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**Expected impacts of monetary integration in Hungary**

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## **1. INTRODUCTION**

It is a widely established fact that the introduction of the euro as a single currency and the creation of the euro area in 1999 were historical moments in the history of the European Union (EU) and the world economy. Having looked at EU's history, one can state that Economic and Monetary Union (EMU) has most probably been the largest achievement of European integration so far. Despite the permanent existence of its critics, as well as debates related to the requirements of joining EMU and infringements by some Member States, the development of EMU can be described as continuous. The initial 11 Member States that fulfilled the convergence criteria in 1998 were followed by 6 old and new Member States in the past years. Even though certain other Member States decided not to adopt the euro, majority of the Member States outside the euro area pledged to strive to introduce the euro in the future.

The outcomes of the past 11 years are mainly in line with the original expectations. The euro is the legal tender of approximately 330 million people in 17 out of 27 EU Member States. In terms of GDP, the euro area is second largest in the world behind the United States of America. The euro has been a relatively stable currency in a mainly low inflation environment. Moreover, it has gained very strong positions and its international dimensions have increased. Its use as a reserve and transaction currency has grown and globally it is the second most important international currency behind the US dollar. The euro has stimulated trade, foreign direct investment and cross-border portfolio investments within the euro area. Moreover, it has contributed to diversification of investment and consumer risks via facilitating portfolio-flows among euro area Member States. By stimulating trade within the euro area, the euro has enhanced competition and, thereby, contributed to the convergence of market prices.

### **Relevance and significance of the chosen topic**

The relevance of the dissertation is widely known. By signing the EU Accession Treaty in 2004, Hungary committed itself to meet the requirements and fulfil the convergence criteria to join the euro area and adopt the euro at some point in the future. Even before 2004, euro adoption was already on the agenda and Hungarian Governments announced official target dates. Despite the fact that the competent Hungarian authorities agreed that the euro would, overall, be beneficial for Hungary, the process of euro adoption did not advance. During the past decade, Hungary's

economic performance was almost always far from the possibility to introduce the euro. In this period, poor economic performance of the economy was accompanied by a persistent loss of market confidence that, at some occasions, resulted in drastic reactions of the markets.

The difficulties of the Hungarian economy, arising from faulty economic policy decisions, were later further complicated by the sub-prime crisis that eventually led rapidly to the worldwide financial and economic crisis in 2008. Due to these developments, too, the Hungarian economy soon found itself in deep crisis, and in October 2008 only the combined EU/IMF rescue package helped avoid an economic crash. Later Hungary got into deep recession and the first, however blurry, lights out of the tunnel were visible only in spring 2010.

In 2010, the issue of euro adoption in Hungary is not only important because of the future realisation of the expected net positive impacts, it has also become important because of the need to stabilise the economy via the process of monetary integration. By targeting membership in the euro area, there is, after lost decades, also a historical opportunity to start, at long last, the long-delayed reform measures, by which the Hungarian economy could be stabilised, the growth path of the economy could become more balanced and the exposures of the Hungarian economy could be eliminated.

By late 2010, it is also evident that getting out of the recession is more fragile and difficult than previously thought, thanks to a changed world economy. Based on all these, during Hungary's preparation to euro adoption one has to take into account not just the recent crisis, but also the unpredictable environment of the world economy, as well as the future expectedly characterised by enduring uncertainties and risks.

My chosen topic is also relevant from the euro area's point of view. In 2010, fears of a collapsing euro area and a disappearing euro have gained much focus. The problems of the Irish, Greek, Portuguese and potentially other euro area economies have sometimes caused short-term panics among investors, which led to volatile movements on the markets. By way of an appropriate preparation, and building on the lessons learnt from these euro area Member States' negative example, Hungary can, already before introducing the euro, strive knowingly to pursue an economic policy that makes it possible to avoid those examples. Also from this perspective, introduction of the euro in Hungary is relevant. The challenge is not only to successfully meet all euro adoption requirements, rather Hungary must achieve this with the future in sight so that it has to have and maintain a stability-oriented economic policy and sustainable convergence well ahead of joining the euro area in order to avoid any potential hurdles.

It is a further relevance of the chosen topic that ever since the Millennium, Hungarian Governments have kept euro adoption on their agenda with constant support for the future introduction of the euro. Also, as a foreign currency, the euro has become an important part of many households' and enterprises' life, similar to the former role the German mark (DEM) used to play.

Next to the relevance, it is important to mention the significance of the topic of this dissertation. Euro adoption in Hungary has, already in the 1990s, been connected to the establishment of economic upswing in Hungary. Its logic is that the introduction of the single currency is not only positive from the evident net gains' point of view, it is also beneficial since it generates long-term extra growth and, thereby, brings Hungary closer to the average development level of the EU. There has been a wide support in the Hungarian literature for Hungary to join the euro area with the maximum possible utilization of the expected benefits. Based on all these, adoption of the euro in Hungary has become a task that should be executed in the appropriate near future but, at the same time, with a stable enough economic environment. This implies an economic performance that surpasses the timely fulfilment of the Maastricht criteria. There is much at stake: it is not irrelevant how developed Hungary can become or how long it will take for Hungary to catch up with the average EU development level. On the other side, as witnessed in the past years in Hungary, it is relevant how much it will cost Hungary if the country further runs a non-credible economic policy and, as a consequence, cannot join a group of countries characterised by strong economic performance and development level, as well as the ability to save against speculative attacks in the financial markets.

### **The goal of the research**

Adoption of the euro is not just a currency changeover, it is a significant, comprehensive and complex event of the economic history of a country, impacting all segments of the society and economy. In line with this, the basic goal of my research was to turn to the challenges arising from the introduction of the euro, since I believe that these challenges are not widely known in Hungary. The main focus of the dissertation was set to the expected micro and macro impacts of monetary integration of Hungary. Some of these expected impacts are well known by now, since they are either evident from the nature of monetary integration or can be concluded from empirical facts. There are, however, other impacts arising from the outcome of future monetary integration of Hungary that cannot be predicted with great certainty or by facts.

In my examinations, I took all macro- and microeconomic players into account and reviewed what changes and challenges euro adoption in Hungary would bring for them. When dealing with the

expected impacts, it was not possible to set aside the tasks related to the preparation for euro introduction, as the preparation itself together with euro adoption and its impacts are in strong relation and impact each other.

In the dissertation I presented the most relevant domestic and foreign literature, my own research and the results of my publications dealing with the chosen topic. Moving on, I outlined my own theory on the potential paths of reaching and maintaining sustainable convergence and, moreover, developed my own model using several relevant economic indicators to determine the probability and the conformation of specific factors with which it is possible to estimate whether Hungary can introduce the euro within 3 years of a given year.

It was my goal, during writing of this dissertation, to take into account all those relevant expected impacts arising from Hungary's monetary integration that the economy and the society must be aware of. Knowing about these impacts may be of great help during the preparation phase of euro adoption, and, at the same time it gives the opportunity to identify first, and evaluate later, the potential benefits, possibilities, threats and risks that go together with such a changeover. For the decision makers, the knowledge of all these parameters may give significant help in the decisions to be made at the right time. This, in fact, is the dissertation's goal to be achieved, i.e. to provide for a knowledge base, as a result of a comprehensive analysis, which gives the chance for the society and the national economy to successfully adopt the euro. This can be achieved through appropriate preparations and using a proper changeover strategy, thereby, contributing to a stable economy in Hungary which can be a successful Member State in the euro area.

### **Hypotheses of the research**

The original topic of this dissertation and the hypotheses were created back in 2004, in a period when Hungary's economic fundamentals had started to deteriorate but the economy itself was characterised by better indicators than in later years. In the meantime, key indicators of the Hungarian economy have persistently diverged from those enabling a Member State to join the euro area. Despite this fact, I still consider the topic of this dissertation relevant because the original plan (to adopt the euro) has since become an event that should be put into a much wider framework (of putting the economy to a stable growth path via implementing long-delayed reform measures before and after euro adoption). In 2004 my research was based on the following two hypotheses:

H1 hypothesis: Hungary shall have the chance to adopt the euro before 2010 if it strives to achieve sustainable convergence based on a stability-oriented economic policy. For euro adoption it is not enough to bring the Hungarian economy to a state where "just-in-time"

fulfils the convergence criteria. Long before the introduction of euro in Hungary, there is a need to start overall structural reforms. If the Hungarian economy fails persistently to be on stable growth path, there will be little chance for Hungary to adopt the euro in the foreseeable future.

H2 hypothesis: Based on the strong ties of the Hungarian financial sector to the euro area and its convergence to the financial sector of the euro area, euro adoption in Hungary will have similar, but more humble in volume, impacts to the Hungarian financial sector than it was the case in the euro area Member States after 1999.

## **2. MATERIAL AND METHOD**

### **Sources of statistics and literature**

During writing the dissertation I have used the following sources:

- Online statistics.

Statistics used in the dissertation are mainly from European Commission's AMECO database. The main source of these statistics is the EU Commission's Statistical Services (Eurostat), while the remaining data come from competent national statistical offices.

- Hungarian and foreign literature

There is a huge amount of literature, published in the past 15 years, presenting research work in the fields of Economic and Monetary Union and the euro. This vast literature had to be filtered and only the most relevant ones concerning my chosen topic were presented in the dissertation. The main types of literature used in the dissertation are as follows:

- Primary and secondary EU legislation
- Publications of the European Central Bank
- Publications issued by the European Commission
- Publications of Magyar Nemzeti Bank (Hungary's national central bank)
- Professional publications issued by national (Hungarian and foreign) authorities (national euro changeover plans, impact studies related to the introduction of the euro)
- Publications presenting Hungarian and international research
- Publications presenting my own research
- Other relevant professional publications

- Internet news portals

- My professional experience (working for Magyar Nemzeti Bank, European Central Bank, European Commission and Hungarian Financial Supervisory Authority).

### **Theory on the possible paths of reaching and maintaining sustainable convergence**

In the dissertation I presented my own theory on the possible paths of reaching and maintaining sustainable convergence, which deals with either Member States aiming to join the euro area or

Member States already in the euro area and their potential paths leading to the achievement or maintenance of sustainable convergence. The consequences of and the lessons to be learned from the moves on the presented potential paths were discussed in more detail in Chapter 3 "Results".

### **Model development**

As part of my research, I developed a projection model. The goal of this model development was to be able to estimate, based on macroeconomic indicators for a given year, the probability of Hungary joining the euro area within three years of a given base year. The model development took place in an integrated development environment with the help of logistic regression, using SPSS PASW® Modeler 13 statistical software.

The model development's steps were as follows:

- (1) Compilation of the database, using data of the European Commission AMECO database, and sampling
- (2) Setting target definition, creation of target outcome variable for the given country and given years
- (3) Data filtering
- (4) Analysis of the variables
- (5) Selection of variables, putting the variables into categories
- (6) Development of a projection model, using multivariate logistic regression
- (7) Development of a convergence model, based on the convergence criteria, using multivariate logistic regression
- (8) Model evaluation, running quantitative tests and measuring discrimination power
- (9) Setting the cut-off, preparation of a classification table
- (10) Setting up 3 macroeconomic scenarios for Hungary for the years 2011-2013
- (11) Presentation of results, comparison of the projection and the convergence model, using the results of model development to scenario analysis, conclusions.

The details and the results of the model development were presented in the Chapter entitled "Results".

### **3. RESULTS**

#### **Timing of euro adoption**

By signing the Accession Treaty in 2004, Hungary committed itself, via meeting all requirements of the convergence criteria, to strive to adopt the euro sometime in the future. Joining EMU is obligatory for EU Member States, however, there is no requirement concerning its exact timing. The decision on when to adopt the euro lies with the decision makers of the given Member State who should set the date of euro introduction with appropriate care. Joining the euro area can primarily be influenced by the timing of fulfilment of the convergence criteria. In line with this, a Member State has the choice to aim for real convergence or, alternatively, nominal convergence.

In practical terms, the timing of euro adoption solves the dilemma whether a given Member State should first strengthen its economy and face the challenges of introduction of the euro with stable economic conditions (real convergence) or do everything it can to fulfil all convergence criteria as soon as possible in order to realise at an early stage the benefits that euro adoption can provide (nominal convergence). For the optimum timing of euro adoption, costs arising from the fulfilment of the criteria should be matched to costs of missing the benefits that euro adoption would give. The size of the extra growth, being the difference of persistent benefits and costs, expressed in % of GDP, is a key factor at the optimum planning of EMU accession.

Nominal and real convergence are dependent on each other, while they can boost each other. Reaching nominal convergence can facilitate structural changes and can establish an economic environment that inspires stronger economic growth and, thereby, higher income per capita. Achieving real convergence supports the sustainability of nominal convergence, inter alia, by enhancing competition in the product markets, increasing the flexibility of labour market and lowering the probability of asymmetric shocks.

#### **Possible paths of reaching and maintaining sustainable convergence – own theory**

Hungary must strive so that its economy will achieve high degree of sustainable convergence, enabling the country to join the euro area. It is crucial under what circumstances a Member State achieves this and, later as a euro area Member State, what performance it can deliver. To this end, I presented my own theory showing the possible paths a given Member State can roam before and after joining the euro area.

As for meeting the necessary requirements, if we assume that by the time of the convergence examination a Member State

- has comfortably achieved a high degree of sustainable convergence (1a), or
- has just hardly achieved a high degree of sustainable convergence (1b),
- has failed to achieve a high degree of sustainable convergence (1c).

and, if we assume that Member States in the euro area (1a or 1b) or Member States outside the euro area (1c) can present

- a successful economic performance, having reached or maintained a high degree of sustainable convergence (2a),
- an unsuccessful economic performance, having failed to reach or maintain a high degree of sustainable convergence (2b),

Member States can then roam the following potential paths:

Table 1 – Paths of reaching and maintaining sustainable convergence

	<b>2a</b>	<b>2b</b>
<b>1a</b>	<b>1a2a</b> The Member State has reached a high degree of sustainable convergence, joined the euro area and was able to maintain this high degree of sustainable convergence.	<b>1a2b</b> The Member State has reached a high degree of sustainable convergence, joined the euro area, but was not able to maintain this high degree of sustainable convergence.
<b>1b</b>	<b>1b2a</b> The Member State has just hardly reached a high degree of sustainable convergence, joined the euro area and was able to reach and, later, maintain this high degree of sustainable convergence.	<b>1b2b</b> The Member State has just hardly reached a high degree of sustainable convergence, joined the euro area, but was not able to maintain this high degree of sustainable convergence (in case of one or more reference indicators).
<b>1c</b>	<b>1c2a</b> <b>1c → 1a / 1 b;</b> <b>1a → 1a2a / 1a2b</b> <b>1b → 1b2a/1b2b</b> The Member State has failed to reach a high degree of sustainable convergence, could not join the euro area, but later was able to reach a high degree of sustainable convergence and consequently join the euro area.	<b>1c2b</b> The Member State has failed to reach a high degree of sustainable convergence, could not join the euro area and later it failed to reach a high degree of sustainable convergence.

Source: Own theory

The direction of potential macroeconomic paths are not necessarily fixed, there is a free passage, i.e. a successful path can be followed by an unsuccessful one and vice versa. The length of a given successful/unsuccessful path can be different. Any given macro path can be analysed from the point of view whether an unsuccessful path is the result of discretionary economic policy decisions of a

Member State or the consequences of external effects (like the recent example of deteriorating conditions of the world economy).

Taken all the above into account, the first eleven years of the euro area provide a lot of lessons to be learnt for the Member States, presently outside the euro area, wishing to adopt the euro. Among these lessons, the most important ones are as follows:

- A number of Member States a number of times have presented (lasting) deteriorating results in case of a number of convergence criteria. This is valid mostly in case of the general government deficit and the gross debt, however, there are cases for suddenly increasing levels of HICP inflation, too.
- The breaching of provisions concerning the levels of general government deficit, i.e. those of the Stability and Growth Pact (SGP), has not triggered unambiguous reactions. The reforms of the SGP have not solved all issues and that complicated the observation of the provisions (i.e. there is an opportunity to breach them).
- Taken strictly, only a very limited number of euro area Member States are persistently committed themselves to successfully maintain the high degree of sustainable convergence.
- In Member States, where a high degree of sustainable convergence was first achieved but later (still before 2008) that Member State proved to be unsuccessful in maintaining that convergence, there is a case for the need to implement structural reforms.
- The performance of most of the euro area Member States show that in most cases they go from being successful to being unsuccessful. There are, however cases, where a step back to being successful again took place.

Among the possible strategies, I recommend that Hungary should aim the 1a2a path. In this strategy, the Hungarian economy would first concentrate on real convergence, strengthening the fundamentals of the economy. In my opinion „adopting the euro as soon as possible” and „adopting the euro by a pre-defined time” approaches in themselves do not lead to the solution, these approaches are worth using only after certain conditions eventuate.

### **The expected implementation of the euro changeover in Hungary**

The relevant part of the euro changeover process will begin at the time of Hungary’s entry to ERM II, where the Hungarian forint should be stable for a minimum of 2 years. The convergence examination will be done by the European Commission and the European Central Bank in their convergence report to be published during spring, preceding 1st January of “euro adoption” year. The period ending on 1 January of ”euro adoption” year will be spent on the final preparations.

Soon after the convergence examinations are published, the Hungarian forint shall be given an irrevocable conversion rate versus the euro. After having known this rate, retailers will start dual display of prices, i.e. prices will also be shown in euro. During the final preparation phase, in September and October, front-loading of euro banknotes and coins to credit institutions and sub-frontloading to retailers shall take place under close security supervision of Magyar Nemzeti Bank. In mid-December a starter kit of euro coins shall be available to buy for the general public. On 1st January “euro adoption” year, Hungary shall become a participating Member State (Member State in euro area). Hungary shall have a „big bang” changeover to the euro, i.e. without any transitional period, and on 1st January euro banknotes and coins shall be circulated. After a period of 2 up to 4 weeks, all forint banknotes and coins shall be phased out and after that only euro banknotes and coins will be the only legal tender in Hungary.

### **Model development for estimating the probability of euro adoption in Hungary**

The purpose of my model development was the forecastability, based on a given country’s macroeconomic indicators, of a given country’s probability to join the euro area within 3 years of the base year. In the development process I deemed it necessary to handle the convergence criteria separately, since the improvement of these indicators correlates the probability of euro adoption. Conclusively, I have developed two models: one using the convergence criteria (convergence model), while the other using other indicators (projection model).

The data used in the development are mainly from AMECO database of the European Commission. Data for the past years are based on ESA95, while the earlier data are based on ESA79. The main source of the data is the Statistical Office of the European Communities (Eurostat), the remaining data are from the competent national statistical authorities. Having used the primary data, further cross variables were created. As of 2002, national time series in the euro area Member States have been published in euro. As for national data concerning the pre-2002 period, AMECO database applied the irrevocable conversion rates set between the euro and the former national currencies. Although this approach maintains the continuity of the national time series, cross country comparisons can still be done using time series expressed in ECU (later in EUR). In case of certain time series, AMECO database also includes the short-term biannual economic forecasts issued by the European Commission.

The indicators downloaded and reviewed from AMECO database can be found in the annex of the dissertation. The annex contains the codes of the variables and other comments concerning whether

the given indicator had been involved in the model development. Also this annex includes the list of the involved primary and cross variables (87 variables besides the target and ID variables).

The basis for the development process was provided by the macroeconomic data of all EU Member States (EU27). European Union (EU15 and EU27) aggregates, as well as euro area (EU12 and EU16) aggregates were excluded, as were the data concerning the three Member States that have a special status outside the euro area, i.e. Denmark, Sweden and United Kingdom.

The observation period is: (a) the year of euro adoption and the preceding 10 years for euro area Member States, (b) year 2010 and the preceding 10 years for non euro area Member States. The behaviour period is the 3-year period after the given base year.

In the development process the target variable was defined as follows: within 3 years after the given (base) year has the euro been introduced in the given Member State? In line with this, in case of the observations involved in the analysis, the target variable has been interpreted as Y (yes) or N (no) binary variable.

The filtering process of the analytical database can generally be divided into two steps. In the first step, the technically and content-wise false rows, as well as rows with missing data, are filtered out, and in the second step, rows that are content-wise right, but have extreme values in terms of the codomain (in the pre-defined lower and upper %) get discarded. Since the data of AMECO database are from a controlled and reliable source, this correction was not needed.

In the first stage of the model development no data records were filtered out, therefore the distribution of the target variable remained unchanged (N – 196 observations = 74,24 % / Y – 68 observations = 25,76 %). Due to this, there was no need during the development to make corrections using the decision matrix. I have divided the full sample randomly to two parts: (a) 70% - training sample, (b) 30% - test sample.

For the 87 variables I have made different analyses to see their applicability in the model development:

- Creation of base statistics, including: pieces of non-missing values, average, minimum, maximum, range, variance, standard error of the mean, standard deviation, median and modus.
- Examination of data quality, including: distribution of codomain, type of field, skewness, standard error of the skewness, kurtosis, standard error of the kurtosis, the unique values of the codomain in case of the nominal variables, outliers (standard deviation from average 3x),

extreme values (standard deviation from average 5x), % of non-missing values, pieces of valid records, pieces of missing values.

During the examination of data availability, there was an automatic exclusion of the fields where availability was less than 70%. There was no need to make data imputation, since during the filtering I have kept only those variables that had an appropriate availability. Among the input variables the ID was also deleted in the model database. The outcome of the chosen method of model development was that the transformation of the distribution functions of the input variables was not necessary, the existence of the standard distribution is not a requirement.

Moving on, I have made a correlation analysis for the 87 variables. Since this has created a large amount of data, the examination was done in smaller steps. As part of that, I have divided the sample into ten 70-30 % partitions (with random seed), and using the “Feature Selection node” of the SPSS “Modeling module” (which uses value “p” for importance) I set, step by step, the first 20 most important variables. With these I have made a correlation analysis and excluded all but one variables that were in strong relations. In the next random sample these variables were excluded and the steps described above were repeated until the relation among the remaining variables became appropriate.

Based on economics-related deliberations, some other variables were also excluded: (a) the convergence criteria, since they served the input variables for the convergence model (b) irrelevant variables from comparison’s point of view (number of population, employed, unemployed, labour force) that were mainly used for cross variables.

To transform the models’ input variables to nominal variables I used the “Field Ops module’s binning node”. I chose the “Optimal” method, which is a supervised method that allows the discretisation of the numeral variables in a way that the cut-off points optimize the relation with the target variable. The Minimum Description Length Principle draws behind this method, which is a “forward binning” method. This algorithm puts each case into a category and insert cut-off points so that smaller and smaller categories are created until the stop rule takes effect (entropy minimalisation).

For the development I used the “Modeling module” of SPSS PASW® Modeler 13 statistical software. Within this module I applied the “Auto Classifier” (within this logistical regression) and “Logistic” nodes. As a final result of this model development, two models were created:

1. Variables of the projection model: HVGDE – Gross domestic product at current market prices per person employed (PPS); KNP – GDP purchasing power parities - Units of national currency per PPS; UBLA\_NPTN – Net lending or net borrowing/total population (1000); UXGS NPTN –

Exports of goods and services at current prices / Total population (1000); ZVGDE – Labour share in total factor productivity.

2. Variables of the convergence model: ILN – Nominal long-term interest rates (%); UBLGE – General government net lending or net borrowing, in % of GDP; UDGG – General government consolidated gross debt, in % of GDP; ZCPIH - HICP inflation. HICP inflation was finally left out as this value was missing in many cases.

The discriminative power of the models was back tested with more tools. I used the ROC index, which is serving the statistics of the area under the ROC curve. I made an examination also with Lift-curve, whose value was measured at 10%. Next to the above two tools, I used the classification table, too. Based on the performance indicators the projection model showed unambiguously a better performance than the convergence model.

During the model development I prepared three different macroeconomic scenarios for Hungary for the years 2011, 2012 and 2013. Scenarios were prepared in a professional way. The content of each scenario is as follows:

Table 2 – Macroeconomic scenarios for Hungary (2011-2013)

<b>Scenarios for Hungary (2011-2013)</b>	
<b>Scenario 1</b>	Recession returns, world economy stops growing, Hungary's economy falls back again, further austerity measures are expected.
<b>Scenario 2</b>	Impacts of the crisis drags, Hungarian economy hardly grows, initial reforms get stuck or move very slowly.
<b>Scenario 3</b>	World economy suddenly rebounds, Hungarian economy starts growing rapidly, reforms are pushed ahead.

Source: Own theory

Based on the macroeconomic environment defined by the three scenarios I have prepared an estimation to the variables of the projection and the convergence model, respectively.

Table 3 – Forecast of projection model used for estimating the probability of euro adoption in Hungary

ID	HVGDE PPS	KNP PPS	ZVGDE 2000 100	UBLA NPTN billion ECU/ EUR/1000	UXGS NPTN billion ECU EUR /1000	Estimated output	Probability
Scenario 1							
HU 2011(1)	37,969	179,232	116,434	-0,005000	0,007890	N	0,903
HU 2012(1)	37,969	181,232	116,935	-0,003234	0,005644	N	0,942
HU 2013(1)	38,348	180,790	117,434	-0,000322	0,005223	N	0,942
Scenario 2							
HU 2011(2)	39,131	174,436	115,012	0,000112	0,008323	N	0,903
HU 2012(2)	39,718	172,900	114,873	0,000133	0,008823	N	0,903
HU 2013(2)	40,314	170,224	114,345	0,000145	0,009111	N	0,564
Scenario 3							
HU 2011(3)	39,906	173,323	114,238	0,000156	0,009344	N	0,903
HU 2012(3)	41,302	167,434	113,144	0,000200	0,010232	N	0,564
HU 2013(3)	42,954	164,435	111,898	0,000245	0,013554	N	0,564

Source: Results of own research

Table 4 – Forecast of convergence model used for estimating the probability of euro adoption in Hungary

ID	ILN	UDGG GDP	ZCPIH 2005 100	UBLGE GDP	Estimated output	Probability
Scenario 1						
HU 2011(1)	10,000	82,000	114,551	-4,500	N	0,653
HU 2012(1)	9,000	82,000	116,842	-4,000	N	0,653
HU 2013(1)	9,000	81,000	120,347	-3,500	N	0,653
Scenario 2						
HU 2011(2)	6,800	81,000	115,674	-3,000	N	0,653
HU 2012(2)	6,700	80,000	119,722	-3,000	N	0,653
HU 2013(2)	6,600	78,000	123,913	-3,000	N	0,653
Scenario 3						
HU 2011(3)	6,500	80,000	116,797	-3,000	N	0,653
HU 2012(3)	6,000	77,000	120,885	-3,000	<b>Y</b>	<b>0,855</b>
HU 2013(3)	5,500	75,000	124,511	-2,800	<b>Y</b>	<b>0,855</b>

Source: Results of own research

When applying onto the scenarios, the projection model gives stricter results. The value of the estimated target variable is, in all cases, N, which means that the probability to adopt the euro within 3 years does not reach 0.5. The more favourable scenarios result in a gradual increase of this probability.

Looking at the estimated outcome of the convergence model, one can see that only the realisation of the third (the optimal) scenario gives the chance for Hungary in two years, namely in 2012 and

2013, respectively, to adopt the euro within 3 years. All the other scenarios result in negative outcomes.

Based on the three scenarios defined for Hungary, I conclude that in case the economy is not put on a lasting and stable growth path, there is hardly any chance for Hungary to adopt the euro in the next couple of years.

### **New and novel scientific results**

Based on my studies and examinations carried out during my research, hereby, I present the following new and novel scientific results:

1. At its EU accession, Hungary committed itself to join the euro area at some point in time by meeting the requirements set by the convergence process. However, **establishment of the sustainable convergence indispensable for euro adoption, as well as overall credibility concerning the Hungarian economy have not been priorities for the Hungarian decision makers for at least a decade.**
2. Based on my examinations, I conclude that, in line with my own theory presented, **among the available strategy options, Hungary should first aim at strengthening its economy and establishing real convergence, and later, with a stronger and more stable economy, join the euro area.** Hungary should not strive to meet the formal requirements by deadline only, rather it should set a goal to fulfil the convergence criteria by a comfortable margin so that it will, as a euro area Member State, have a chance to be successful in EMU.
3. My research has given reinforcement in the fact that the **general public in Hungary knows very little about finances** and for this the Government and the financial institutions are to blame. Therefore, in my opinion, the Hungarian Government should introduce general finances in the national education plan, and appropriate information materials should be available for the general public. At the same time, the general public will have to prepare for and adapt to the new reality to be caused by the introduction of euro. **Hungary shall be moderately affected by psycho-sociological impacts arising from euro adoption.** It is highly advisable that **recommendations issued by the European Commission should be implemented more strictly in Hungary**, while the Hungarian authorities responsible for consumer protection should step up rigorously.
4. **It is expected that preparation for euro adoption shall have a sizeable costs, at the same time the corporate sector may reckon with long-term profit increases that will**

**offset the one-off preparation costs.** There is enough time for the Hungarian corporate sector to make the necessary preparations for the euro. The foreign parent companies registered in the euro area may be of great help for their daughters during the preparations.

5. **Euro adoption in Hungary shall bring a generally favourable, more stable than before environment for the Hungarian financial sector. Joining EMU shall** expectedly act, in medium to long-term, as a catalyst and **reinforce underlying trends and processes** in the Hungarian financial sector. Stronger competition in the sector will put profitability under pressure and may lead to growing geographical diversification and internationalisation, as well as larger conglomerations and more mergers and acquisitions. The experience of the parent institutions in the euro area can give significant help to the Hungarian institutions.

6. After having studied the relevant documentation of the concerned Member States, I conclude that at the time of the euro changeover in Hungary, the **practical experience of the 17 euro area members will be of great help for the Hungarian authorities,** as Hungary will be able to use readily available recipes in specific fields. As for the learning of new price/value ratios, the Slovenian case may be a good reference for Hungary.

7. **Based on my model development I conclude that in case of Hungary, the possibility to join the euro area within 3 years can be better forecast with indicators contributing to real convergence than with those to nominal convergence.** The estimated outcomes of the projection model based on real factors are more conservative, thus in the long run I deem the forecast based on them more stable and reliable in professional terms.

8. As a result of the model development, and based on the scenarios given to Hungary for the years 2011-2013, I conclude that **in the absence of putting the economy to a significant and lasting growth path, there is no chance for Hungary in the coming years to join the euro area and introduce the euro along the strategy I consider desirable, i.e. an entrance strategy based on real convergence.**

#### **4. CONSEQUENCES AND RECOMMENDATIONS**

When joining the EU in 2004 Hungary committed itself to adopt the euro after the convergence process. Based on my examinations, I conclude that from macroeconomic point of view, the introduction of the euro shall, overall, be beneficial for Hungary. The sooner euro adoption in Hungary takes place, the earlier Hungary can enjoy its benefits.

Hungarian authorities will have to decide on the timing of euro adoption and must take into account all sacrifices of fulfilling the convergence criteria and the extra benefits arising from euro introduction, respectively. Building upon my research, the best strategy for Hungary to join the euro area is to target real convergence first and start the euro adoption process only thereafter with a reinforced and more stable economy.

Hungary must not only reckon with the same strict conditions under which euro preparedness is examined, as it was the case with the 17 euro area Member States, it will have to prepare for an even more rigorous framework due to former years' examples of Member States breaching the provisions and Hungary's persistent loss of credibility in the markets, respectively. Taken all these into account, Hungary must set a goal to comfortably fulfil all necessary requirements before joining the euro area.

Moving on, one of the most significant lessons to be learnt is that it is not enough to have a near fulfilment of the convergence criteria because several euro area Member States' example have shown that these countries had not been successful in the euro area. My examinations have reinforced my hypothesis that in order to be able to fulfil the convergence criteria comfortably, there will have to be a major change in Hungary's economy with structural reforms and the economy itself being put on a stable growth path. As a conclusion, in 2010 Hungary has no chance whatsoever in the short and medium term to adopt the euro and any effort for it in the coming years could easily lead to Hungary being in the euro area as a problem country.

The most important message for decision makers in Hungary is that there should be speak about Hungary's introduction of the euro only if decision makers and the economic policy are consistent and credible and, moreover, they strive to gradually achieve a high degree of sustainable convergence. First steps along the monetary integration process, i.e. joining ERM II, should be taken only when the Hungarian economy stabilizes and the conditions of the world economy are calm.

Based on my research, I am of the opinion that after the continuous economic policy mistakes of the past decade, the first and foremost task for Hungary is to finally start to initiate and implement

reforms that contribute to a durable uplifting of the economy and put it onto a stable growth path. Similarly important is to earn back the trust of the markets by establishing credibility for the Hungarian economic policy and currency. All measures pointing opposite directions will postpone the possibility for Hungary to join the euro area.

After having studied the experience of euro area Member States I conclude that introduction of the euro in Hungary shall go together with serious economic and social sacrifices and therefore the whole country will have to get together to realise this project. Changeover to the euro will be, on one hand, a new chapter in Hungarian economic history due to its complexity and socio-economic significance, while on the other hand, it will give a new opportunity for Hungary to get closer to the EU average level of development.

Due to the still low level of financial culture and banking relations of the general public in Hungary, euro adoption will require a serious preparation and adaptation from the population.

As a consequence of my research I conclude that the corporate sector in Hungary shall have to face sizeable preparation costs before joining EMU, however, offsetting these one-off costs, the sector can expect significant long-term profit growth by exploiting the economic benefits and related possibilities presented in the dissertation.

My examinations have reinforced my hypothesis that EMU will have similar, though more humble in volume, effects on the Hungarian financial sector than it was the case with the other euro area Member States. The reason for it is that the Hungarian financial sector has strong ties to the financial sectors of the EMU countries, and additionally, it converges to the EMU financial system. Building upon my studies of the Hungarian financial system, I am of the opinion that joining EMU shall be, in medium to long-term, a catalyst and will reinforce the already existing processes and trends in the Hungarian financial sector. Growing competition in the financial sector will put profitably under pressure and may lead to growing geographical diversification and internationalisation, as well as to larger conglomerations and mergers and acquisitions. The experience of the parent institutions in the euro area can be of great help for their Hungarian daughter institutions. The stable economic environment established by joining the EMU will have an overall positive effect on the Hungarian financial sector.

Having studied the practical aspects concerning the euro changeover it is clear to see that the experiences of the euro area Member States in the fields of application of conversion rules, dual display of prices, preparation and behaviour of the retail sector, the treatment of handicapped people and making the different equipments euro-compatible, etc. shall be available for the Hungarian authorities and that will largely make the preparations easier. Considering the low financial culture

in Hungary, and the lack of experience of the public in such a major change, I deem it necessary that Hungarian authorities should require that the recommendations issued by the European Commission concerning the facilitation of euro changeover be implemented in Hungary by a more rigorous way. Based on the experiences of adverse behaviour by some retailers, it is recommended that the authorities responsible for consumer protection in Hungary should work closely together with Government authorities and prepare an action plan against deliberate behaviour of retailers aimed at tricking consumers.

After having studied the relevant documentation of the concerned Member States I conclude that at the time of euro changeover in Hungary, the practical experience of the 17 euro area members will be of great help for the Hungarian authorities, as Hungary will be able to use available recipes in specific fields.

Finally, having developed a model, I conclude that the possibility to join the euro area within 3 years can be better forecast with indicators contributing to real convergence than with those to nominal convergence. Among the three possible scenarios, applied in my model, relating to Hungary's economy, only the realisation of the third (the optimal) scenario gives the chance for Hungary in 2012 and in 2013, respectively, to adopt the euro within 3 years. All the other possible scenarios give negative results for all other years. My model development has confirmed my hypothesis that in the absence of a persistent growth path for the economy there is no chance for Hungary to introduce the euro in the next couple of years.

## **5. CONCLUSION**

During the past decades, Hungary based its economic growth mainly on external financing and a more dynamic economic growth was accompanied by instability of the external balance. Before 2008 external debt and gross debt had kept growing and real convergence came to a halt. By the time of the 2008 crisis all the above made the Hungarian economy extremely vulnerable. Several structural factors have set back the lasting growth of the Hungarian economy and the 2008 crisis has intensified the underlying problems. One of the lessons of the crisis is that countries following an economic growth model based on strong external financing must suffer from a deeper recession than those financing the economic growth mainly from domestic savings. In the post-crisis period, risk appetite of investors will, for a longer time, not return to the pre-crisis level, therefore the economic growth model of Hungary should be reconsidered because due to the much less available external financing, catching up of the Hungarian economy cannot, even in the medium run, go together with significant deterioration of the external balance.

In 2010 this is the state the Hungarian economy must start to improve from. Hungary committed itself to introduce the euro after the convergence process. The past couple of years have clearly shown that there is only one way of introducing the euro and that is if the parties are fully devoted and set the goal of achieving and maintaining sustainable convergence. This has not been a priority in Hungary for at least a decade.

In my own theory, outlined in the dissertation, I presented the potential paths of achieving and maintaining sustainable convergence. Among the possible paths, I deem the one aiming at reinforcing real convergence and adopting the euro only with a stable economy feasible for Hungary. Compared to the euro area Member States, Hungary must prepare for at least the same or even more rigorous framework within which it should fulfil the convergence criteria. Hungary will have to set a goal to meet the requirements by a larger margin so that it can be a successful Member State in the euro area.

As a result of my research, I presented my own model development. I created two models, a so-called projection and a convergence model, respectively. The projection model gives a better performance. The improvement of the indicators of the projection model provides wealth, growth and more capital for the economy, therefore the possibility of joining the euro area within 3 years can be better projected with indicators contributing to real convergence than with those to nominal convergence. I defined input variables for the two models and using these inputs I created three macroeconomic scenarios for the years 2011-2013. The estimated outputs of the projection model,

based on real factors, are more conservative, thus the estimation based on this I deem more stable and reliable in the longer run. Taken this into account, if the economy does not get to a lasting growth path, there is no chance for Hungary to adopt the euro in the next couple of years. The model development has confirmed my presumption that for Hungary the most desirable strategy is to avoid fast euro adoption, rather the economy should first be stabilised and strengthened. Joining the euro area should only take place with appropriately stable macroeconomic fundamentals.

Changeover to the euro shall go together with lots of challenges, however, the experience of the 17 euro area Member States will be of great help for Hungary. Introduction of the euro will require economic and social sacrifices, therefore there will be a need for joining forces for the successful adoption of euro. In my opinion, it is worth making the short-term sacrifices since the changeover to the euro will expectedly give another chance for Hungary to close the gap and get closer to the EU average level of economic development.

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