



THE WILLIAM DAVIDSON INSTITUTE  
AT THE UNIVERSITY OF MICHIGAN

# **EU Enlargement and Monetary Regimes from the Insurance Model Perspectives**

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William Davidson Institute Working Paper Number 997  
June 2010

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**Summary:** Some ten years ago, Michael Dooley (Dooley, 1997; Dooley, 2000) put forward an insurance model of currency crises, which after some modifications gives a good theoretical basis for explanation of the overall dynamics of the post communist transformation and diversity across countries and periods. The article analyses, within the framework of *the insurance model*, the role of monetary regimes (currency anchor) and EU enlargement (political and geostrategic anchor) and their relationships. The insurance game model not only contains an explanatory power, but it also has the potential to suggest a range of measures that could be useful in overcoming the "bad" dynamics, which we are witnessing today not only in the new member-states, but also EU-wide.

**JEL codes:** F33, F36, P20, P30

**Key words:** post communist transformation, monetary regimes, insurance model of currency crisis

June 2010

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# EU Enlargement and Monetary Regimes from the Insurance Model Perspectives

## I. Introduction

No in-depth observations are required to see that the economic, political and in general social behaviour of individuals, groups, elites, and key players in the post-communist countries has changed after these countries joined EU. Indeed, these changes manifest themselves to a different extent and take various forms. Following the EU accession, certain trends, such as the lack of motivation and discipline, non-cooperation and nationalism, are clearly observable. At the concrete economic level, this is also evident with fiscal discipline being largely undermined and public finances registering fast deficit trends, currency anchors losing their credibility and discipline effects and private sector debt growing rapidly. The ensuing trend was of an economic system based on accumulating debt rather than on fiscal and monetary discipline<sup>1</sup>.

In this situation, the logical question arises: How could we account for this change in the new countries? In fact, this question arises not only when observing the period of membership, but also when we look at the entire period of transformation – the 20 years of cyclic and uneven developments of alternating discipline with voluntarism, cooperation with opportunism<sup>2</sup>. This same problem also comes up when we try to find an explanation for the differences in the evolution and the diversity of trajectories across countries, periods, and geographic areas (the so-called “variety of transformation”)<sup>3</sup>.

The theoretical answers to these issues can be various but many common elements and theoretical bridges often link them. In my view, the *insurance model of currency crises* proposed more than ten years ago by Michael Dooley (Dooley, 1997; Dooley, 2000) and

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<sup>1</sup>Actually, what is now happening in Greece and in the euro area in general has similar explanations with those given in this article.

<sup>2</sup> See Ialnazov and Nenovsky (2011), about the interpretation of transition from the perspective of cooperation and game theory. On social anchors and the euro-integration process, see also Ialnazov (2003).

<sup>3</sup> Without exhaustiveness, we could mention Abdelal (2001), Aslund (2002), Colombatto (2002), Beck and Laeven (2005), Csaba (2007), Pejovich (2003), Sandholtz and Taagepera (2005), Winiecki (2004), etc.

empirically applied to the East Asian and Latin American countries (Chinn et al., 1999), after being expanded and given a new theoretical interpretation, provides good possibilities for analysing the post communist evolution. This model, when examined within a broader context (not in its narrow meaning as the currency crises interpretation), as in this particular case the overall dynamics of the economic system, holds an extraordinary potential for development by including a number of elements from other models and theories. Expanded and enriched, while also given a new direction, the insurance game model acquires both an explanatory power and the potential to apply a set of measures that could be useful for dealing with the so-called "bad" dynamics witnessed not only in the new EU member-states, but at the EU level as well. The insurance model offers a number of concrete ideas about the level of collateral (foreign reserves), about the relationship between monetary regime (currency anchor) and euro membership (political anchor), and many others.

The article's main objectives, and the novelties relative to previous studies, are to propose the building blocks of a theoretical model that could explain the dynamics of post-communist countries. The aim is to substantiate the logical succession of cause-and-effect relations and their possible interpretations. After a brief outline of Dooley's insurance model, we offer our argumentation of the directions in which the model could be expanded and how it could be adapted for the purpose of the interpretation of the post-communist countries. The article suggests two types of formalizations and illustrations of the model: the first by means of a simple linear model and the second, using a graphical representation and introducing some new concepts such as "insurance possibility frontier", "market for insurable funds", etc. Finally, we offer a discussion on the theoretical and empirical potentials and limitations of the proposed model.

## **II. Dooley's insurance model and its extensions for post communist period**

Within the context of discussing currency crises, Michael Dooley put forward a model, a variant of the first generation model of currency crises, expanded to include the issues of moral hazard, the role of banking sector and in general, expanding and redefining assets and liabilities of economic players (Dooley, 1997; 2000).

The main idea of the model is the assumption that there is a logical cause-and-effect chain, which leads to a crisis. The major reason for a crisis is the following. The government is

under a borrowing constraint, i.e. it cannot borrow currently against future revenue. In this situation, its net external assets operate as a tool to achieve two objectives. The first objective is to serve as collateral securing the government itself, its liabilities, external debt mainly. The second objective consists to act as a collateral for the private bank sector liabilities (to non-residents), as it is assumed that the government will fulfil its lender-of-last-resort function. The government becomes a credible insurer and self-insurer. These net government assets (and in Dooley's model these assets are approximated with official foreign reserves), when positive, are considered a free insurance against a bank crisis and serve as a powerful incentive for non-resident investors to use this free insurance. After initial constraint loosening, following some form of initial shock expressed in international interest rates decline, different forms of debt cancellation, accorded credit lines, etc., the return on deposits becomes attractive to non-residents, thereby rising capital inflows. The free insurance intensifies the banks fight for deposits; the banks offer increasingly higher interest rates on these deposits. The capital inflows lead to growing liabilities in the private sector. Once they equalize with the government's net external assets the dynamics reverses, an attack on the insurance fund starts and a crisis begins. The interest rate spread melts and non-residents start withdrawing their deposits. Banks, in turn, are forced to sell assets and collect the deposit insurance from the government. Generally, Dooley believes that there are three preconditions for such a crisis, namely: (i) the external assets of the government should have a net positive figure; (ii) government's commitment should be credible, i.e. the government should be ready to spend these assets to pay its debt and save the banking system, and (iii) private investors should have a free access, i.e. there is no capital control.

Moreover, Dooley's model can be expanded with new elements, related for instance to the role of foreign reserves (collateral) uncertainty, which the government is ready and able to mobilize – i.e. uncertainty seen as a trigger of crisis (Aizenmann and Marion, 1999). Alternatively, by including asymmetry of information (adverse selection) of bank assets (Furman and Stiglitz, 1998), which intensifies with the increase of deposits, the collateral secures increasingly risky liabilities<sup>4</sup>. Subsequently, Dooley's model was applied to Latin America and Asia and gives relatively good explanations of the crises in these regions (Chinn et al., 1999).

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<sup>4</sup> On these models, as well as on a discussion of the currency crises types see also the presentation by Artus (2000) and Allegret (2005).

This in general outlines the theoretical miniature model, which, in my view, could be used as the basis for understanding the developments over the last 20 years in the former socialist countries. What are the directions, in which the model could expand?

First, the model could be interpreted in a much broader sense as a complex linkage between anchor, its credibility and the dynamics of the collateral, linkage that shapes the differences across countries. Second, the model could be expanded to include two anchors (in this case monetary regime and EU membership) while also describing the relationship between them and arriving at a relation of the mutually enhancing *or* eliminating effect of the two anchors. Within a concrete context this could be expressed as the inclusion of three new functional dependences, in particular (i) the insurance premium as a function of the collateral's dynamics (which is implied though not formalized with Dooley) of (ii) foreign reserves as a function of the credibility of the anchor (anchors), and finally – (iii) the relationship between these anchors. Third, the model can include a number of dependences stemming from the relationship between external transfers (in this particular case – EU pre-accession and EU structural funds), moral hazard, deformation of information and incentives, redistribution processes etc.

The insurance game has its specific features during the *three stages of transition* that could be differentiated and interpreted in the following way: the stage one (*T1*) is from the onset of transition until the second half of 1990s when a decision was taken for EU enlargement to include the new countries and the accession processes commenced; the second stage (*T2*) is until the actual EU accession (the beginning of the first decade of 21 c.); and stage three (*T3*) concerns the post EU accession (countries became full members). In a sense, a fourth stage could also be differentiated, i.e. after the adoption of the euro<sup>5</sup>, but we think the character of this stage does not allow placing it at the same level as the other three.

In the *first period T1* – from the collapse of the socialist system until the start of negotiations – the sequence of events and relations is the following. After the Soviet bloc's disintegration, the choice of a geostrategic orientation and national identity became a most pressing issue (for details see Abdelal, 2001), a choice which is key to interpreting the chain of events and the diversity of trajectories across countries and groups of countries. This choice is manifested in

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<sup>5</sup> Currently only Slovakia and Slovenia are euro area members.

two basic anchors, namely economic and political. In our view, money and monetary regimes fulfill the main functions of an economic anchor, while the political regime and the EU membership or non-membership fulfils the basic functions of a political anchor.

Without going into details, we will note that the anchor's main function is to coordinate the expectations, interests, and behaviour of the key social players<sup>6</sup>. The anchor plays two basic roles, i.e. discipline effect and credibility effect. In turn, the two effects are sometimes mutually enforcing, other times they are mutually eliminating.

Thus, the historical review of the last 20 years shows that the countries within the socialist bloc were characterised by different trends and groupings<sup>7</sup>. We could illustrate this with the Baltic countries whose main goal was to part quickly with the Soviet influence and integrate into the modern Western community. This strategic choice needed a signal that would fix the radical abandoning of the rouble zone through the choice of currency board arrangements. Currency board is a legally fixed exchange rate to a strong western currency, monetary base coverage, and elimination of the discretionary monetary policy as "hands-tying mechanisms." Later on, these countries carried out rapid economic and political liberalization as a total negation of the planned system followed by speedy EU integration. Relatively similar, although slower, developments took place in the other Central European countries – Poland, Hungary, the Czech Republic, and Slovakia, while the other countries from South Europe – to mention Bulgaria and Romania – took a different type of trajectory with more variability and hesitations of their monetary regimes and geo-political choices. We are not going to discuss other countries that are currently non-EU member-states; still we could point as an example Ukraine, Serbia, Moldova, and partly Belarus, where the variability of the national choice is high, which precludes the emergence of a stable monetary and political anchor.

Overall, at point *T1*, the economic or monetary anchor was the leading and the only one actually existing, and it was still unclear whether EU would enlarge. It served as a manifestation of the national choice and its task was to indicate a departure from the Soviet bloc and integration into the bloc of modern and advanced market economies (just as the

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<sup>6</sup> The integrating social role of money was noted quite some time ago (see Simmel, 1990 [1900, 1907]), as well as the fact that it is an important part of the national identity (Helleiner, 1998, 2003). As regards the discipline effect, the credibility effect and the confidence effect, and their links, see Raybaut and Torre (2005) who analyse them in relation to the currency boards in Europe. On the role of the broad institutional context, in which a monetary regime fits, see Ball (1999), Nenovsky (2006).

<sup>7</sup> On the evolution of monetary regimes in post communists countries, see Nenovsky (2006, 2009).

adoption of the gold standard in late 19 c. was considered a strategic, national and civilisational choice in some peripheral countries – such as Russia, Japan, the Balkans, etc.). The choice of a fixed exchange rate as a form of a monetary regime was dictated by the desire for credibility, which did not exist at all in the old communist system, even more so that there was no such thing as communist central bank independence. In order for these fixed exchange rate regimes to start functioning, cancellation of foreign debts and accumulation of minimum foreign reserves were needed<sup>8</sup>. This was achieved in various ways – foreign loans were extended; a number of blocked foreign reserves with western countries were recovered; debts were cancelled, etc. This ultimately led to the emergence of a minimum level of credibility and a positive value of net external assets, i.e. of collateral. It was exactly at this time that the insurance game started, whose logic we explained above. The quick liberalization and increased economic flexibility (e.g., one extreme case is Estonia) made it possible to limit and counteract the adverse effects of the insurance process<sup>9</sup>.

At *T2 period* a new anchor emerged, i.e. the decision for enlargement and the start of the negotiation process for membership. It is important to note that at that time no commitments were taken by EU, both in general political terms and in terms of an aid plan for crises, lender-of-last-resort, etc., that could widen the collateral and boost up the insurance game. The lack of a guarantee made it possible for the two anchors (monetary and political) to move in the same direction and in a way to enhance each other. The efforts of the key players, and the public at large, were aimed at complying with the restrictions and preparing for membership. The new anchor introduced the fresh infusion of credibility needed to sustain the growing trend of the insurance game. In other words, the new fresh EU anchor compensated the diminishing marginal importance of the old (monetary) anchor. We can say that the credibility effect and the confidence effect are single acting. Credibility increase led to a strong capital inflow, i.e. to an increase in the banking sector liabilities, to which we could add the pre-accession funds that started to flow in. Some of the countries, especially those from Central Europe, gradually moved to exchange rates that are more flexible or to alternatives of inflation targeting. The Baltic countries retained their fixed exchange rates just

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<sup>8</sup> This bears a resemblance to the policy of mercantilism from past centuries, when international reserves were considered a symbol of autonomy, independence, power and in general part of the reputation of a country (or rather of a monarch).

<sup>9</sup> The existence of flexibility of prices and labour market is the major element for the success of fixed and rigid monetary regimes, which has been known ever since the operation of the gold standard (Desquilbet and Nenovsky, 2005), while it could be theoretically deduced within the conventional theory on currency crises (Irwin, 2004).

as Bulgaria did by introducing a currency board in mid-1997, but tried to compensate with introducing more markets flexibilities.

In the last phase, *T3, after joining EU*, things changed. A range of guarantees emerged, mostly implicit, for intervention in times of crises. The processes of insecurity as regards the value of collateral heightened, and so did the processes of asymmetry of information and moral hazard in the banking system. Generally, the restriction was lifted and a shift to soft budget constraints was made while the credibility effect and the discipline effect started to work on each other adversely<sup>10</sup>. The new anchor began to undermine the credibility of the monetary anchor, notably the fixed exchange rate regimes. Reliance now was upon the new anchor and the old one was no longer appreciated, which caused shock to the collateral and its deterioration (the role of foreign reserves declines while the role of implicit aid increases). In a sense, we can speak of a process of driving out the explicit, visible and clear anchor (monetary regime) by the implicit, invisible and insecure (EU). The first anchor improves the discipline effect while the second worsens it. This holds the analogies with the Gresham's law of bad money driving out good money. The new structural funds amplify moral hazard, deform incentives and motivations, and fuel the fight for these funds' misappropriation. Non-cooperative strategies come to prevail, which ultimately widens social differentiation<sup>11</sup>.

### **III. Two formalized representations of the model**

The above interpretations and expanded versions of Dooley's model could be represented in different ways. Below we have given two such possible variants – the first one is functional

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<sup>10</sup> The danger of loosening budget restriction, increasing moral hazard and diminishing the credibility of monetary authorities within the context of monetary coordination and monetary union have long been an object of analysis, see Rogoff (1985) who demonstrates deterioration of the welfare in the participating countries. As Feldstein points out (1988) "Governments may not take the politically painful steps that they should because they believe that foreign actions will make such policies unnecessary or because they want to use their lack of action as part of a bargaining strategy to induce desire policies on the part of foreign governments", p. 11. The same author also mentions the existence of this "free rider" to EU and the euro area years later (Feldstein (2005)), while today the loosening of budget constraints and the underestimation of this process in EU is recognised, see Bini-Smagini (2010).

<sup>11</sup> In Ialnazov and Nenovsky (2011) the above three phases of post-communist transition are interpreted from the perspectives of the relative predominance of cooperative and non-cooperative strategies within the framework of two types of big social games – "the prisoner's dilemma" (lack of a common goal) and "the stag hunter" (the existence of a common goal). Respectively, these two types of meta-games depend on the existence and the character of anchors. On the adverse impact of foreign aid see the analyses of Bauer (2000), Williamson (2010). In the light of the above we can suggest the hypothesis, extravagant at first glance, that the lower the utilisation of euro funds, the better this economy develops.

and offers a system of linear equations illustrating the cause-and-effect relations, and the second is a graphic representation and introduces some new concepts adapted from other branches of the economic knowledge.

### **Functional representation**

The model in a simplified form could be represented by using the following relations:

$$(1) d^d = a_0 + a_1(r - r^*) - a_2\alpha$$

$$(2) \alpha = \alpha_0 - \alpha_1 F$$

$$(3) F = \beta_0 + \beta_1 \lambda_1$$

Where equation (1) (the only one that we borrow from Dooley) shows demand for deposits by non-residents  $d^d$  as a function of real interest rates on deposits  $r$ , risk-free real interest rates abroad  $r^*$ , and additional return  $\alpha$ , which non-residents would require in case of a lack of insurance. Demand for deposits grows with the increase of interest rates spread and declines with the increase of insurance premium. We introduce the equations (2) and (3) that capture the logic of our model extension. Equation (2) shows the negative link between this premium  $\alpha$  and the collateral, in this case approximated with net external assets of the government, or even closer with foreign reserves  $F$ . Finally, equation (3) indicates the supposedly positive connection between the collateral's dynamics,  $F$ , and the power of the anchor's credibility (in this case the monetary regime)  $\lambda_1$ .

We are examining three periods, of course with all conditionalities. The first period,  $T1$ , covers the time before the start of negotiations for EU membership. The second period,  $T2$ , after start of negotiations until accession, and the third period,  $T3$ , is the period after the official entry. While the first period is characterised by the existence of one anchor, in this case  $\lambda_1$ , which reflects the monetary regime (either exchange rate target or inflation target), in the second and third period a second, already external, anchor emerges (EU membership),  $\lambda_2$ . While in  $T1$  this anchor plays a mobilizing, stimulating and disciplining role for the countries heading for membership, and overall both anchors – internal and external – move in a single direction and act in synchrony.

Thus in  $T2$ :

$$(1) d^d = a_0 + a_1(r - r^*) - a_2\alpha$$

$$(2) \alpha = \alpha_0 - \alpha_1 F$$

$$(3) F = \beta_0 + \beta_1 \lambda_1$$

$$(4) \lambda_1 = \gamma_0 + \gamma_1 \lambda_2$$

The equation (4) describes the amplifying effect of the second anchor on the first anchor (+ $\gamma_1$ ).

And in *T3*:

$$(1) d^d = a_0 + a_1(r - r^*) - a_2\alpha$$

$$(2) \alpha = \alpha_0 - \alpha_1 F$$

$$(3) F = \beta_0 + \beta_1 \lambda_1 + \beta_2 \lambda_2$$

$$(4) \lambda_1 = \gamma_0 - \gamma_1 \lambda_2$$

In this period *T3* there is every logical and empirical evidence to assume that the second, external anchor – EU membership – brings detriment to and undermines the credibility of the monetary regime anchor (- $\gamma_1$ ). Besides, in equation (3), we add the second anchor  $\lambda_2$  in explaining foreign reserves dynamics. Of course, at first approximation, the functional correlations are taken as linear, which is clearly a simplification, because non-linear dependences could be surmised<sup>12</sup>.

In *T1*, after transformations, we arrive at the following dependence between insurance premium and anchor credibility:  $\alpha = \alpha_0 - \alpha_1(\beta_0 + \beta_1 \lambda_1) = \alpha_0 - \alpha_1 \beta_0 - \alpha_1 \beta_1 \lambda_1$ .

From where it follows that  $\frac{d\alpha}{d\lambda_1} = -\alpha_1 \beta_1 < 0$ , and the elasticity of demand for deposits in

relation to the anchor is  $\frac{dd^d}{d\lambda_1} = a_2 \alpha_1 \beta_1 > 0$ .

In *T2* we obtain:  $\lambda_2 = -\frac{\gamma_0}{\gamma_1} + \frac{\lambda_1}{\gamma_1}$ , therefore  $\alpha = \alpha_0 - \alpha_1 \beta_0 - \alpha_1 \beta_1 + \frac{\alpha_1 \beta_2 \gamma_0}{\gamma_1} - \frac{\alpha_1 \beta_2}{\gamma_1} \lambda_1$

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<sup>12</sup> We could presume for example that the premium movement depends not only on the level, but also on the rate of growth of foreign reserves  $\alpha = \alpha_0 - \alpha_1 F - \alpha_2 \frac{dF}{dt}$ .

whence  $\frac{d\alpha}{d\lambda_1} = -\frac{\alpha_1\beta_2}{\gamma_1} < 0$  and  $\frac{dd^d}{d\lambda_1} = \frac{a_2\alpha_1\beta_2}{\gamma_1} > 0$ .

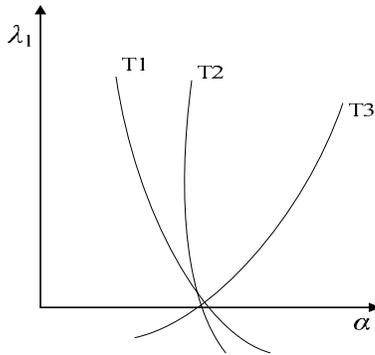
Besides,  $\frac{\alpha_1\beta_2}{\gamma_1} > \alpha_1\beta_1$ , because  $\gamma_1 < 1$ , i.e. the sensitivity of the premium to the credibility of the new anchor is growing, which is logical since the external anchor amplifies the internal one. This, however, is not the case with period  $T3$ , where the new anchor disables the first one and cannot offset it. After the transformation, we have:  $\lambda_2 = \frac{\gamma_0}{\gamma_1} - \frac{\lambda_1}{\gamma_1}$  and consequently

$$\alpha = \alpha_0 - \alpha_1\beta_0 - \alpha_1\beta_1\lambda_1 - \frac{\alpha_1\beta_2\gamma_0}{\gamma_1} + \frac{\alpha_1\beta_2}{\gamma_1}\lambda_1 = \alpha_0 - \alpha_1\beta_0 - \frac{\alpha_1\beta_2\gamma_0}{\gamma_1} + \left(\frac{\alpha_1\beta_2}{\gamma_1} - \alpha_1\beta_1\right)\lambda_1.$$

Thus we derive  $\frac{d\alpha}{d\lambda_1} = \frac{\alpha_1\beta_2}{\gamma_1} - \alpha_1\beta_1 > 0$  and  $\frac{dd^d}{d\lambda_1} = a_2\left(\frac{\alpha_1\beta_2}{\gamma_1} - \alpha_1\beta_1\right) < 0$ .

It is clear that while in the first two periods deposit demand is magnified first by one, then by both anchors through reducing the risk premium, at  $T3$  a reversal occurs with non-residents starting to withdraw their deposits, or at worst, the inflow quickly subsides. Chart 1 shows the presumable relations between anchor  $\lambda_1$  and insurance premium  $\alpha$  in the examined periods  $T1$ ,  $T2$  and  $T3$ .

Chart 1 Anchors dynamics and insurance premium in  $T1$ ,  $T2$  and  $T3$

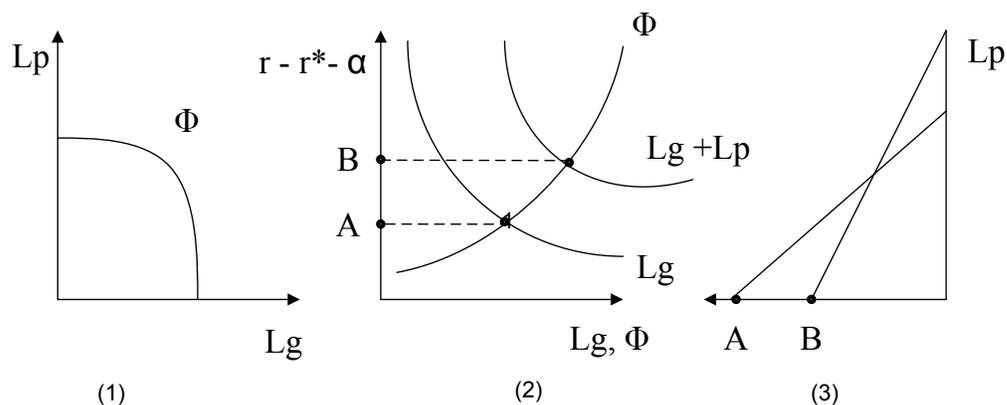


### Graphical representation

The logic of the exposed model could be presented graphically and this allows for playing different scenarios. For this purpose we use and adapt familiar concepts from other spheres of the economic knowledge. To be more specific we introduce (i) the insurance possibilities frontier (similar to the production possibilities frontier), (ii) insurance funds market (similarly

to loanable funds market) and (iii) time structure of private liabilities, deposits (similar to the time structure of capital). The above is triggered by the structure of Roger Garrison's macroeconomic model (Garrison, 2001) used on another occasion and for other purposes.

Chart 2 Graphical presentation of insurance model



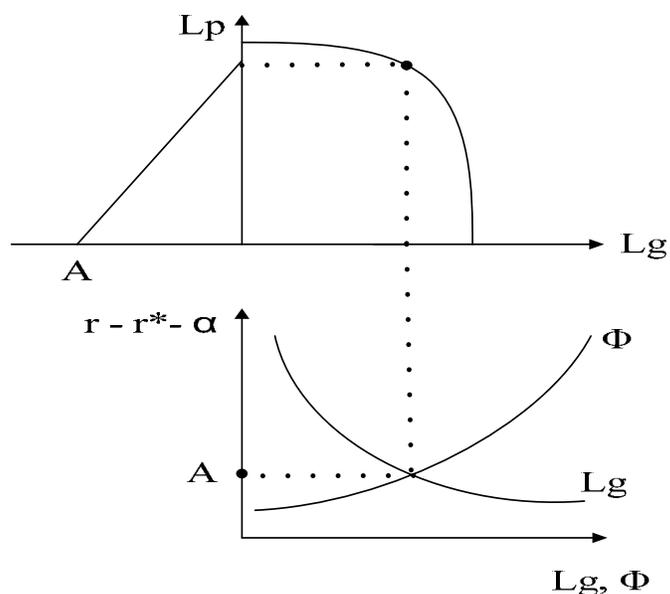
The insurance possibilities frontier is illustrated in Chart (2/1). She shows the possibilities of the government's collateral ( $\Phi$ ) to cover the insurance of different combinations of public liabilities  $Lg$  and private liabilities  $Lp$ . We can see that  $\Phi$  is a resource, an instrument used for two purposes. Further, down we will see that this frontier can change and modify in the period of EU membership.

Chart (2/2) illustrates the insurance funds market (collateral market) where  $\Phi$  stands for the government's supply of funds, while demand is represented by the external liabilities of the public and private sectors ( $Lg + Lp$ ). The cost of these funds is approximated by the interest margin and the insurance premium ( $r - r^* - \alpha$ ). Point  $A$  is characterized by equilibrium and  $\Phi$  covers public liabilities, so we can suppose that at this point  $\alpha = 0$ . In the event of lifting of the restriction, which we discussed in Part 2, i.e. if return is higher than market return, in point  $B$  private liabilities can be insured, i.e. collateralized ( $\Phi > Lg$ ).

Moreover, the last component in the Chart is (2/3), which shows the time structure of private liabilities, of deposits. At a given volume of deposits, long-term deposits are positioned in point  $A$ , and in point  $B$  – the short-term deposits. Foreign depositors can view the maturity structure of deposits as an expression of the risk structure and the preferences for risk and liquidity.

Chart 3 shows a static form of the model with an equilibrium on the insurance funds market reflected in a definite level of the insurance frontier and resulting in a definite structure of deposits<sup>13</sup>. This could be viewed as the natural state of preferences as well as a state, where the insurance game has stopped.

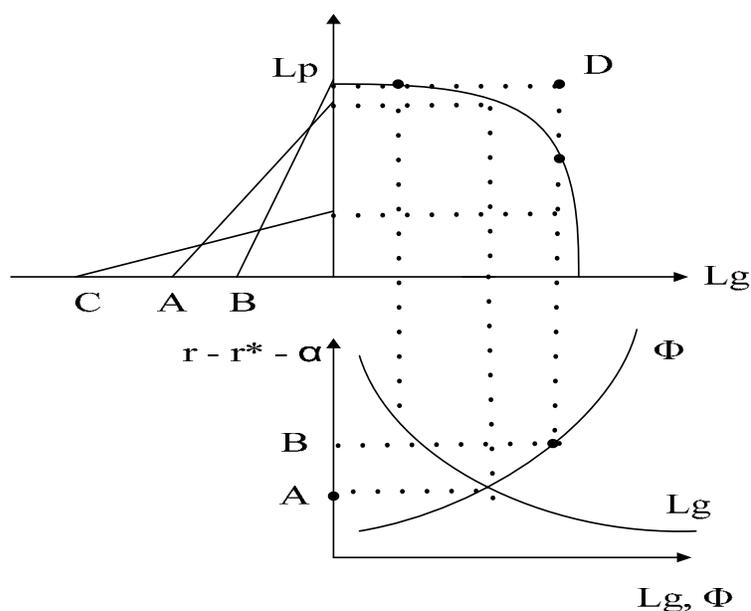
Chart 3 Insurance model in equilibrium



Things take an interesting development when the model is dynamised, and in fact, the possibilities are numerous. We will discuss just a few of them. Chart 4 shows what would follow a shock, the return on deposits exceeds market return, and a free insurance emerges. Then the movement is to point *B* and above the borderline in point *D*, i.e. the insurance possibilities of the collateral are split, ultimately leading to variation of the term structure of deposits. Both shortest-term, speculative, deposits and those with very long maturity increase, which destroys the structure of bank liabilities and assets (in the chart this is presented as moves from *A* to *B*, from *A* to *C*). When  $\Phi$  is conveyed with  $Lg$ , a fight starts for quick appropriation of the free insurance, run on deposits, disinvestment, and crisis in general.

<sup>13</sup> It is possible to include other components of analysis, especially for determining the price of insurance funds, i.e. modelling of the interest rate differential  $\alpha$ .

Chart 4 Insurance model after the shock that bring positive net asset value of the collateral



From here, we can simulate various others shocks and economic policy measures. We could see for instance how EU membership could affect the basic components of the model. The possibilities here are also various, one of the basic could involve bringing insecurity ( $\varepsilon$ ) into the insurance possibilities frontier ( $\Phi \pm \varepsilon$ ); when the volume of the collateral is not clear, which largely speeds up the insurance game.

It would be interesting to note that the model proposed here not only holds a number of external similarities with the model proposed by Roger Garrison (2001), but also actually illustrates dependences and relations, which are in synchrony with the main ideas of Garrison's model. The injection of additional money supply totally fits into the framework of an exogenous shock, which reduces the international interest rates below the national ones, adjusted with the insurance premium, and the resulting above-market return (due to the free insurance) attracts capitals. In turn, this has dynamic effects on the assets and liabilities of banks, consumption, investments, and the structure of production and capital.

### Concluding remarks

In conclusion, it is reasonable to discuss the theoretical and empirical limits of the presented model. First, in theoretical terms there are several possible developments. These concern

mostly refinement and development of all functional relations, assuming their various nonlinear forms. Another direction in which a lot of work is needed is the theoretical compounding of the anchors ( $\lambda_1$  and  $\lambda_2$ ) in order to make them operational and easier to measure. Theoretical improvements also bear on the graphical model, where the key components presented in our paper were in a most common and simple way. This concerns the Insurance possibilities frontier, the market for insurable funds and term structure of deposits, they all should be made more realistic. For example, as already mentioned, it is necessary to incorporate uncertainty and dynamics into Insurance possibilities frontier.

Secondly, the confrontation of our model with reality needs its basic notions and concepts to be quantified and statistically checked. Of course, empirical verification cannot prove a theory by itself but a movement of statistical data in a satisfactory way would be of benefit to the model itself. No doubt, quantification and empirical verification is an extremely difficult work. The important thing is to find the reasonable approximations for the fundamental variables. For example, an approximate of monetary anchor  $\lambda_1$ , could be the behaviour of various monetary variables (currency in circulation/deposits ratios, money multiplier volatility, CDS premiums etc.) or the results based on different polls<sup>14</sup>. Concerning the political, EU anchor  $\lambda_2$  and its impact on new members, things are more complicated<sup>15</sup>. Important quantitative work is necessary when definition of collateral, either explicit or implied, and accurate measurement of public and private liabilities is needed. Finally, it is important to build a coherent set of practical proposals that can form the basis of an economic policy that seeks to prevent and counter the emergence of the insurance game, and to mitigate its consequences when the game appears.

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<sup>14</sup> See for example Valev and Carlson (2007).

<sup>15</sup> See for example the interesting empirical analysis conducted by Mathisen and Mitra (2010), who are trying to differentiate the movement of capital, due to the influence of the EU (convergence factors) and that caused by different types of monetary regimes. In the same direction is the study of Hegerty (2009) on the role of fixed rates in explaining the movement of capital in the Baltic countries and Bulgaria, as well as that of Hobdari and al. (2009) for the financial constraints on companies in Estonia.

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