is likely to provide some increase in the degree to which private capital markets offer insurance against regional income fluctuations. This foreseen increase in insurance will most likely turn out to be modest since today's stock markets facilitate direct hedging of only small part of the risks associated with national income fluctuations (i.e. corporate earnings). Capital markets are, hence, incomplete in the sense that private agents are unable to hedge large fractions of their income against adverse shocks. If insurance cannot be provided by markets there could be a role for government intervention at least, at the level of individual country.

Thirdly, however, it was noted that there are and there will be several conditions, which will constrain national stabilization policies. In a nutshell, EU countries will,

partially because of the loss of power to use inflation tax, be unable to self-insure themselves if financial markets do not allow governments to borrow to the extent they do now, and if the deficit ceiling of 3 percent is exceeded after severe adverse shock. Also if the preliminary results that the growth in labor demand in Europe will be biased toward relatively high skilled workers turns out to be true there will be an additional constraint on the taxing possibilities of local governments if they want to avoid fiscal competition and disadvantageous 'brain drain'.

Fourthly, labor contracts and labor mobility were studied from the point of view alternative insurance arrangements. It was concluded that the importance of real-life labor mobility as an insurance arrangement against temporary, short-run fluctuations is negligible and cannot constitute an economic proposition. It was also concluded that labor mobility is not an efficient insurance arrangement in large scale, although it might well be a welfare improving arrangement against agent-specific shocks. Furthermore there are several problems in enforcement and formulating wage contracts that could serve as risksharing contracts.

These observations provided the grounds for the discussion of the policy implications of incomplete insurance market. A couple of issues should be noted.

First, fiscal federalism was discussed from the view point of insurance arrangement, and other aspects of fiscal federalism were ignored. One of the foreseeable tasks of the fiscal system of a unified Europe is to provide consumption insurance to member countries. Evidence suggested that EU-wide stabilization policy acting as an insurance against regional-specific shocks may be desirable. However, before Europe is ready for fiscal federalism the problem of democratic deficit must be solved. Also any conceivable future common fiscal policy may be endangered if there are too large differences in per capita incomes across member countries and also if there are substantial differences in income distribution across member countries.

Second, the policy proposition put forward concerned opening new financial markets, namely macro markets. These markets would help people to insure themselves against longer-run macroeconomic risks that really matter to individuals. This solution would include markets for indices of national incomes, components and aggregates of national income, and real estate. It was also proposed that old financial market institutions should be more concerned with hedging consumers from domestic fluctuations by using existing insurance arrangements more efficiently. What is needed urgently is more serious research both on the creation of relevant indices for the use of macro markets and also research on the possible ways to create such markets. It would be also interesting to see at this stage in a theoretical context how fiscal federalism and macro markets would optimally interact to provide efficient insurance.

The whole area of consumption insurance is quite new and all of its components are worth of further research. Especially models with alternative insurance markets (e.g. international trade, production factor flows and so) and models in which financial market incompleteness raises endogenously may throw light on the international consumption correlations.

Moreover, the knowledge of the theories and applications of consumption insurance will obviously give fruitful insights in to discussions of the welfare state. In the latest discussion on the domain of the European welfare state it is often claimed that unemployment, and as a consequence of this, social polarization is one of the biggest social and economic problem that today's Europe is facing. Indeed, the implied problem of growing inequality should stimulate debate concerning visions and ideas of new social contracts. It is obvious that well-trained economists familiar with risksharing arrangements would play an important role in this discussion together with sociologists and philosophers.

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