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INSURANCE AND ECONOMIC DEVELOPMENT: GROWTH, STABILIZATION AND DISTRIBUTION

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EXECUTIVE SUMMARY

Insurance is a largely invisible yet ubiquitous part of our economies. Our health, movements, purchases, homes, and even lives are usually covered by insurance. Without insurance, the unpredictability of the future would be too great and it would be difficult to take risks and innovate. In other words, insurance typically allows people to break the psychological and financial barriers which normally prevent them from engaging in potentially riskier activities thus forgoing greater reward and innovation. Insurance has contributed to macroeconomic development through economic growth, stabilization, distribution, and innovation.

- Economic growth

Insurance can be described as an enabler for people and companies to take risks and as a way to allow individuals' minds and assets to be productively and confidently invested in the economy. Higher economic development usually leads to larger risk-taking, and greater financial inclusion and sophistication supporting insurance development. Insurance provision helps to improve the overall efficiency of the financial sector, notably by facilitating the provision of credit to the private sector.

Low levels of economic development are usually associated with low insurance penetration, with informal and traditional self-insurance schemes operating instead. At levels of around \$3,000 to \$5,000 GDP per capita, insurance penetration rates rise faster than GDP until a maturation of the markets sets in to form a kind of "plateau". One study (Lee et al. 2013) suggests that for OECD countries, a 1% increase in life insurance premia raises real GDP by 0.06% per year. On a dataset of 77 advanced and emerging economies from 1994 to 2005 Han et al. (2010) find that a 1% increase in total insurance penetration led to a 4.8% increase in economic growth per year.

- Stabilization

Insurance has a key function of economic stabilizer in times of individual shocks, smoothing the consumption of individuals facing idiosyncratic or aggregated shocks such as natural disasters or financial crises. Some examples of such stabilizers are variable annuities and unemployment insurance.

Insurance is also a source of stable funding for both the financial markets and the economy as it fosters lending and investment with a long-term perspective. This has to do with insurance companies being far more "future-oriented" than other companies, such as banks, for example.

- Distribution

As is often said, insurance is about connecting "the misfortunes of the few to the fortunes of the many" which naturally creates a form of distribution. Insurance creates an invisible net of solidarity between economic agents, interconnecting them in time and place around shared preferences and priorities. Insurance organizes the concept of solidarity through its fundamental pooling principles --aggregating and mutualizing risks by pricing them depending on their statistical occurrence for the larger pool and not for the individual.

Intergenerational sharing of financial risk by life insurers has an impact on intergenerational welfare that has been deemed equivalent to an increase in asset returns by as much as a full 1% every year (Gollier 2008). This social benefit is obtained by an anti-cyclical retention of the return of the invested assets, as well as the guarantees provided by the insurer over time.

- Innovation

Insurance entertains a paradoxical relationship with innovation. On the one hand, insurance fosters

innovation by protecting innovators from external shocks and protecting wealth, while, on the other hand, it can limit innovation by adapting its coverage to new types of risks or adapting its own functioning to technological changes. Some examples of this are cyber risks, or, autonomous vehicles --which could call for the reinvention of insurance itself.

- Focus on microinsurance

There has been evidence that the development of microinsurance induces economic benefits at both the micro and macroeconomic levels. By providing external financial protection to poor households, microinsurance can enable the beginning of specialization, as households do not need to resort to substitute and ineffective coping mechanisms. Insurance can also increase people's productivity by inducing healthier habits, as in the case of health insurance. One example of innovation in microinsurance is with parametric agricultural insurance. Parametric (or index) insurance contracts outline specific predefined conditions that will lead to compensation of customers (level of rain, sun, temperature... which are public parameters easy to track automatically by satellite for instance), to be used to estimate damages not directly observable or difficult or expensive to assess (fields in remote areas...).

The role of modern insurance is multi-layered. By managing risks, insurance allows individuals and companies to take risks and innovate. Insurance also reduces the level of interest rates by lowering default probabilities and investing with long-term horizons. Finally, insurance modifies the level and allocation of individual and aggregate savings, leading to a more optimal allocation of capital. By doing so, it has an impact on the economic cycle, the nature of economic development, and on the distribution of income and shocks across economic agents.

1 INTRODUCTION

In common with most financial services, insurance is largely invisible in our economies, as it mainly provides conditional financial promises for the future. The only material dimension is the paperwork that describes those commitments. Compared with other financial services, it is even less on people's minds because insurance customers have very rare encounters with their insurance company, agent or broker. In financial markets, too, insurance companies generally attract less attention than commercial banks, investment banks or investment funds – because insurers act as long-term investors, mostly with 'buy-and-hold' strategies and very limited trading.

Nonetheless, insurance is everywhere in developed economies and societies. A vast number of actions and interactions are covered by an insurance contract: people's health, their movements, purchases, homes, and even their lives. Without any form of insurance, it would be difficult to take risks to invest, to innovate, and to create companies: because modern insurance manages risks, it allows individuals, companies, and societies to take action.

From a more anthropological and historical perspective, the concept of insurance has existed in many ways since Antiquity and the Middle Ages. It has been a 'mirror' of the evolution of social and economic values and priorities, as well as of our relationship with risk and its consequences.¹ In that sense, insurance as we know it today is a formalized, monetized, and sophisticated form of what many traditional and pre-industrial societies had developed as tools for creating 'confidence' among people (and early forms of private organizations) and public or central authorities. Indeed, in many languages, the words insurance and confidence have the same roots or overlapping meanings. These more traditional 'self-insurance' tools for collectively transferring, managing, and compensating for risks often took the form of community savings supervised by a 'wise' person or more complex family, hierarchical, and social norms and relationships – and many countries and societies today continue to operate relying on such schemes.

The genuine way to gauge the importance of insurance and its externalities in industrialized, capitalist, and liberal societies would be to imagine our modern economies without any formal insurance coverage (i.e. products and services which are being commonly delivered). One can easily envisage how many economic activities would be discontinued or scaled down, and how the behaviour of firms and individuals would change. The whole range of activities or projects would be affected that represent a physical risk (e.g. driving), technological risk (air travel), legal risk (launching and selling new products), natural risk (farming, dwelling close to river banks and sea shores) or economic risk (signing a commercial contract as a supplier). Another way to measure the importance of formal insurance would be to assess the impact of the introduction of simple insurance products in less developed economies where social and economic relationships rely on informal confidence-creating tools. Micro-insurance experiments undertaken in recent years are very relevant in this context.

More generally, without any forms of insurance, the unpredictability of future conditions of living becomes a major concern, with individuals afraid of being sick and unable to pay for treatment, or leaving their families in dire straits were they to pass away prematurely or should their assets (including their own ability to work and earn a living mean) suffer a sizeable loss. In such a world, economic opportunities and outcomes are highly volatile and highly unequal: those able to invest and take risks with sufficient financial margins versus those affected by the materialization of risk and with no financial cover to cope with it.

¹ From the glorification of noble death (Achilles, Roland) or honour (the 'Bushidō' code of samurai warriors) carried through ages by warrior societies to the virtues of stability and transmission of heritage, but also of accumulation of capital and financial risk-taking emphasized by the bourgeois society, one can assume that the perception of risk is influenced by economic and social structures and values. The formalization and systematic use of insurance goes hand in hand with this evolution.

For a long time, because of its perceived invisibility, the macroeconomic contribution of insurance has not been a major topic of interest. Traditionally, it has been reported in national accounts through two proxies: premia collected and number of people employed. This approach maintains the image of a sector with a relatively low value-added and a limited contribution to economic growth and development. Indeed, as collected premia in aggregate broadly match the losses and claims that insurance companies compensate,² insurance is seen mostly as a means for ‘redistributing’ funds across individuals and organizations, at any point in time and over time. Its positive externalities remain therefore to be further studied and assessed.

Recently, insurance has generated renewed interest because of the conjunction of at least three factors: first, the debate about systemic risk in insurance that emerged in the wake of AIG’s failure in 2008; second, the identification of insurance companies as vital providers of long-term funding for infrastructure projects and investment in securitized loans to small and medium-sized enterprises (SMEs) in a context of constrained bank financing, especially in Europe; and third, the ultra-low interest-rate environment, which is modifying and in some markets jeopardizing the functioning of life insurance and retirement management, shedding light on the social role of insurance for retirement savings. In addition from these factors, there is a growing recognition that insurance development is a key step for modernizing and upscaling economic conditions in many emerging countries when formal insurance awareness, access and use is limited, and recent joint developments of micro-insurance alongside micro-finance is an anecdotal evidence of this trend. Combining these two pillars of micro-financial services is of strong value because, on top of providing formal protection to those devoid of it, credit micro-insurance also takes credit risk off of microfinance institutions and enables them to expand their core lending activities.

Yet, conceptual and empirical research on the macroeconomic role of insurance has remained to date relatively limited,³ even if some core insights on the need for insurance are widely shared. The United Nations Conference on Trade and Development (UNCTAD) declared as early as 1964 that ‘*a sound national insurance and reinsurance market is an essential characteristic of economic growth.*’ More recently, it was noted (Skipper 1997) that insurance is not merely a characteristic of economic growth, but a *necessity* for such growth,⁴ and the development literature highlights insurance as a key component of broader financial inclusion and entrepreneurship, including through micro-insurance (Brainard 2008).

One reason for the limited research on the specific macroeconomic role of insurance is that the sector has long been subsumed in financial intermediation in general, which broadly presents financial institutions as natural enablers of economic growth and activity (Rajan and Zingales 1998) without subsectoral and clear-cut delineation. But it would be mistaken to amalgamate the insurance business model with that of banks, as even life insurance activities are closer to asset management than banking. As a signal of the peculiarity of insurance in the financial sector, insurance was treated in national accounts globally as part of the industry sector until 1993, when it was then reclassified as industrial service. In addition, the prudential frameworks developed for banks and insurance companies are known to be substantially different, for example, as far as Basel III and Solvency II in Europe are concerned (Gatzer and Wesker 2012).

This paper presents a framework for understanding the macroeconomic role of insurance, based on its economic contribution to the development of the economy and society, beyond the traditional role of

² Combined ratios (which compute a ratio of claims paid over premia collected) have been superior to 100 for many years in developed countries, signaling that insurance companies were mostly profitable because of the financial revenues generated by the investment of premia in financial markets. The recent trends of cost reduction and optimization lead to improved combined ratios of 96% to 98% for the largest European players.

³ While numerous and diverse research has been conducted more specifically over the conceptual and econometric role of the banking sector in economic growth (see the work of Levine and colleagues), the role of insurance has been much less studied in part because of the lack of available data.

⁴ He presented a framework where he envisaged insurance as contributing to economic growth in 7 different aspects : (1) Promotes financial stability and reduces anxiety; (2) Can substitute for government security programs; (3) Facilitates trade and commerce; (4) Mobilizes savings; (5) Enables risk to be managed more efficiently; (6) Encourages loss mitigation; (7) Fosters a more efficient capital allocation’.

financial intermediary and long-term investor. More specifically, the paper provides a conceptual framework for analyzing insurance interactions with the wider economic development by looking at three main functions: economic growth; stabilization; and distribution. In addition, it sheds some light on the relationships between insurance and innovation, and the potential future development of insurance activities in view of major changes in technology ('Big Data'), the nature of risk (notably climate risk) and social expectations around risk (the lower acceptance of risk itself, and the primacy given to prevention over compensation). It also includes reflections on the weaknesses and potential downsides of insurance for the functioning of the economy – including the risk of failure in insurance, the consequences of 'over-insurance' and of involvement in pure financial activities.

The fact that the framework we develop resembles Musgrave's (1959) view of the role of the state in providing allocation, stabilization, and redistribution functions is not a coincidence. Many states provide key insurance functions through public schemes (social security, social and unemployment benefits, etc.), the provision of public goods, and redistributive taxation. In turn, many modern and now privately owned insurance companies were often initially public agencies and companies, their function being seen as totally aligned with the objectives of the public and the state.

2 INSURANCE AND ECONOMIC GROWTH

‘New York City has only been made possible by insurers. They are the ones who really built this city. Without insurers, there would be no skyscrapers. No investor would finance buildings that one cigarette butt could burn to the ground.’⁵
Henry Ford (1863-1947)

2.1 RISK-TAKING AND ECONOMIC GROWTH

Economic growth is typically defined as the combined effect of two major factors: growth in the quantity and efficiency of labour (a product of advances in technology on the one hand and improvements in economic and social organization on the other) and the economy's capital intensity. With this frame in mind, policies that accelerate innovation or improve institutions and so boost the efficiency of labour accelerate economic growth and create prosperity, as do policies that boost investment and raise the economy's capital. The neoclassical model refines this approach and proposes a growth model where a balanced growth path is determined by the economy's ratio of savings to investment, the growth rate of labour and productivity, and the capital stock depreciation rate.

Statistically, economic growth is a stochastic process and many different equilibria are possible at any given moment. As outlined by Robert Solow (1956): *‘No credible theory of investment can be built on the assumption of perfect foresight and arbitrage over time. There are only too many reasons why net investment should be at times insensitive to current changes in the real return to capital, at other times oversensitive’*.

This approach highlights the uncertain or unpredictable nature of economic development, based on a sum of individual decisions, which all carry an intrinsic form of unpredictability, linked in particular to the risk-taking they involve. This unpredictability naturally leads to the need to create mitigation factors – such as insurance – which enable decision-taking. Keynes, in his General Theory (1936) hinted at such mitigation factors:

‘We should not conclude from this that everything depends on waves of irrational psychology. [...] We are merely reminding ourselves that human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist [...]. There are, however, certain important factors which mitigate in practice the effects of our ignorance of the future.’

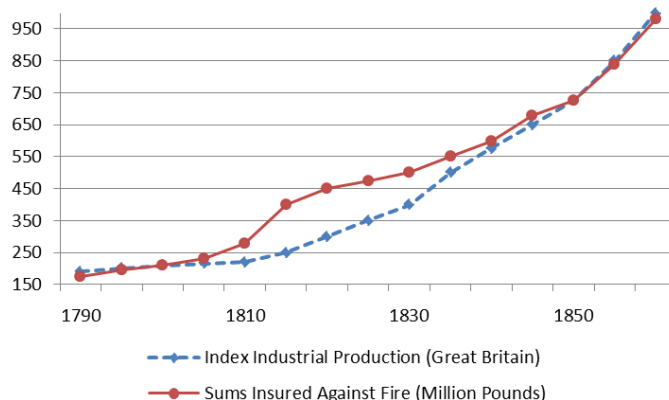
In the context of the inherent uncertainty surrounding the individual and collective decisions on which economic growth and development are based, the expansion of insurance becomes an interesting dimension to study as part of the theory of economic growth.

⁵ The first two skyscrapers, the New York's Equitable Life Assurance Building built in 1870 and the Chicago's Home Insurance Building built in 1885 were, as their names display it, funded by and built for insurance companies.

2.1.1 CORRELATION AND CAUSATION BETWEEN THE PENETRATION OF INSURANCE AND MACROECONOMIC GROWTH

Insurance has historically developed closely in parallel with economic development and growth, and in particular with the development of manufacturing industry as shown in the UK during the nineteenth century (see Figure 1).

Figure 1: Correlation between fire insurance and growth in the UK



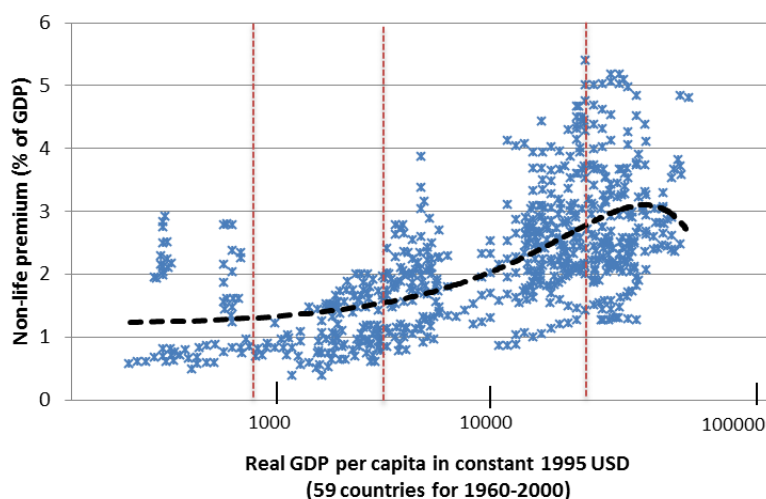
Source: L.T. Little (1937) and USAID (2006)

There is ample evidence of a general correlation between formal insurance penetration and GDP growth. Ranges of impact are different depending on methodologies and scope of surveys. Empirical evidence (Lee et al 2013) suggests that for OECD countries, a 1% increase in life insurance premia raises real GDP by 0.06% per year. On a larger set of 77 advanced and emerging economies for the period 1994-2005, Han et al (2010) find that a 1% increase in total insurance penetration led to a 4.8% increase in economic growth per year (versus a 1.7% increase in economic growth per year when only considering life insurance). For the purpose of comparison, the positive impact of banking activities on economic growth is no more than 1.8% per year given a 1% increase in bank credit (Beck and Levine 2004).

Part of the difference in the estimated impact of insurance on growth can be explained by the non-linear nature of insurance development relative to GDP. Cross-country data (USAID 2006) show that over the last 40 years, formal insurance penetration is not linearly correlated with economic growth but follows an 'S'-curve (Enz 2000). Low levels of economic development are typically associated with low insurance penetration, while informal and traditional self-insurance mechanisms are operating and not easily quantifiable. Then, at levels of around US\$3,000-5,000 GDP per capita, insurance penetration's rate rises faster than GDP until the maturity of the market sets in to reach of form of 'plateau' (see Figure 2).

Some refinement of this S-curve shows differences between life and non-life insurance. While life insurance is causally linked to growth only in higher income economies, non-life insurance makes a positive contribution in both developing and higher income economies as Figure 2 highlights (Arena 2006 and Brainard 2008).

Figure 2: Increasing insurance penetration versus economic growth



Source: Source: SwissRe, WorldBank and USAID (2006)

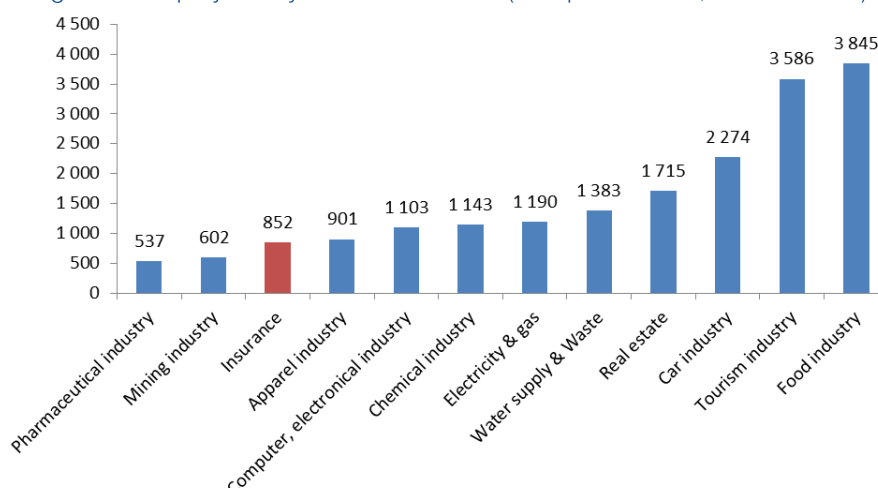
A number of empirical studies have also been able to demonstrate the causal relationship between formalized insurance, growth, and productivity:

- Granger causality tests with disaggregated measures of specific clusters of life and non-life insurance in the UK find that eight out of nine clusters of insurance show evidence of causing economic growth (Kugler and Ofoghi 2005).
- Soo (1996) highlighted the contribution of life insurance to the productivity and economic growth of the United States over a 30-year period.
- The macroeconomic contribution of insurance is fundamentally linked to the general impact of greater financial market development and inclusion: the insurance and banking systems appear to play complementary roles in the growth process as they develop. Although insurance and banking each make specific positive contributions to growth, their individual contributions are greater when both are present (Brainard 2008).⁶

Reflecting all these interactions, including causalities, between insurance and economic growth, insurance became a major economic sector in virtually all mature economies: there are around 5,000 insurance companies in the European Union (Insurance Europe 2014), with close to one million direct employees and around the same number of indirect employees in insurance distribution. In terms of direct employment, insurance is larger in Europe than the pharmaceutical and mining industries and comparable to the apparel industry (see Figure 3). In the United States, there are 6,000 insurance companies and 2.6 million jobs, of which 1.4 million people are working directly for insurance companies (IIF 2015).

⁶ There is some contrary evidence on this point. Thus, for example, Adams et al (2005) find that banking sector growth but not insurance market growth preceded economic growth in Sweden during the nineteenth century and more broadly that the insurance sector appears to be more economic development driven than leading though still important for it. While in some specifications life and non-life insurance do not appear to be significant contributors to growth in the presence of an interaction term with banking, subsequent research such as Webb et al. (2002), suggests the independent contribution of insurance is robust to the inclusion of banking sector variables, and higher levels of insurance and banking penetration jointly produce a greater effect on growth than their individual contributions combined.

Figure 3: Employees by economic sector (European Union, in thousands)



Source: Eurostat

2.1.2 MICROECONOMIC RISK-TAKING AND GROWTH

To understand the close relationship between insurance and economic development, one has to go back to the microeconomic foundations and decision-making processes that underlie economic growth. Unlike banking activities – which can support growth through the provision of credit, coupled with the creation of money, leverage and maturity transformation, and which are thus reflected directly in the economic cycle – insurance contributes to economic development at a microeconomic and individual level.

As most human activities are coupled with uncertainty – starting from life itself, health, economic opportunity, future standards of living, and others, individuals therefore develop complex decision-making routines to cope with uncertainty and continuous risk-taking in decisions. The ability to cope with perpetual uncertainty is so essential that psychiatrists find out that ‘intolerance to uncertainty’ is a source of major mental disorders (Paulus and Yu 2012). From this perspective, providing “peace of mind” to individuals as insurance does is part of a logic of empowerment which is especially valuable in the pursuit of fair and equitable economic development in many emerging countries and beyond.

Economic development, as most other ‘man-made’ processes, is rooted in decisions that involve taking risks, be it financial, human, reputational, or other. In industrialized and capitalist societies, the scope of risks goes beyond individuals’ capacities to bear them. This calls for the advanced forms of personal and collective risk-management mechanisms that are the essence of insurance activities.

It is not surprising therefore that insurance has historically grown exponentially, in line with the Industrial Revolution, when the technological, technical, and social risks to be taken became larger than individuals could bear. With the development of factories and modern capitalism, entrepreneurs⁷ became exposed to uncertainties that could destroy their business and reputation, leaving them unable to restart their activities using their own means (Ewald 1999).

Beyond the first steps of the Industrial Revolution, all industrial activities, even those that are not seen as particularly innovative, embed uncertainty, mostly in the form of technical and technological risks. Such risks can stem from a lack of scientific knowledge about technical developments, from unequal

⁷ The first formal theory of entrepreneurship by Cantillon (1755) described entrepreneurs as the self-employed who ‘adjust themselves to risk’ where the returns are uncertain. Although theorists disagree over exact definitions, entrepreneurs are widely considered to be attracted to risky ventures that promise above-average profit and growth (d’Amboise and Muldowney, 1988).

understanding of the nature of the risks and vulnerabilities, and from a lack of awareness of actual conditions of use of a product or from natural risks. This historical process is interestingly at play today in many emerging economies, where local economic development raises new questions about risk management and collective choices regarding the new forms of uncertainty (urbanization, pollution, industrial accidents, etc.) and the potential mitigation schemes, sometimes in a context of consequent redefinition of the respective role of the public sector and of national or foreign companies in designing responses to the new needs of the populations.

2.1.3 INSURANCE AS A COLLECTIVE RISK-MANAGEMENT TOOL FOR A FRACTION OF THE RISKS

In order to manage this general uncertainty and the risks it creates for individuals, companies, and societies, insurance systems based on pooling and mutualization emerged early in human history. Their sophistication increased alongside the growing complexity of risk.

Accordingly, since modern insurance companies came into existence in the late eighteenth century, the nature of the protection that they were able to provide evolved over time. This created a moving definition of the risks that insurance companies would accept bearing, often described as those being ‘insurable’ (Thimann 2015). Specifically, insurance can be described as the business of accepting insurable risks, managing them, and providing compensation for possible losses.

Insurable risks are traditionally understood as those that are, at a given moment:

- faced by individuals or firms, but beyond their control;
- not systematic but subject to a defined and observed law of large numbers, or at least to a known maximal loss⁸ – this latter condition making it possible to insure relatively new products or activities;
- non-financial – that is, not directly related to the economic and financial cycle.

The management of these different insurable risks then takes place through pooling – that is, the aggregation of a large number of similar risks; through mutualization – that is, linking the misfortune of the few to the fortune of the many, with insurers using reinsurance or hedging instruments to eliminate the tail risk. Finally, it is important that in insurance, compensation takes place for losses that have *actually* occurred and not for hypothetical losses or for events that may have *potentially* caused losses.

Parametric insurance contracts are an interesting example of sophistication in insurance, which nonetheless respect its main features. Such contracts continue to make explicit the precise conditions that will lead to compensation, but are innovative in the sense that they relate to situations where the damage is not directly observable and is instead estimated *ex ante* by a number of proxies taking the form of observable external parameters (not market conditions and not ‘events’ as defined by an external committees as in the case of CDS⁹). No profits are possible for policyholders and compensation is designed to increase according to the intensity of the damage. Examples include insurance against droughts or extreme climate-related events in specific regions for farmers, as recently developed by the World Bank and private insurance companies through the Global Index Insurance Facility (GIIF). Similar index insurance solutions were rolled out in Kenya

⁸ The maximum losses can be unknown for many reasons: by nature (systemic risk), because of State intervention (which, for example, may forbid caps on maximum indemnities), because of moral hazard (when insurees have no incentive for prevention) or anti-selection (when a lack of information leads insurance companies to raise premia and to cover only the higher-risk profiles).

⁹ In the case of Credit Derivatives (typically CDS), Credit Derivatives Determinations Committees are established to make ‘determinations’ in connection with Credit Derivative Transactions, and in particular decide if an ‘event of default’ has occurred to trigger the CDS payments.

on a more individual level by the Syngenta Foundation in 2008 with the “Kilimo Salama” scheme (literally “safe insurance” in Swahili). The concept was to use satellite data to pay out to farmers whose crops were victims of drought. The farmers to be indemnified were pinpointed geographically thanks to phone geo-localisation data, thus accelerating claims pay-out and accelerating recovery. Kilimo Salama was successful and within five years the scheme covered close to 200.000 farmers across Kenya and Rwanda.

At the level of the individual, insurance covers many of the risks involved in decisions and initiatives that ultimately enable economic development: protection, health, and life insurance contracts typically allow people to break the psychological and financial barriers and fully engage in new and potentially riskier activities and environments. In turn, insurance has clear limits: mostly because of moral hazard and asymmetry of information, no contract exists to protect individuals for example from lower-than-expected wage increases or the impact of major technological changes in their professional sector that would make their skills obsolete.

At the corporate level, insurance is decisive to allow for trade and contract agreement (as included in typical counterparty risk and credit risk insurance contracts) – and the trust it creates is key for economic development. Insurance also provides companies with protection against future consequences or outcomes of their actions, which were not measurable at the time of the contract, such as those included in civil, criminal, and administrative professional liability insurance products. Finally, insurance contracts provide the means to enable continuity of service – and therefore sales and revenues – by protecting production tools – for example, protecting a factory against flood and fire, or a service company against the theft of its intellectual property or its client data.

Hence, insurance can be described as an enabler for people and companies to take risks and as a way to allow individuals’ minds and assets to be productively and confidently invested in the economy. In the reverse sense, higher economic development usually leads to larger risk-taking and greater financial inclusion and sophistication supporting insurance development.

2.2 INSURANCE AND INTEREST RATES

A key channel to explain the positive impact of insurance on economic development is the role it plays in reducing risk aversion (Gollier and Pratt 1996), thereby reducing the market risk premium and equity premium (while admittedly reducing in parallel individual precautionary savings and theoretically raising the risk free rate). Insurance also lowers term premia, thereby easing credit conditions, facilitating investment, and increasing financial returns. The impact of insurance on the general level of interest rates has therefore to be seen as the result of the interaction of various simultaneous factors. The impact of insurance on the yield curve can be summarized as being that it allows ‘lower interest rates and a longer maturity curve’.

2.2.1 INSURANCE AND ALLOCATION OF CAPITAL

A major driver of impact is the fact that the ability of an economy to allocate resources efficiently is highly determined by the level of development of its financial sector and the degree of financial intermediation. Therefore, in markets with low penetration of banks and insurance companies, adverse selection for formal insurance contracts or bank loans tend to arise, and lead to a combination of high interest rates and low growth, leading to a sub-optimal equilibrium.

In turn, the risk management provided by a complete insurance market allows the economy to allocate resources more effectively and reach a more efficient mix of activities, as higher risk-taking usually means higher returns, productivity, and growth.

This allocation process is based on the identification and standardization of risks and contracts, as well as

the pricing of risk generated by insurance companies and then disclosed and shared with the entire economy. This pricing and signalling of risk is a key tool for helping resources to be allocated more productively. The allocation signal provided by insurers reduces the transaction costs of investors and borrowers by enabling them to identify underlying risks carried by specific projects.¹⁰

In doing so, insurance increases expected investment returns by reducing the costs of risk financing (Webb et al. 2002). Life insurance can increase productivity by reducing the demand for liquidity in the whole economy as hinted by Skipper et al (2000),¹¹ and by shifting resources from unproductive to more productive uses, thereby easing the funding conditions for a wider range of activities. This is similar to the impact of banking on investment quality (Pagano 1993).

2.2.2 INSURANCE AND CREDIT RISK

By providing a range of insurance services to firms and households against property losses, damages, and negative events affecting loan repayment abilities, insurers effectively help lower credit risk and therefore contribute to the development of credit markets.

Non-life insurance directly helps to reduce the likelihood of households or firms not being able to meet payments on the loans they contracted. Indeed, by covering households and companies from major losses provoked by hazards (such as fire, accidents, sickness), non-life insurance helps to smooth available income profiles, allowing them to meet regular interest payments on their loans, thereby reducing the share of non-performing loans at the macroeconomic level and reducing funding costs and interest rates offered by banks (Garmaise and Moskowitz 2009). Recent developments in insurance distributed through microfinance distribution are leading to a diversification in the product range, from pure credit insurance (in which the loan is reimbursed upon death) to « credit-health » coverages in which the insurer pays out the loan during hospitalization and as well as similar « credit-accident » schemes.

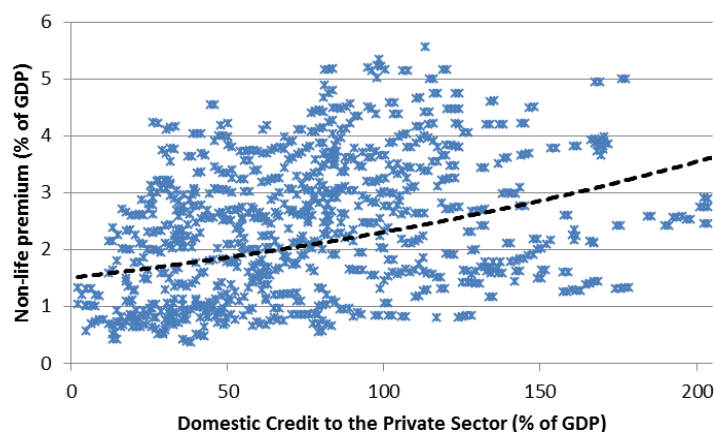
Insurance development can also be specifically targeted at increasing loan repayment abilities and confidence, through trade and credit insurance. Credit insurance protects companies against the failure of their customers to pay their trade credit debts: credit insurance helps managing account receivables and mitigates losses in the event of non-payment. Such contracts naturally improve banking relationships and access to finance, and ultimately access to credit at lower interest rates.

As a consequence, insurance provision helps to improve the overall efficiency of the financial sector, notably by facilitating the provision of credit to the private sector. There was a strong correlation between the latter and the amount of non-life premia in 59 developed and developing countries between 1960 and 2000 (see Figure 4).

¹⁰ As USAID (2006) points it out: 'It is not surprising that insurance is generally a necessary precondition in many mortgage finance markets and large-scale industrial investments.'

¹¹ 'Insurers create liquidity. Insurers invest the funds entrusted to them by their customers to make long-term loans and other investments. Policyholders, however, have immediate access to loss payments and savings while borrowers need not repay their loans immediately. If all individuals instead undertook equivalent direct lending, the proportion of their personal wealth held in long-term, illiquid assets would be unacceptably high. Insurers and other financial intermediaries thereby reduce the illiquidity inherent in direct lending'.

Figure 4: Correlation between non-life insurance and credit



Source: USAID (2006)

Through this angle, insurance development is a necessary condition for credit provision, banks and financial markets to develop. The development of life insurance companies and pension funds is specifically associated with more efficient banking systems (Musalem et al 2001) and the development of securities markets (Vittas 1998).

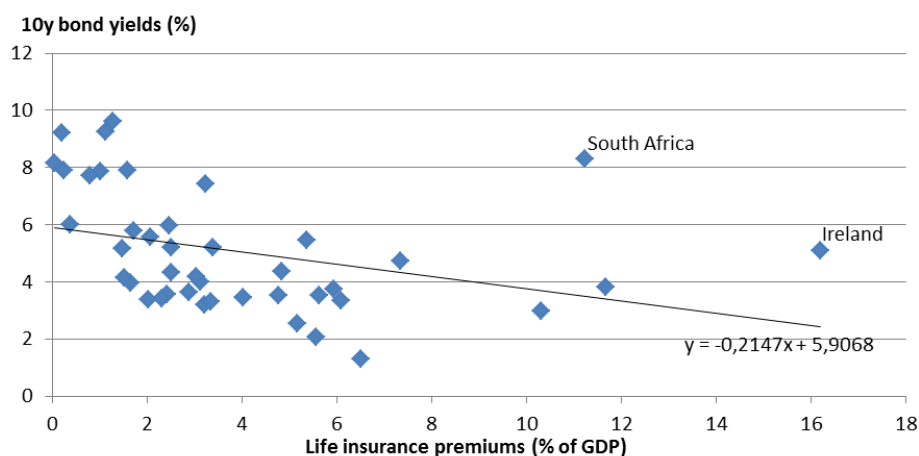
2.2.3 INSURERS' INVESTMENT STRATEGIES AND LONG-TERM PREMIA

As institutional investors, insurers also reduce long-term premia through their purchase of long-term assets and by raising the time horizon of savings that they allow through the collective and durable nature of life insurance. Without life insurance, households may well also purchase long-term assets directly, but life insurance also organizes the intergenerational risk-sharing that the individuals' strong preference for liquidity (Skipper et al. 2000) does not allow and, by acting as a perpetual investor, systematically extends the investment horizon beyond a single generation which in turn enables the accumulation of capital and economic development over time.

This 'perpetual investor' is responsible to honour its commitments to its policyholders over several decades and the profile of its investments must therefore reflect it. This is achieved through the Assets and Liabilities Management strategy, which aims to match duration on both sides of the balance sheet and which explains in particular the strong demand for long-term assets, be they government bonds or infrastructure-related assets.

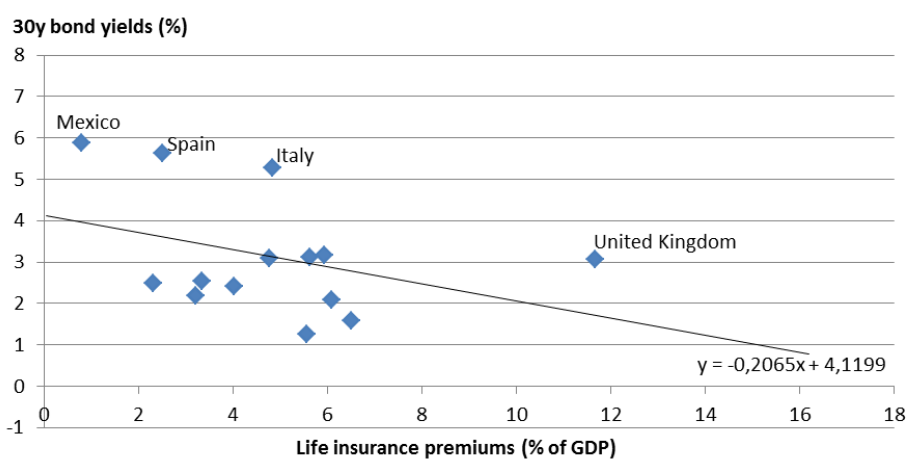
By increasing demand for long-term assets with stable and predictable cash flows, insurers reduce the term premium on the fixed income market as illustrated by the observations presented below, on the observed negative relationship between life insurance penetration and ten- and 30-year bond yields. For OECD countries over the period 2004-2013, our basic estimates with simple linear regressions show that a one GDP-point increase in life-insurance premia is associated to a 0.29 percentage point decrease in ten-year sovereign bond yields and a 0.46 percentage point decrease in 30-year sovereign bond yields. These first illustrative results (see Figures 5 and 6) need to be further investigated over time and geographies. Such a decrease in government bonds yields generally translates into an easing of corporate and households funding conditions as the crowding-out effects of higher risk-free rates (upon which most commercial loans are based) are being reduced which ultimately helps unleash private initiatives.

Figure 5: Average 10-year sovereign bond yields and life-insurance penetration, 2004-2013



Source: Reuters, OECD, A one GDP-point increase in life-insurance premia is associated with a decrease in 10 year sovereign bond yields of 0.21 percentage point (impact estimated with simple linear regression)

Figure 6: Average 30-year bond yields and life-insurance penetration in OECD countries emitting at this horizon, 2004-2013



Source: Reuters, OECD

This long-term bias can also lead insurers to favour long-term holding of assets such as infrastructure investments, particularly in the context of overall low interest rates in bond markets. For developing countries, the greater development of insurance and opening to investments from international insurance companies are consequently often seen as a welcome step for having large infrastructure projects being funded,¹² and contributing to greater growth potential and economic activities, with a large economic multiplier.

¹² Contractual savings institutions, such as pension funds and life insurance companies, are particularly suited to making long-term investments. These institutions levy fixed premia, have steady and predictable cash inflows, and incur long-term liabilities, making them ideal suppliers of term finance for infrastructure projects.', World Bank (1994).

2.3 INSURANCE AND SAVINGS

By easing decision-making in the face of risks and uncertainty, a direct role of insurance is to optimize savings at the individual level by reducing its precautionary component and therefore optimizing capital allocation at the collective level thanks to pooling mechanisms (Guiso et al. 1992).

Insurance also enhances savings behaviour by providing incentives for long-term savings objectives and gives customers access to more competitive and long-term contractual savings vehicles than those offered by traditional ones or other financial institutions (USAID 2006).

2.3.1 INSURANCE AND PRECAUTIONARY SAVINGS

By providing a sense of safety and protection against risk, insurance contributes to reducing precautionary savings at the individual level and may therefore at first glance have potential negative consequences on growth (as lower savings means lower investment). In reality, the impact of insurance is to lower sub-optimal precautionary savings at the individual level (because typically made of small amounts of cash placed in very liquid and therefore not long-term oriented vehicles in order to face future recurrent shocks) and increase the *collective optimization of savings to enhance long-term productive investment*. Individuals covered by a formal insurance contract use their remaining available income to invest and the insurance company also invests the collected premia in the economy.

The provision of liquidity at the macro level is therefore optimized, enhanced, and stabilized over the long term, allowing investment to be more substantial and less volatile. These links between savings, insurance, and investments enhancing economic development are particularly emphasized through the development of micro-insurance:

- In the absence of risk-pooling mechanisms, plunges in incomes due to death, disability, and adverse agricultural outcomes often translate into substantial decreases in consumption and investment, which can permanently set back a poor family's livelihoods and prospects (Brainard 2008). When drought or floods lead to low agricultural yields, critical health interventions may be delayed, education of younger members of a household put on hold indefinitely, and land, livestock or equipment sold to regain liquidity quickly.
- There is evidence that micro-insurance can help prevent the adverse consequences of such disasters for households' human capital investments and their future productivity by enabling them not to give up their assets or reduce their consumption during crises (Janzen and Carter 2013).

Should there be no formal insurance, there is also extensive evidence that due to the expected catastrophic consequence of such losses, poor households and communities attempt to 'self-insure' through a combination of building assets, diversifying sources of income, implementing basic pooling schemes at the community level or simply short-term hoarding. This all leads to sub-optimal allocation of capital in the economy and lower level of investment due to lack of visibility on the actual nature and efficiency of the risk-mitigation strategy in place. In turn, formal insurance and the broader development of financial services create economic opportunities by enabling people to manage their assets in a way that generates income and decisions options (Sutton and Jenkins 2007); and by increasing investment, especially to enhance productivity in agriculture (Karlán et al 2014).

2.3.2 EMPIRICAL RESULTS PRESENTED IN THE MICRO-INSURANCE LITERATURE

While the term 'micro-insurance' was first published around 1999, it is a part of micro-finance that has existed for a long time. Micro-insurance is designed to manage the risks faced by low-income people, through products tailored to their needs, income, and risk profile, and managed according to insurance

principles. Operationally, the distinction between micro-insurance and typical insurance schemes is often made by regulatory authorities through placing a cap on the sum assured and/or premium, as an empirical means of ensuring that these products benefit low-income people.

The micro-insurance market is a particularly important and fast growing one, estimated at more than four billion people and a potential premium volume of US\$ 40 billion with Asia-Pacific being the largest regional market (Swiss Re 2010).

As hinted above, evidence has been widely provided that the development of micro-insurance induces economic benefits at both the micro and macroeconomic levels. This positive impact can first be linked to the very provision of formal insurance schemes instead of the informal ones prevailing in traditional or village societies.¹³ Platteau (2000) stresses the imperfections carried by informal insurance mechanisms developed by small communities: restricted scope of risks and population covered, fragile (opportunistic entry or exit, low resistance to frequent shocks), unreliable in protecting the poorest households (and implicit or explicit denial of income redistribution through risk sharing), and susceptible of retarding capital accumulation and economic growth.

But even if formal insurance schemes may offer enhanced protection, which would in turn favour riskier and productivity-enhancing investments, such an impact is strongly linked to the very design of the insurance products and services, as shown by Munro (2015) in the case of farmers in rural India.

By providing external financial protection to poor households, micro-insurance can enable the beginning of specialization, as households do not need to resort to substitute and ineffective coping mechanisms.¹⁴ Last but not least, insurance can also increase people's productivity by inducing healthier habits, as in the case of health insurance: there have been solid findings that health micro-insurance helps to reduce out-of-pocket health expenditure and increase the use of healthcare services (Radermacher et al. 2012). Polonsky et al. (2009) find that members of nine Oxfam operated Armenian micro health-insurance schemes visited health facilities 3.5 times more often than uninsured persons.

¹³ In the case of an Indian village, Townsend (1994) provides a list of potential risk-bearing institutions in the absence of a formal insurance market: 1) Diversification of a given farmer's landholding into various spatially separated plots and various crops; 2) storage of grain from one year to the next; 3) purchases and sales of assets such as bullocks and land; 4) borrowing from village lenders or itinerant merchants and borrowing/lending more generally; 5) gifts and transfers from family networks.

¹⁴ Such mechanisms can include depleting savings and additional supplies of goods like food and livestock, selling valuable and income-generating assets, borrowing at high interest rates, adjusting labour supply, altering purchases and consumption patterns or withdrawing children from school (Radermacher et al, 2012)

3 INSURANCE AND STABILIZATION OF THE ECONOMIC AND FINANCIAL CYCLE

'If it was possible for me, I would write the word 'insurance' in each home and on each man's forehead, since I am so convinced that insurance can, at a moderate price, liberate families of irreparable catastrophes'.
Winston Churchill

3.1 STABILIZATION OF THE ECONOMIC CYCLE THROUGH THE INSURANCE PRODUCTS' CORE FEATURES

Insurance has a key function of economic stabilizer in times of individual shocks, smoothing the consumption of individuals facing idiosyncratic shocks or aggregated shocks, such as natural catastrophes.

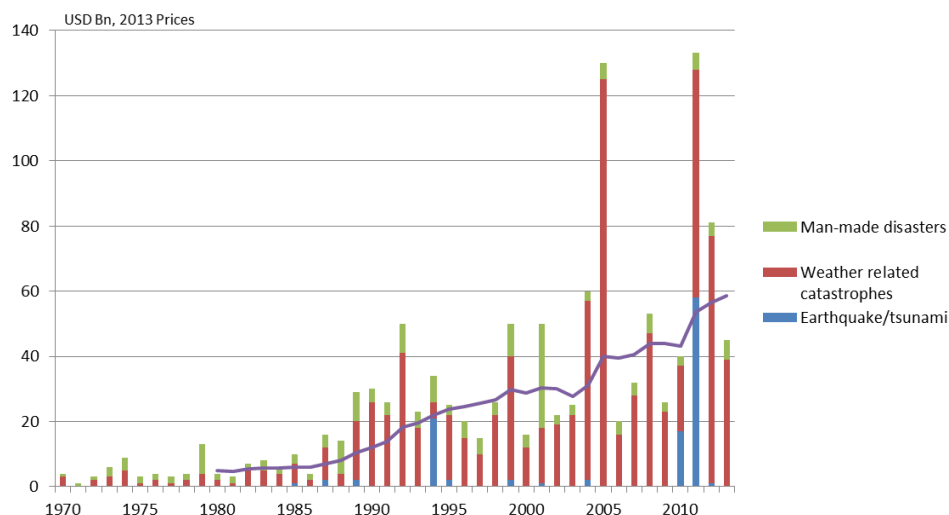
3.1.1 INSURANCE AND RESILIENCE IN CASE OF NATURAL CATASTROPHES

This stabilization role is visible when natural catastrophes hit lower income countries, where there is a lack of funding and prioritization of disaster preparedness activities.¹⁵ As these countries may not have the funds or borrowing capacity to recover expeditiously from natural disasters, risk transfer to insurance markets can be particularly effective for these countries to avoid drastic disruptions to economic growth (Brassard and Raffin 2011). In addition, the international risk-sharing made possible by internationally active insurance companies allows for reduced premia in countries with high risks of natural catastrophes, adding to the economic benefits of formal insurance in these countries and the smoothing effect that insurance has on national GDP growth (OECD 2000).

A positive trend in the insured losses due to natural catastrophes highlights the growing implicit resilience capacity of economies with increasing exposures to extreme and destructive events without having to suffer their full-blown economic consequences. According to SwissRe (2014), it is estimated that almost one third, or US\$45 billion, of the US\$140 billion in total economic losses from natural and man-made disasters in 2013 were covered by the insurance industry. Natural catastrophes generated claims of US\$37 billion and large man-made disasters generated insurance claims of US\$8 billion in 2013 (see Figure 7).

¹⁵ In general, disasters are exacerbated by poverty, badly planned and badly managed urbanization, environmental degradation and weak institutions for managing risk at local and national levels. These effects were exemplified by the Thailand and Cambodia floods of 2011.

Figure 7: Insured catastrophe losses, 1970-2013 (in US\$ billion)



Source: Swiss Re, Economic Research and Consulting

3.1.2 INSURANCE AND STABILIZATION OF LONG-TERM INCOME

Insurance also protects savings and retirement income thanks to modern and innovative products and services that enable people to undertake actions that require projection into the future and where choices rely on their self-estimated permanent income (Friedman 1957).

Variable annuities are a good example of individuals' incomes stabilization at the individual level provided by insurers. Such contracts enable policyholders to diversify their savings allocation towards a wider and potentially more profitable range of investment products while benefiting from future minimum guaranteed incomes.¹⁶ These guarantees prevent households from withdrawing their investment in the event of a market fall and thus from experiencing losses as they are insured that their future annuities will be based on high points. In that sense, insurance can stabilize incomes when it continues to rely on pooling and mutualization of individual, non-financial risks.

A second example is unemployment insurance attached to mortgages, which enables people facing unemployment to maintain the needed level of income to meet their payments. When an economic downturn occurs and unemployment rate increases, without any insurance to allow for mortgage payments for home owners who lost their jobs – at least for a temporary period – one would see severe and immediate real estate price adjustments, banks affected by higher non-performing mortgages, and families losing shelter – three outcomes that would make an economic recession deeper.

Lastly, in emerging economies where external shocks such as a disease, a natural catastrophe or an accident are more susceptible than somewhere else – because of the absence of state-funded safety net for example - to negatively disrupt the functioning of a family and community, this capacity for households to rely on a stable income over time through tailored local schemes is fundamental to allow for a quick recovery and long-term investment decisions. In India, 40 million people fall back into poverty because of health-related events, a figure that is directly correlated with the fact that only 5% of rural dwellers have access to personal health insurance and thus the majority has to pay for treatments out-of-pocket.

¹⁶ Depending on contractual terms, the initial guaranteed investment (and future payments to the policyholder) can be revised upward on a minimum regular growth rate basis or benefit from a 'ratchet effect' based on the underlying assets' performance.

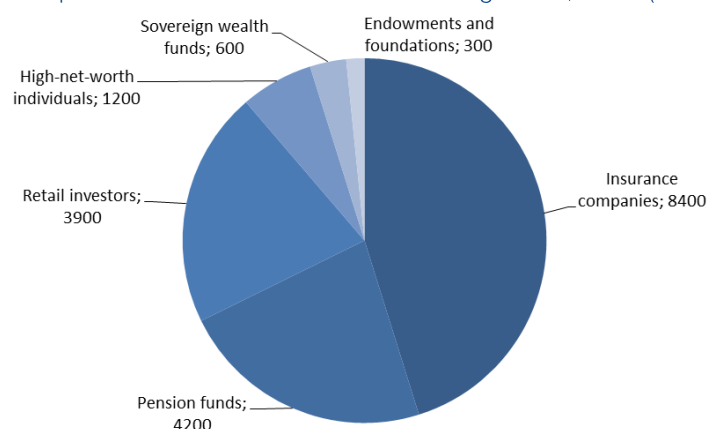
3.1.3 STABILIZATION OF THE FINANCIAL CYCLE THROUGH LONG-TERM ORIENTATION

As mentioned above, insurance is a key source of stable funding, and therefore stabilization, for the both financial markets and the economy as it fosters lending and investment with a long-term perspective. Looking for instance at the US economy, the insurance sector has been historically substantially more stable than the banking sector as Gollier et al. (2014) found that insurance is five times less volatile than aggregate GDP, while investment banking is almost twice as volatile.

Behind this stability is the business model of insurance, which is different from banks in its timing and functioning. Insurers can indeed be seen as ‘future-oriented’: they collect the current liquidity of individuals and organizations to fund their future lifestyles and projects. In contrast, banks can be seen as ‘present-oriented’: through credit, they fund today’s projects and lifestyle by pre-funding future liquidity. This difference in relationship with time is visible in the nature and importance of liquidity for insurers and banks: banks are extremely and permanently dependent on the market liquidity to stay solvent; while insurers are liquidity-rich as they receive upfront payments by policyholders (so-called “*premia*”) and can well be temporarily lacking capital while not failing.

Insurers have long-term, stable liabilities which they match with their assets profile. The result is that insurers are net suppliers of stable capital in the economy with life insurers being large players in financial markets: in 2010, the latter managed US\$18.7 trillion of assets, or 11% of the world’s total financial assets (Geneva Association 2010). The insurance sector is also the largest institutional investor in the European Union, with over €8.4 trillion of assets under management invested in the economy in end 2012, which represent 60% of the GDP.

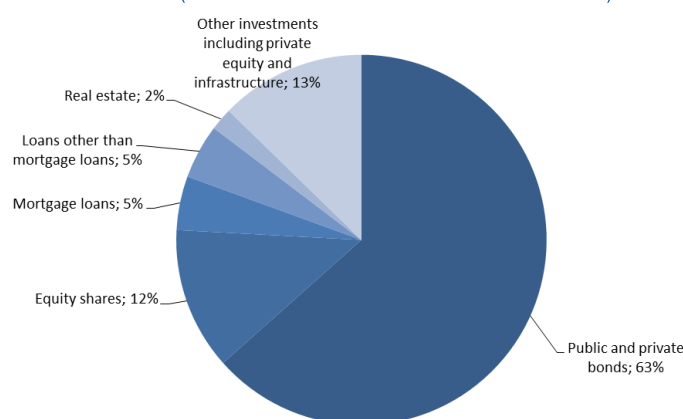
Figure 8: European institutional assets under management, 2012 (in EURO billion)



Source: Insurance Europe

Finally, insurers have a natural attraction for financial assets that can deliver stable returns and income flows over the long run. In 2013, the largest component of insurance companies’ portfolio in four major markets (France, Germany, the UK and the United States) were public and private bonds (63%) followed by listed equities (12%), according to the OECD (see Figure 9).

Figure 9: Portfolio allocation of insurance companies in France, Germany, the UK and the United States, 2013 (in % of total assets on balance sheet)



Source: OECD Insurance Statistics, 2014

3.2 THE ROLE AND USE OF DERIVATIVES AND ALTERNATIVE RISK TRANSFER SCHEMES

To offer credible protection to policyholders and reinforce the positive impact of insurance on growth, insurers need to be able to withstand external shocks while honouring commitments to policyholders. To achieve this self-reinforcement, insurance companies rely on derivatives for limiting financial risk, 'Alternative Risk Transfer' schemes, and reinsurance treaties to limit peak exposure to catastrophes (storms, earthquakes, pandemics, large losses).

Derivatives are unfunded instruments essentially allowing the transfer of financial risk to another investor. As diversification is the essential foundation of the modern portfolio management (Markowitz 1952, Sharpe 1964), financial risk is not increased but transferred to willing investors.

Derivatives are essential to buffer potential shocks affecting the insurance balance sheet and make credible the provision of guarantees over time. As insurance companies invest premia received from policyholders into financial markets and, as a result, get a pure long exposure to financial markets, they need to 'hedge' against this undiversified risk and therefore resort to financial risk-transfer instruments – derivatives – to limit their exposure to large capital markets variance. From an operational perspective, derivatives allow an insurer to smooth the income stemming from its investments decisions, and to be less exposed to financial cycles and corporate insolvency risks.

Without derivatives, insurance companies would be completely exposed to financial shocks and the result would be a weakening of the whole financial system.

4 INSURANCE AND DISTRIBUTION

4.1 THE UNEQUAL NATURE OF RISK

Insurance creates an invisible net of solidarity between economic agents, interconnecting them in time and place, around shared preferences and priorities. Insurance gives economic materiality to the concept of solidarity (Ewald, 1999), and organizes it financially through its fundamental principles of pooling – that is, aggregating risks – and mutualising – that is, pricing them depending on their statistical occurrence for the larger pool and not for the individual.

As is often said, insurance is about connecting ‘the misfortunes of the few to the fortunes of the many’ (Thimann 2015), which naturally operates a form of distribution. This distribution of income happens *ex post* and is linked to an accident – which is fundamentally different from the one allowed by public redistribution, which happens based on the comparison of *ex ante* and desired *ex post* income levels. Risks are indeed not equally shared among individuals in society and in time for a given individual (Ewald 1999), and this inequality has little to do with initial income levels.

There is also a genuinely social dimension of risk, and technology contributes to increasing inequality between those who control and understand the industrial cycle – and risk – and those who are affected by it. The multiplicity of risk is a new given in the economies and societies that develop and modernize, and the ways and means to share the burden of its consequences has subsequently become central to the social and economic decisions of public authorities, local professional communities as well as companies and individuals over time.

4.2 INTERGENERATIONAL DISTRIBUTION

The mechanism of risk pooling and the strategy of long-term investment and holding of securities enable insurers and pension funds to deliver income redistribution across generations. This intergenerational sharing of financial risk by life insurers has an impact on intergenerational welfare that has been deemed equivalent to an increase in asset returns by as much as a full 1% every year (Gollier 2008). This social benefit is obtained by an anti-cyclical retention of the return of the invested assets, as well as the guarantees provided by the insurer over time.

In addition, there exist intergenerational cross-subsidization effects in guaranteed interest rate life and pension contracts as the different generations partially share the same reserves. Early generations build up bonus reserves, which are left with the company at expiry of the contract (Døskeland and Nordahl 2006) and then benefit to later generations.

4.3 ‘INTER-INDIVIDUALS’ DISTRIBUTION

Insurance is also a redistributive force among individuals at any given point in time – theoretically independent from the level of their income.

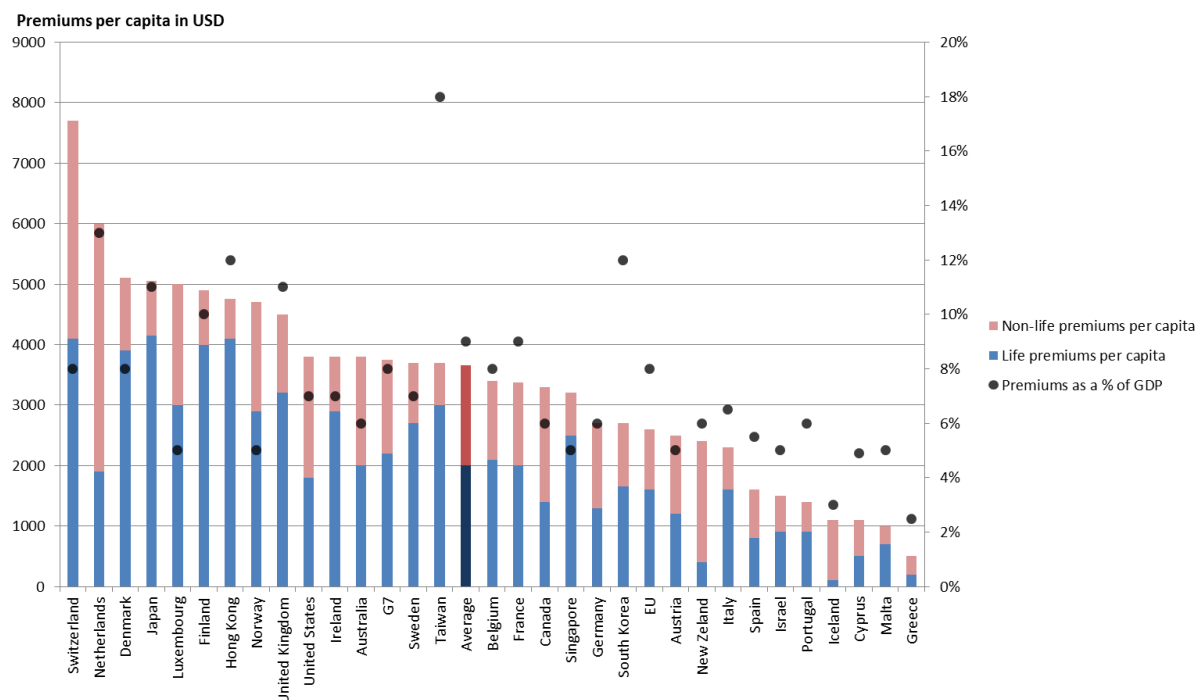
Insurers appear to be actively recycling and redistributing liquidity (claims and payments) among economic agents towards those having faced some risks. This is different from the redistribution operated by public authorities, which looks at economic needs and means to transfer income from the ‘richer’ to the ‘poorer’. As highlighted earlier, mutualization and pooling of risks are the natural engines for this redistribution to happen – typically for P&C markets.

In addition, mechanisms such as participating contracts (designed so that the pool of policyholders retains a part of the financial risks linked to the investments of their savings and premia) create redistribution between individuals, as some would have entered in respective high/low market environments and then

exited in low/high ones, which offsets the opposite effects of individual and not synchronized decisions.

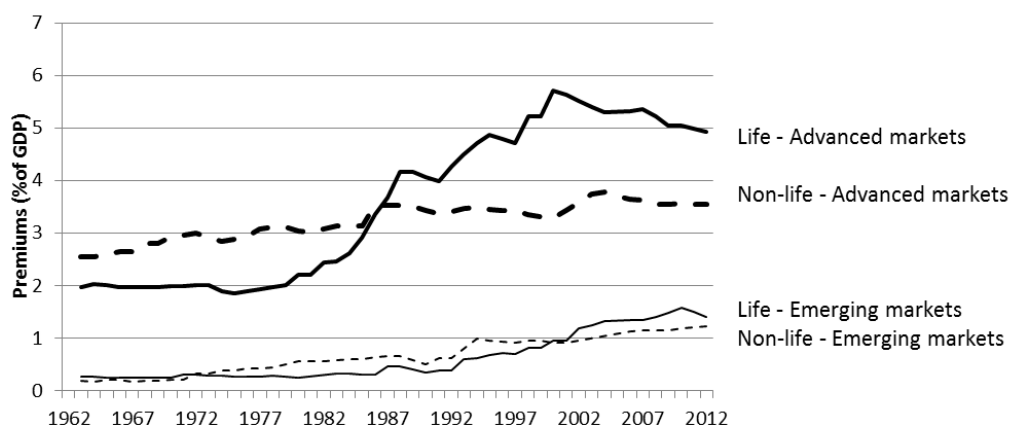
To illustrate the scale of the redistribution coming from these pooling mechanisms, see for instance the US\$2.6 trillion and US\$2 trillion of respectively life and non-life insurance premia that were collected in 2012 around the world, representing 6.5% of world GDP (Swiss Re 2013). At the European level, the collected premia amounted to €1.4 trillion in 2012 (7.7% of EU GDP), which equals an average of €1887 per capita or 10% of EU average household income.

Figure 10: Insurance density and penetration in advanced markets, 2012
(in US\$ per capita and % of GDP)



Source: Swiss Re, Economic Research and Consulting

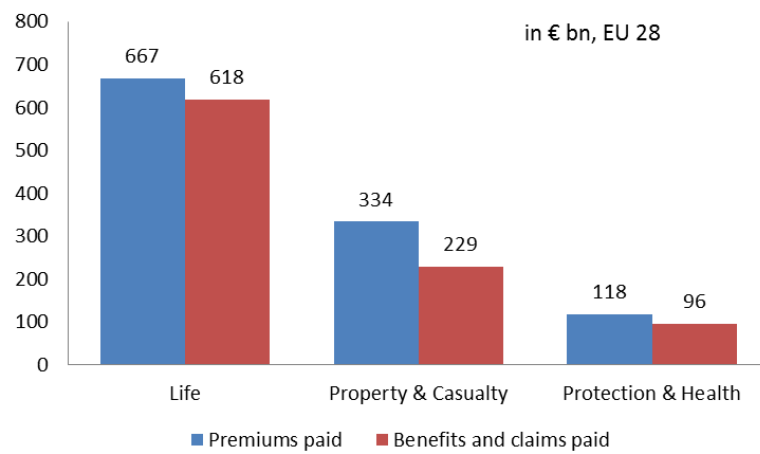
Figure 11: Life and non-life insurance penetration, 1962–2012 (in % of GDP)



Source: Swiss Re, Economic Research and Consulting

These collected premia have to be put in perspective of the benefits and claims paid. At the European scale, €0.9 trillion benefits and claims were paid in the EU28 in 2011, which represents the equivalent of Spain's GDP (see Figure 12).

Figure 12: Premia collected and claims paid, European Union, 2011 (in EURO billion)



Source: *Insurance Europe*

5 INSURANCE: INNOVATION, LIMITS AND THE FUTURE

5.1 INSURANCE AND INNOVATION

'The UK insurance industry is known for its innovation and entrepreneurialism, typified through the modest beginnings of Edward Lloyd's coffee house. The role played by the insurance sector in future will be contingent upon maintaining that tradition of competition and innovation.'
Paul Fischer

By creating confidence and reducing uncertainty, insurance is an enabler of human and technical endeavours, through its economic function, its long-term investments, as well as the diversified nature of insurers' business and portfolio.

The nature of risk has followed economic progress and insurance has been created as a tool to address new risks and limit their potential consequences. In the eighteenth century, the new risks were those taken by entrepreneurs during the beginnings of the Industrial Revolution (with the invention of the steam engine and the mechanisation of the textile industry and the first factories); in the nineteenth century, those relating to work accidents in more industrialised and larger scale processes; and in the twentieth century, those linked to work contracts and more widely the overall environment of economic development (health, technology, and the environment). Over time, society went from a perception of risk to one of catastrophes, given the increasing power of industrial activities (wider effect and more lasting effect). This mechanically led insurance companies to follow, understand, and price innovation and new risks.

5.1.1 INSURANCE AND THE PARADOX OF INNOVATION

More widely, insurance entertains a paradoxical relationship with innovation, as it allows innovation in particular by protecting the innovator from external shocks and protecting its wealth, while insurance simultaneously limits innovation by being rather slow in covering new types of risks or adapting its own functioning to technological changes.

Facing the unknown, insurance is what makes the risk acceptable, or at least bearable, but insurers are not ready to insure immediately everything that is new, as currently for instance cyber risk (Biener et al. 2015) or autonomous vehicles which may call for a reinvention of insurance itself. In turn, as soon as insurability and the fact that insurance companies, regulators and society accept a new risk to be collectively covered is granted, scaling up of a technology beyond the initial circles of pioneers and entrepreneurs, i.e. industrialisation, can go very fast. In that sense, insurance is a signal of the 'technological and technical' frontiers of a given time. Insurance and innovation in insurance mechanisms have therefore quite naturally been closely linked to many great human projects, by taking risks and allowing others to take some by strategically mobilizing savings previously pooled. History is filled with such examples:

- 1400 years BC, stonemasons in Lower Egypt were among the first to establish an aid fund in case of accidents on very large projects such as tombstones and pyramids.
- The UK, which is commonly seen as the birthplace of the Industrial Revolution, turned to various forms of insurance early on its economic development, thereby contributing to the development of modern insurance market know-how and practices (USAID 2006).
- The first two skyscrapers – the New York's Equitable Life Assurance Building built in 1870 and the

Chicago's Home Insurance Building built in 1885 – were, as their names indicate, funded by and built for insurance companies.

- If not for life insurance, major entrepreneurial successes such as Disneyland or McDonald's would not exist. Stanford University might have been a short-lived tribute to a son who died young.
- As materialized after the 9/11 attack, airline activities, even if not considered as extremely innovative anymore by the public, were immediately interrupted when there is a lack of insurance coverage. In this case, (re)insurers suspended their liability covers in case of terrorist attacks as they estimated these attacks had changed the nature of the risk. The suspension only ended when governments accepted a private-public partnership with the Terrorism Risk Insurance Act for instance in the United States. This illustrates that no economic activity can be pursued without a sufficient insurance cover, especially for liability risks.

5.2 THE LIMITS OF INSURANCE IN THE ECONOMY

5.2.1 INSURANCE DEVELOPMENT IS NOT INFINITE, NOR ARE ITS IMPACTS

Insurance can surely not be an end in itself¹⁷ and the limits to its further development in mature markets clearly proves it. The 'S-curve' relationship between the penetration rate of insurance and economic growth reminds us that at a certain stage the former can no longer outpace the latter.¹⁸ The reason is that increasing risks and product complexity makes insurance more expensive to potential buyers (mainly companies), which prefer to retain greater amounts of risks. The recent development of self-insurance subsidiaries, so-called captives, within large manufacturing or services companies is a good example of this trend.

5.2.2 THE 'UNINSURABILITY' OF CERTAIN RISKS

As described earlier, insurability follows a certain number of criteria. Some risks appear to be outside the scope of 'insurability', such as cyber risk at the moment. The debate about insurability is complex. First, there are the technical barriers, both statistical and linked to the understanding of the nature of the risk itself: does the risk obey the law of large numbers and do we have a sense of the potential maximum loss? This is a difficult question with little historical views on the nature of the risk (see earlier section on insurability).

Second, there are the social and political questions: is the risk one wants to insure a public good and therefore should it be covered by the state or can private sector companies manage it introducing selective pricing methods?

And third, there are the more cultural questions: is this a risk we can let exist and for which one should invent compensation mechanisms – or should it be totally prevented by forbidding any activity leading to it? This last question is typically at play in debates on the primacy to be given to prevention over compensation (as in the 'precaution principle' introduced in the French Constitution). It highlights a shift in social preferences and tolerance to the very idea of risk, even before considering its consequences. In turn, the prevalence of some collective mental representations that for instance praise, as seen in some traditional, the individual capacity to overcome adverse situations with one's own courage and means may appear to be limiting the demand for protection solutions ahead of a potential shock.

¹⁷ Radermacher et al (2012).

¹⁸ When no 'insurance gap' prevails, i.e., when financial institutions and economic activity no longer outpace insurance supply, no potential economic benefit from an insurance market intervention can therefore be expected by private companies (USAID 2006).

5.2.3 THE RISK OF OVER-INSURANCE

A potential downside of insurance occurs if people and companies ‘over-insure’ themselves or duplicate coverage for a same type of risk – as this could happen in contexts where people do not understand well the protection they are buying or when it comes in bundles with other services. In such a world, excessive premia collection would lead to a sub-optimal allocation of resources, lower liquidity for investments and riskier projects, as well as lower consumption and demand for goods and services. Insurance would in this case clearly act as a disincentive to take useful risks or to adapt one’s behaviour or organization.¹⁹

Too high levels of insurance are also not optimal as they might deter useful actions to prevent the risk or protect oneself against its consequences. Insurance indeed functions based on the assumption that insurees have natural incentives to manage the risk and implement expected preventive actions. In that sense, a traditional result of insurance economics is that an insurance deductible is optimal to create this minimal level of incentives towards basic risk management. A good counter-example is given by Annan and Schlenker (2014) who show that US federal crop insurance may, in some cases, give farmers a disincentive from engaging in possible adaptation strategies to cope with extreme heat, thereby exacerbating potential losses.

5.2.4 INSURANCE COMPANIES CAN FAIL

Just like any other business, insurance companies can fail (Gollier 2014). Their specific economic and social role within society has justified the long existence of a stringent regulatory framework as insurers’ liabilities to their policyholders often extend to decades. But as mentioned above, the Asset and Liability Management implemented by insurers make their risk of failure not only less likely to happen but also much more manageable than failures from other types of financial institutions.

First, insurance companies operate a thorough selection of risks they cover among their policyholders and cover themselves through diversification, hedging and reinsurance.

Second, in case of financial distress, ‘insurance runs’ are less likely to occur as the termination of a life insurance contract generally leads to financial penalties for policyholders, therefore ensuring a form of bail-in capacity for insurance companies. For non-life insurance, such ‘runs’ are actually impossible unless massive and coordinated fraud, as the payment is triggered by an external event, and not controlled by the policyholder (a car accident, a natural catastrophe etc.)

Third, insurance companies are, within the scope of their traditional activities, much less exposed to financial risks as they are much less indebted and leveraged than other financial institutions.

5.3 THE FUTURE OF INSURANCE

Insurance as we know it today in mature economies is the result of the conjunction of many different inputs: social preferences around risk management; appetite for monetized and financial tools; a capitalist economic model; and subtle division of roles between private and public agents around large social risk (health, longevity and climate).

The degree of financial sophistication we have reached today will therefore undoubtedly be put under pressure by many changes and challenges created by our economic, financial and social evolutions. The role that insurance plays today in our economic functioning is likely to evolve, because of major changes in: (1) technology and Big Data capabilities, in particular opening new understanding or risks and inter-

¹⁹ One could also argue that over-insurance could induce excessive risk-taking but such possibility is balanced by insurers’ pricing practices through bonus-malus mechanisms. We consider downsides with regard to ineffective allocation of resources.

individual financial interdependencies (crowd-funding, peer-insurance...); (2) the very nature of risk as highlighted by the highly correlated, unpredictable and interdependent nature of the global climate risk; and (3) renewed social expectations around risk, with a much lower acceptance of risk itself, and the primacy given to prevention over compensation and reparation.

In turn, economic development leads insurance to be everywhere and often compulsory (starting often with motor insurance), and there is no reason not to expect that a similar pattern would be observed in emerging economies where greater economic development and rising income will lead households, the state and local corporations to seek more optimal collective risk management schemes. Innovative private-public initiatives have been for instance launched around the World Bank, the World Health Organization on Road Safety for emerging countries, with private insurers taking part to this global effort.²⁰

²⁰ https://cdn.axa.com/www-axa-com%2F86762efe-37b9-4aeb-898f-425fa9ba0be7_axa_pr_20151119.pdf

CONCLUSION

This paper has presented a framework for describing the variety of contributions that modern insurance makes to macroeconomic performance and economic development. There are three main levers: the role of insurance in the mechanisms of economic growth; the role of insurance in stabilizing individual incomes and the economic cycle; and the role of insurance in redistributing risk and misfortunes among people and over time.

The role of modern insurance is multilayered. By managing risks, insurance allows individuals and companies to take risks and innovate. Insurance also reduces the level of interest rates, by lowering default probabilities and investing with long-term horizons. Finally, insurance modifies the level and allocation of individual and aggregated savings, leading to a more optimal allocation of capital. By doing so, it has an impact on the economic cycle, the nature of economic development and on the distribution of income and shocks across economic agents.

Interestingly, some of these observations rely on the long-established methods of pooling and mutualizing risk, while others are linked to the financial, statistical and sophisticated form that insurance has taken since the late nineteenth century.

Given the major changes in the risks created by technology and social evolutions, the new tools and capabilities emerging as well as the social acceptance of risk and the growing importance given to prevention, one cannot predict how the macroeconomic role of insurance will evolve. But as all human societies organized over time to reduce uncertainty by collectively managing risks, we can trust that insurance mechanisms will continue to exist in some form.

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