Financial Adjustment in Small, Open Economies in Light of the "Impossible Trinity" Trilemma*

István Magas

The study examines the resilience of small and open European economies to external shocks and the various types of financial integration adjustment in an empirical approach for the period between 1993 and 2016. External financial integration has been implemented in all of the examined countries, offering payment channels fully or largely open to foreign countries. The only major difference was in the level of monetary independence and foreign exchange rate stability. We were able to differentiate between two types of adjustment: in type A, financial policy was characterised by a greater level of monetary independence and a lower level of exchange rate stability, while countries that can be classified under type B practically gave up their monetary independence with their euro area membership, and opted for full exchange rate stability. But resilience to external shocks depends not only on the choices determined by the impossible trinity, but also on other macro-prudential factors, especially on the stability of budgetary processes and the repayment of external foreign currency debts. The difficulty to adjust, transcending beyond the limitations of the "trinity trade-off", was confirmed by the case of Portugal and Greece using the euro as their local currency, while the example of the non-euro area member Czech Republic illustrated a traditionally conservative, monetarily independent and successful external financial adjustment, built on flexible exchange rates and interest spreads. Hence there were many types of adjustment, where euro area membership in itself did not mean "bulletproof" protection in every respect. Hungary possibly joining the euro area would certainly improve its external financial resilience, but it would not make the existing competitiveness/development deficits disappear.

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1. Introduction

From the early 1990s all the way through to the 2007–2008 crisis, and in the following period, to what extent can the adjustment of small, open economies to the increasing flows of international capital in the global economy and specifically in the EU be considered uniform? Our short answer is that this adjustment was not uniform, and especially not uniformly successful. Following the global economic crisis, did the resilience to external shocks improve in the small European countries aligned strongly on foreign trade? Essentially yes, is our argument: after the 2008 crisis, resilience to external shocks improved somewhat everywhere. During the intensive period of financial globalisation between 1994 and 2007, according to the mainstream theorem, i.e. the impossibility trilemma proposition, the economic policy of small, open economies did not enable the simultaneous assertion of the trinity requirements of foreign exchange rate stability, monetary independence and international capital market integration. We shall examine the validity of this theorem until the year 2014 (since reliable data are only available until that year), striving to identify the various types of adjustment and where the countries of the Central and Eastern European region, in particular Hungary, can be classified. We also seek to answer whether the evolution of the trilemma indices and the experiences of other small, open economies provide any guidance for Hungary in joining the euro area. These are the fundamental questions of this study. The approach is model-based and empirical in nature, in that we present the evolution of the so-called "impossible" trilemma indices for the examined countries. We illustrate the adjustment patterns that could be identified in the small, open economies involved in the analysis, and to what extent it was possible to assert the simultaneous requirements of foreign exchange stability, monetary independence and capital market opening.

Although the theorem of the "impossible trinity" is not a strict mathematical statement that is particularly difficult to quantify, it still expresses the difficulty embodied by the conflicting ambition of simultaneously ensuring capital market integration, monetary independence and foreign-exchange rate stability well. Namely, it is impossible to simultaneously take successful action in all three areas. One of the goals must be abandoned, partially or entirely: strengthening any two goals can only take place at the expense of the third. If we nonetheless try to somehow measure the ultimate, aggregate success of such balancing of the goals, then we must define the parameters that can capture the change in the key variables of the trilemma. To this end, we use the unified trilemma index. *According to Aizenman* (*2010*) the variables most influencing the performance of the three objectives are the following: the difference between the prevailing domestic interest rates and those of the main commercial partners of the countries in question; the extent of the restrictions affecting capital transactions in the current account; and the exchange rate stability of the domestic currency.

The most important result we want to present is that one of the core requirements of international capital market integration, i.e. the offering of open capital accounts, was implemented in almost every analysed country; there were differences only in the levels of monetary independence and foreign exchange rate stability, in the size of the exchange rate stability indices. We could differentiate between two fundamental types of adjustment: one that opted for relative monetary independence and lower exchange rate stability, referred to as type A (for example Hungary or the Czech Republic); and the other (type B), which gave up monetary independence and exchange rate stability, and opted for full financial integration (such as Austria, Slovenia, Slovakia, Estonia, Portugal, Greece, and with its own currency, Denmark). After the introduction we shall briefly review the early initial theoretical frameworks, the original Mundell–Fleming (M–F) model, then its extensions, modernised and measurable versions, and finally the trilemma-index structure itself. Thereafter, in Section 3, we shall present the evolution of the so-called trilemma indices in terms of the typical, small, open EU economies for the period between 1993 and 2014. The study ends with a summary and conclusion.

2. A theoretical framework still valid today

2.1. Message of the Mundell–Fleming (M–F) model

From the turn of the millennium until the crisis in 2007 and 2008, international capital movements still enjoyed a very liberalised framework within the global economy. National measures regulating the transactions influencing capital accounts and current accounts still imposed few restrictions and generally offered friendly conditions for international capital flows. After the crisis many countries introduced restrictions on open capital accounts once again, and it was difficult to maintain the previously obtained levels of financial integration at that time. However, the possibilities of national economic policy adjustment to global financial processes and the tools of adjustment did not change after the financial crisis of 2007–2008, although the attitudes, actions and opportunities of central banks changed considerably (*Lehmann – Palotai – Virág (ed.) 2017*). Even today, one of the best original theoretical frameworks for understanding adjustment problems, providing the best approach in terms of small open national economies, is the Mundell–Fleming model (hereinafter: M–F model).[1] So we shall take the version of the M–F model (bearing the names of the Canadian-American economists) assuming flexible foreign exchange rates and free movement of capital as our starting point. Let's see what this frequently cited model tells us.

The following baseline can serve as our starting point: international capital movements are fundamentally driven by differences between domestic and external real interest rates and the exchange rates of currencies are essentially determined by the market.

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[1] *Mundell* (*1968*)*; Fleming* (*1971,* originally: *1962*)

Within such a theoretical framework, the monetary and fiscal measures of financial policies pursued by domestic financial authorities can only operate with limited efficiency. If the level of domestic interest rates, and parallel to this, the difference between domestic and external interest rates increases, thanks to the central bank, this increases capital inflows and impedes capital outflows, improving the balance of payments. In the theoretical scheme of the M-F model, but also in reality, two developments can be expected in a fully liberalised capital market environment:

1. For small open economies, assuming floating or flexible exchange rates, the uncertainty associated with monetary policy steps increases in terms of their ultimate results.

2. Domestic financial governments are able, though only to a limited extent, to utilise the tools of monetary and fiscal regulation to create internal and external equilibriums, without also trying to strongly and directly influence the exchange rate itself.
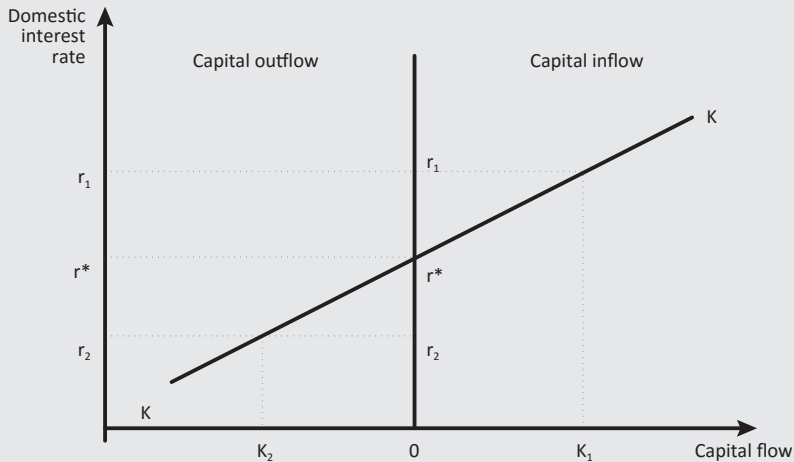
The statements covered by the above two points are general findings, which give rise to numerous theoretical and practical complications, and to some exceptional situations.

Let us now look at the details and the internal logic of the original M-F model.

The baseline assumption is that the base case in the model is a country that is sufficiently small for its own monetary movements not to significantly influence the pricing and income conditions and interest levels of other countries. The internal price level is given and fixed in the model; money supply is controlled and base interest rates are determined by the central bank. Moreover, from the perspective of a domestic investor, domestic and foreign bonds are not perfect substitutes for one another (they are imperfect substitutes, meaning that substitution is not fully ensured in bond portfolios), so whenever the interest difference changes, only some investors switch from one – domestic – bond to another – foreign – bond. Therefore, increased demand for a bond with a higher real return does not automatically trigger the disappearance of the existing yield difference. The central bank can influence interest levels with open market operations. By making purchases it can increase cash volumes and reduce the outstanding volume of bonds, while selling bonds it can reduce cash volumes and increase the yield of domestic bonds. In the M-F model, the constant interest difference results in constant capital flows (this was a fairly strong assumption at the birth of the theory in terms of reality, when the extent and the speed of capital flows were only a fragment of today's rates; this was immediately criticised by many, but did not weaken the strength, still recognised today, of the original logical structure. Let us assume that the domestic central bank of the small country increases its base rate (since the price level is fixed, this will always entail an increase in real yields). In this case, foreign investor demand for

domestic bonds increases, and as long as the difference persists, foreign investors continue increasing the share of domestic bonds within their own portfolios (*Figure 1*).

Figure 1
Interest rates and capital flows in the M-F model

Note: r* denotes the foreign interest rate.
Source: Edited, based on Kenen (1989)

The KK line shows the correlation between capital movements and levels of domestic and foreign interest rates. The examined variables are domestic and foreign interest rate levels shown on the vertical axis, and capital inflow and outflow shown on the horizontal axis. The functional relationship shown on the figure is strongly simplistic because it assumes linearity, which rarely exists in reality. The assumed function continuity is not realistic either. Yet despite these simplifications, the "textbook core logic" initiating financial flows between countries still stands up today, i.e. substituting securities (government bonds in the base case) bearing different returns, but with practically the same risk and maturity in the typical portfolios.

If the foreign interest rate is Or^* and domestic interest rates are Or_1 and Or_2, we can talk about OK_1 capital inflow and OK_2 capital outflow as a function of the interest differences. So, if $Or_1 > Or^*$, then we have a capital inflow, and if $Or_2 < Or^*$, then we have a capital outflow. The steepness of the KK slope depends on the degree of substitutability between domestic and foreign bonds. If the substitution is almost perfect, then the KK line is close to horizontal. However, assuming perfect substitutability the central bank would lose its control over interest rate levels. The higher the degree of substitutability the more central bank involvement is needed to maintain the existing interest difference and thereby capital inflow. The degree of substitutability depends on investors' risk aversion.

There is no mention of foreign exchange rate risk in this simple model since the structure assumes national bonds and deposits in an identical currency, but earning different interest in each country, such as the bonds of euro-area member states. We will naturally relax this simplification later on (allowing countries using other currencies to enter and permitting covered interest parity, according to which the degree of expected appreciation/depreciation of the domestic currency is identical with the pro rata degree of the nominal interest differential).

2.2. Exchange rate flexibility, money and commodity markets

How do capital movements influence exchange rates? The short answer is: the more capital movement is sensitive to interest differences and to future expectations, the more sensitive the reaction of exchange rates will be and the more we can feel the economy's openness on the commodity markets and in the balance of payments. This, in itself, creates an instability factor in adjustment since managing a suddenly weakening exchange rate will not be unambiguous, the central bank cannot just follow domestic equilibrium objectives. So it must also be considered that the effects of the disturbed exchange rate may have a strong influence not just on the balance of payments, but also on the formation of severe domestic imbalances. This central bank policy, i.e. always vigilantly watching the exchange rate, but generally not intervening, is perhaps the key message of the M-F model still valid today. This original foreign-domestic balance dilemma, which later expanded into a trilemma, has essentially remained unchanged until today.

Previously, prior to the upswing of financial liberalisation, the question as to why an internal macro balance cannot be exclusively maintained with fiscal measures seemed justified. Without reviewing the related details and complications, we can say that under a regime with intensive international capital flows and flexible exchange rates, fiscal policy is increasingly losing ground as the main effective instrument in influencing the domestic business cycle.

The concept of balance appearing in the M–F model is rather strict. Those responsible for a domestic economic policy harmoniously adjusted to the global money markets must pay attention to three objectives at the same time, but following them simultaneously is very difficult. What is more, it is almost impossible at the theoretical level. The three objectives to be followed simultaneously are as follows:

a) A *national monetary policy* that is sufficiently *independent;*

b) A relatively *stable foreign exchange* rate that can be influenced through own monetary measures;

c) *Integration of international capital markets*: access to external borrowing, lending and related foreign savings opportunities offered by the open financial capital account.

The simultaneous assertion of these three monetary policy objectives – i.e. monetary independence, foreign exchange rate stability and open capital accounts – is simply not possible. So this dilemma has been named the "impossible trinity" in literature.

It is worthwhile briefly explaining this impossibility issue: promoting any two objectives of the "trinity" can only happen at the expense of the third objective. For example, capital market openness and an autonomous monetary policy are only possible if we give up exchange rate stability; monetary independence and a stable foreign exchange rate are only possible with capital flow limitations; while exchange rate stability and liberalised capital flows rule out an independent monetary policy.

2.3. Financial stability and resilience to external shocks

The huge volume growth per se in international bond investments, especially government bonds – the "sovereign" segment – increased the chance of negative risks spreading like shocks, and even two decades ago foreshadowed the increased vulnerability of countries exposed to large foreign exchange debt, if they were considered small compared to the overall size of the bond market. The reasons for the financial crises in South East Asia in 1998, in Argentina in 2001, in Hungary in 2008 and in Greece, Ireland and Portugal in 2010 varied, and the courses of events were also different; the responses of the banking systems and central-bank policies differed too, but everywhere the crises strongly correlated with the weaknesses of government budgets (i.e. with difficulties in financing sovereign debt). The expressions "external financial shock" and "contagion threat" became part of everyday language, but more importantly: improving resilience became a primary task.

The methodology for measuring resilience to shocks has also improved considerably over the past two decades. The measurement itself became more standard, greatly aiding comparability. Yet the starting point and the most important components are still defined today by a country's ability to use its own resources, foreign currency reserves and short-term loans to finance the – external – pressure, increased to extreme levels in some cases, to sell the bonds held by non-residents in the case of sudden external shocks and high volume capital movements.

The methodological developments are well demonstrated by the resistance index – constructed by *Rojas-Suarez* (*2015*) – which is also considered authoritative by the IMF for emerging economies. The index comprises seven components, which are the following:

1. Current account deficit as percentage of GDP; X_1

2. Total external debt as percentage of GDP; X_2

3. Short-term debt to foreign-exchange reserves; X_3

4. Annual budget deficit as percentage of GDP; X_4

5. Government debt as percentage of GDP; X_5

6. Error of inflation targeting (deviation from target); X_6

7. Change in financial fragility based on credit cycles. X_7

Only factors 6 and 7 can be regarded as explicitly new variables in the index compared to previous perceptions, which also take into account the success of the inflation targeting and the role of the credit cycle. The success in attaining the inflation target is measured by taking the square of the differences between the target and the actual figure in a given period. The financial fragility potentially emerging in credit cycles is defined as the product of the difference between the upper limit (cap) of the credit growth rate that can still be maintained in the boom phase of the economy and the real credit growth realised during the examined period, and the difference between the credit growth rate realised in the bust period of the economy and the still acceptable (lower limit) of the credit growth rate. We can describe this in a formula as follows:

$$\text{FinFrag} = (dRC^{boom} - dRC_t) \cdot (dRC_t - dRC^{bust}), \tag{1}$$

where dRC^{boom} is the upper limit of the change in credit production and dRC^{bust} is its lower limit.

The resistance index itself is a composite indicator, where +1.5 is the best attainable value and −1.5 is the worst. Based on *Rojas-Suarez (2015, pp. 15–18)* the index structure follows the methodology below.

First, they standardise the seven variables described above, which means that for each of the 21 countries sampled they take the difference between the sample average and the actual data of the given country, then divide it by the standard deviation of the sample. So for example, in the case of country number i, we obtain the constructed standardised variable of X_1^{i*} as follows:

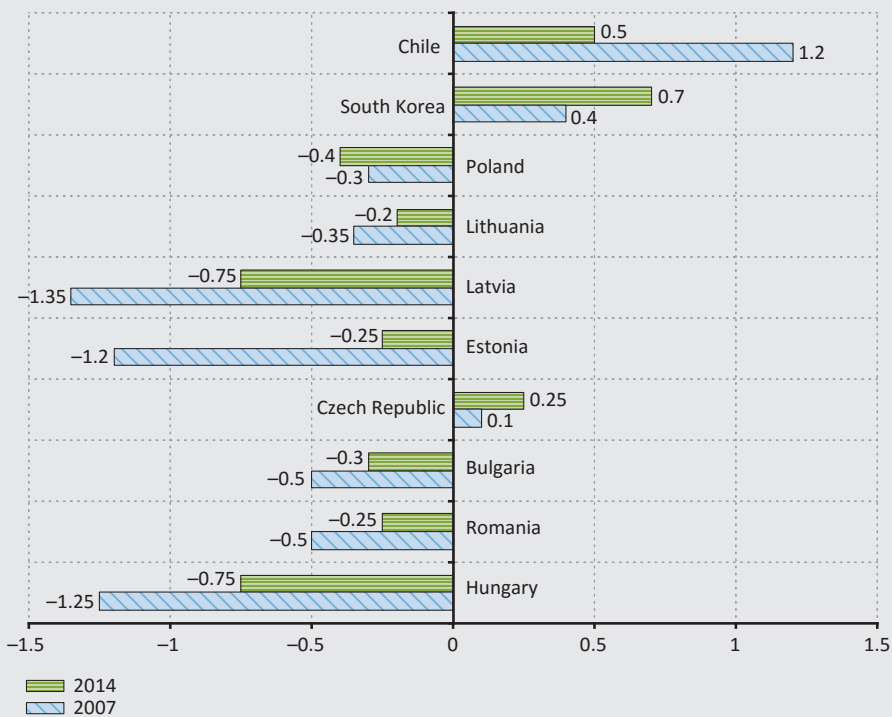$$X_1^{i*} = (X_1^i - AVGX_1) / \sigma_{x1}. \tag{2}$$

If the increase in any given variable reduces resilience, i.e. it increases fragility, then we multiply it by minus 1. For example, variables number 4 and 5, budget deficit/GDP, sovereign debt/GDP, behave like this, so in their case the procedure follows this method. Finally, the standardised measure showing the financial resilience of a country is the simple arithmetical average of the seven indicators, i.e. the measure of resilience to external shocks in the case of country number i is as follows (Shock resistance index, SRI):

$$SRI^i = (X_1^{i*} + X_2^{i*} + X_3^{i*} + X_4^{i*} + X_5^{i*} + X_6^{i*} + X_7^{i*})/7. \tag{3}$$

Figure 2 displays the change in the financial resilience against external shocks of some small open economies in Central and Eastern Europe that were especially vulnerable

during the 1998 global financial crisis, based on the calculation used by *Rojas – Suarez* (*2015).* For comparison purposes, a medium-sized country with a fairly large internal market, Poland, and 2 small open non-European economies, South Korea and Chile, are also shown, which were able to demonstrate a very strong crisis resilience in 2007 and thereafter. As shown on *Figure 2*, on the (+1.5) – (–1.5) scale the higher positive number denotes a higher shock resilience. From the small open economies of Central Europe, the Czech Republic clearly stood out, producing positive values both in 2007/2008 and in the period following the global economic crisis. Latvia, Estonia and Hungary proved to be especially vulnerable during the years of the crisis with values even lower than (–1). Yet by 2014 the resilience of all three countries improved; in the case of the two Baltic states, their euro-area accession (internal devaluation performed in time and their previous sacrifices) helped considerably in improving their resilience. It is worthwhile noting that even the Polish economy with its large internal market displayed a strongly negative, low resilience, and a strongly negative exposure, with its relatively low figure of close to (–0.5) according to the index. But Chile and South Korea stood out as positive counter-examples; these countries had a developed capital market and moderate sovereign debt, and operated as small open economies with good resilience to external financial shocks.

Figure 2
Change in financial resilience in small open economies following the 2007 crisis

Source: Edited based on data of (Rojas-Suarez 2015)

Overall we can conclude that the statistics describing the degree of shock resilience varied greatly in terms of both capital and money market adjustment and the general resilience to external shocks. However, we can also deduce that higher central-bank foreign exchange reserves, lower sovereign debt levels and more advanced capital markets provided more protection. In this sense we can therefore say that there is nothing new under the sun. So the question naturally arises as to whether opting for the trinity clearly defines the degree of resilience to external shocks and its different modes? The answer is no. We cannot talk about a clear-cut economic policy success or failure associated with a path managing only the trilemma, i.e. the impossible trinity. But this statement is far from trivial, so let's look at a more thorough statistical overview of the evolution of the trilemma indices.

2.4. Modern extensions and the measurability of the "trinity"

How can we quantify the relative success, or at least some extent thereof, in the adjustment to the three different economy policy targets, and with it, the success of international adjustment? This topic had already been studied by many prior to the 2008 crisis, including *O'Neill* (*2001*)*. Aizenman et al* (*2013*) were the first to offer a measurement technique elaborated in every aspect, suitable for continuous empirical use and built on modern theoretical grounds. We also use the trilemma index they defined and its public database for our analysis.

First though, we briefly have to clarify the issue of measurability, which, as we may suspect, is not high-precision calculus. Let's delve into the devilish details!

2.4.1. Issues of measuring independence and international financial integration. Can we actually measure the impossibility of the "trinity"?

The quantitative analysis of two of the three objectives is fairly simple. Monetary policy can be followed by international prime rates of interest. Although nominal interest rates do not carry any information themselves regarding the monetary independence of a small open economy, in comparison with the interest rates of a larger dominant partner economy, the degree of correlation between the two, i.e. the interest rate levels of the small country and its main partners, can be a good indicator of the degree of independence. We can measure foreign exchange rate stability with the degree of change in the exchange rate. In this case, one of the critical questions is to figure out what is the amount of change over which period that we should consider stable. Comparing the variables of the interest rate difference and the time interval is a difficult task in itself, partly, for example, because although the value set of the correlation is limited (can be between −1 and +1), the value set of the exchange rate change is far from limited. So we must perform transformations on the variables to make them easily comparable.

But financial integration, the liberalisation of the financial (capital) account, does not have a clearly quantifiable variable. Hence the restriction of capital flows can mainly

be accepted as a binary "variable" (it either exists or it doesn't). When restricting the movement of financial capital with varying maturities, these binary variables take the value of 1 when there is no restriction, and 0 when there is a restriction for the given capital type in any given country. But it is more fortunate to work with continuous variables, i.e. ones that can be interpreted even between the two values. To capture the trilemma quantitatively, the ideal scenario would be if all three variables took a value between 0 and 1 (variables normalised to 1). *Joshua Aizenman, Menzie Chinn and Hiro Ito* (*2013*) created a model for this concept. They named the created variables trilemma indices. We used these indices – updated until 2014 on our own website – to analyse the financial adjustment of small open economies between 1993 and 2014.

2.4.2. Structure of the trilemma indices

Monetary independence

The index measuring monetary independence takes the annual correlation of the monthly prime interest rates as its basis by mapping the relationship between the money markets of the analysed country and of the reference country. The index transforms the obtained correlation in the given way:

$$MI = 1 - \frac{corr(i_i, i_j) - (-1)}{1 - (-1)} \, , \tag{4}$$

where index *i* denotes the analysed country and *j* denotes the reference country.

Thanks to this transformation, the variable obtained in this way will fall between 0 and 1. The greater the value of the variable, the greater the country's monetary independence. Reference countries are defined based on the country with which the monetary (interest rate) dependency is the strongest. These reference countries have been defined in the work of *Shambaugh* (*2004*). Australia, Belgium, France, Germany, India, Malaysia, South Africa, the United Kingdom and the United States are found among the reference countries. In the cases where Shambaugh was unable to determine reference countries, the model defines them based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

Foreign exchange rate stability

The basis of the index measuring foreign exchange rate stability (ERS) is the annual standard deviation of the monthly exchange rates. It transforms the standard deviation of the exchange rate between the analysed and the reference country in the following way:

$$ERS = \frac{1}{1 + \dfrac{stdev(exch\_rate)}{|dlogE_t / dt| + 0.01}} \, , \tag{5}$$

where *stdev*(*exch_rate*) is the standard deviation of the exchange rate, while $|dlogE_t/dt|$ is the absolute value of the change in the exchange rate, year after year, using exchange rates for December. Higher values represent a higher degree of satisfaction of the trilemma objective, i.e. a higher figure indicates greater exchange rate stability.

Financial integration

From the binary variables, transforming the degree of financial integration into a continuous variable is maybe the most difficult of the three variables. The created index was examined in a separate study (*Chinn – Ito 2008*) and was named the Chinn–Ito index after its creators; it is referred to as KAOPEN when used as a variable. The index uses the IMF's Annual Reports on Exchange Arrangements and Exchange Restrictions (AREAER).

The binary variables describe the presence of restrictions on international capital movements. Capital movements can be classified into four large categories:

• Presence of several foreign exchange rates (k_1)

• Restriction of current-account transactions (k_2)

• Restriction of capital account (financial account) transactions (k_3)

• Deposit obligation of export revenues (k_4)

Given the need to be consistent with the previous two indices, the meaning of the binary variables has also been reversed: the index takes the value 1 if the economy is fully open, and 0 when it is completely closed. As a consequence, a higher value represents a higher level of integration. Moreover, we look at the five-year average of variable k_3 (the average of k_3 in the given year and in the previous four years):

$$SHAREK_{3,t} = \left(\frac{k_{3,t} + k_{3,t-1} + k_{3,t-2} + k_{3,t-3} + k_{3,t-4}}{5} \right). \tag{6}$$

Then we take $k_{1,t}$, $k_{2,t}$, $SHAREk_{3,t}$ and $k_{4,t}$. The first standardised main component of these will be $KAOPEN_t$, that is, the openness of the capital account, while its first own vector will be *(SHAREk$_3$, k$_1$, k$_2$, k$_4$)*, which shows that it is not exclusively *SHAREk$_3$* that defines the index (*Chinn – Ito 2008*).

Distortions of the variables

Due to their structure, all three trilemma indices may take values between 0 and 1. According to the trilemma assumption, any economy may reach only two of the three objectives simultaneously. For this reason the "theoretical sum" of the variables should be exactly 2 for any given country. But in this transformed, abstract form, these variables are partly misleading. Despite being normalised in a closed [0;1] interval, suggesting that the achieved states of exchange rate stability,

monetary independence and financial market integration "can be forced" into a range described as constant, as if this was a strict mathematical law, in reality we unfortunately cannot expect such rigorous restricting assumptions from the indices. However, the historic analysis of the trilemma indices could still help in developing a sufficiently "meaningful" pattern characterising the external financial adjustment.

3. What do trilemma indices show?

The trilemma indices elaborated with the methodology of Aizenman – Chinn – Ito *(Aizenman et al. 2013)* are accessible on the authors' website[2], updated until 2014. We used these data available in Excel format when analysing the adjustment of developed, and mainly small, open European economies during the period 1993 to 2014 (but for the sake of comparison we also included Israel in the sample observing the 12 countries). In terms of adjustment to international financial integration we should differentiate – fundamentally but certainly not comprehensively – between two types; type A and type B (*Table 1*).

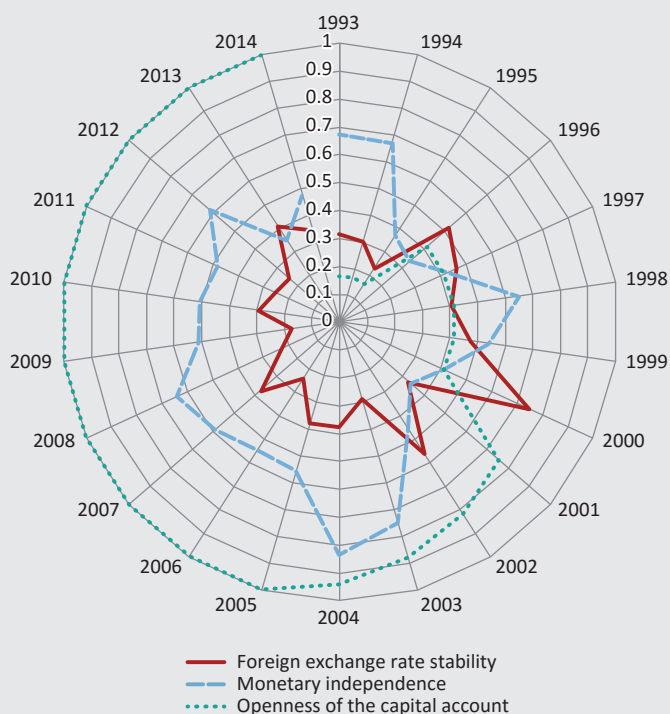| **Table 1** | | | | |
| **Versions of the impossible trinity and financial adjustment in some small, open developed economies** | | | | |
Consequences of financial openness	**Characteristics of type A**	**Countries Type A**	**Characteristics of type B**	**Countries type B**
Foreign exchange rate stability	No	Hungary, Czech Republic, Israel, Chile, South Korea, Denmark*	Yes	Austria, Slovenia, Estonia, Slovakia, Portugal, Greece
Monetary independence	Yes		No	
Level of financial integration/ Openness of capital account	Yes		Yes	
*Note: *Denmark, in reality, is a real borderline case in that its monetary policy is only quasi-independent since it has long been aligned with ECB policy, and its foreign-exchange rate stability was considerably higher than that of other countries classified in the type A group, so it could even be part of the type B group.*				
Source: Edited based on the database of the Aizenman et al. (2013) trilemma index.				

Between 1993 and 2014 the adjustment of *type A* countries was characterised by a capital account initially opening gradually, then subsequently fully open, relative monetary independence and foreign exchange rate stability of varying degrees. Hungary, the Czech Republic, Israel, Chile, South Korea and Denmark belong to the type A group, opting for relative monetary independence (though Denmark is a rather special, borderline case). In these countries the total adjustment picture shows an almost identical pattern. *Figures 3* to *5* show the "adjustment patterns" of the first three countries from the six small open economies mentioned above

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[2] http://web.pdx.edu/~ito/trilemma_indexes.htm

(and *Figure A.1* in the Annex shows the adjustment pattern of Israel). The pattern characterising these countries shows that after 1999 the capital account opened up only gradually, and became fully open only after 2005, while the degree of monetary independence/dependence varied; overall though, the level of independence rather decreased, instead of increasing, as we approach 2014. (As a reminder, a higher number indicates greater independence, while a smaller number closer to zero indicates progression towards the end of independence).
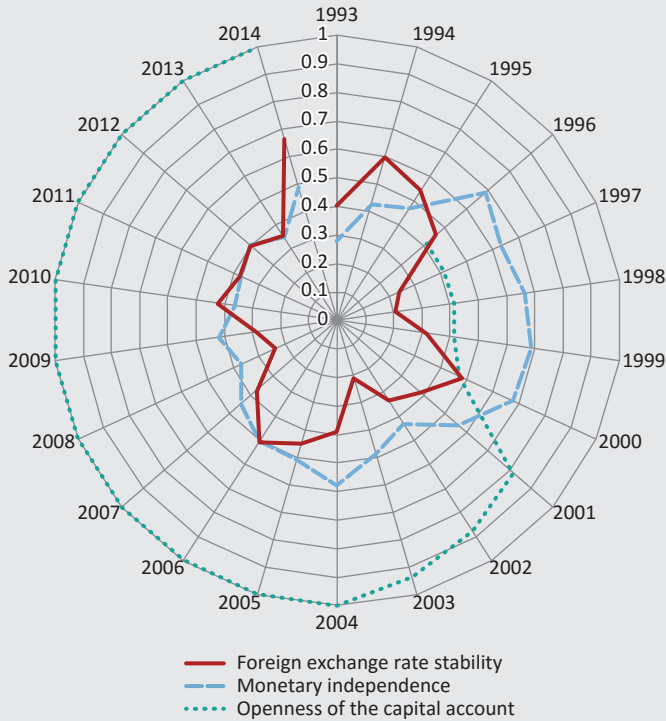
Hungary had the greatest monetary independence in 2004 (*Figure 3*) and the lowest in 1996 during the period under review. Moving forward in time (clockwise on *Figure 3*), the forint's exchange rate stability tended to decrease, in other words tending towards the middle of the circle. *Figure 6* and *Figure 7*, a few paragraphs below, can help us gain a deeper understanding of this process, and simultaneously of the fundamental direction of the Hungarian and Czech exchange rate policy. These provide an overview of developments in nominal and real effective exchange rates over the entire observed period extended until today, i.e. 1994–2017.

Figure 3
Trilemma-indices, Hungary, 1993–2014

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

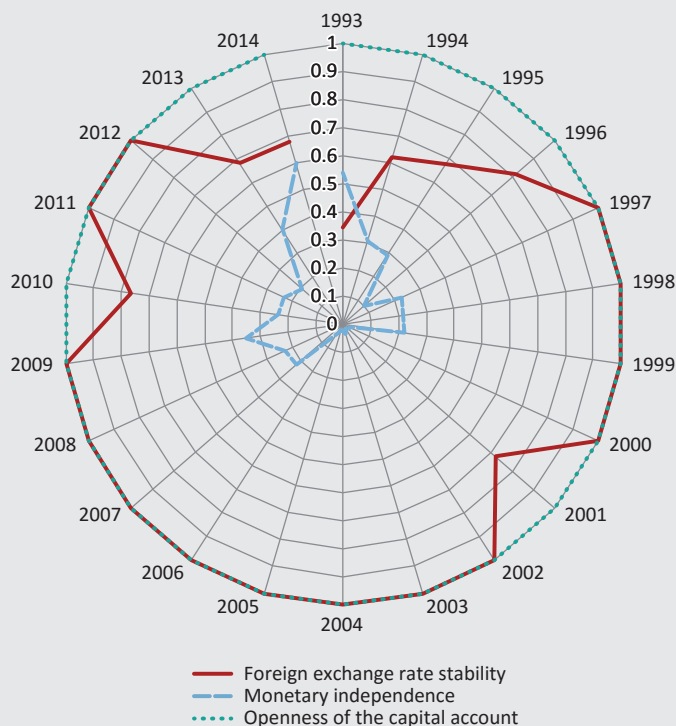**Figure 4**
Trilemma indices, Czech Republic, 1993–2014

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

In comparison to Hungary, the Czech Republic exhibited similar adjustment trends based on the trilemma indices (*Figure 4*), with the difference being that the total capital account opening only began in 2004 and the exchange rate of the Czech koruna had already surpassed 0.6 by 2014, shifting towards greater stability. Yet monetary independence in the Czech Republic already started decreasing at a faster rate from 2005, at least compared to Hungary, indicating the adjustment trajectory that its euro-area accession may become a reality sooner, as justified based on the trilemma indices.

Denmark (*Figure 5*) differed slightly from the typical flexible exchange rate transformation adjustments in that it was able to shadow the ECB through its monetary policy with relatively low monetary independence, maintaining an open capital account with its own currency and relatively high exchange rate stability (except in 2009–2010). This required very developed money and capital markets and a high degree of international competitiveness, alongside a sufficiently consolidated general government. So it is not surprising to say that the Danish trajectory is not for everyone, with the Danish "recipe" for successful adjustment suited only to small, open economies which are financially very robust and already have high income.

Figure 5
Trilemma indices, Denmark, 1993–2014

Foreign exchange rate stability
Monetary independence
Openness of the capital account

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016
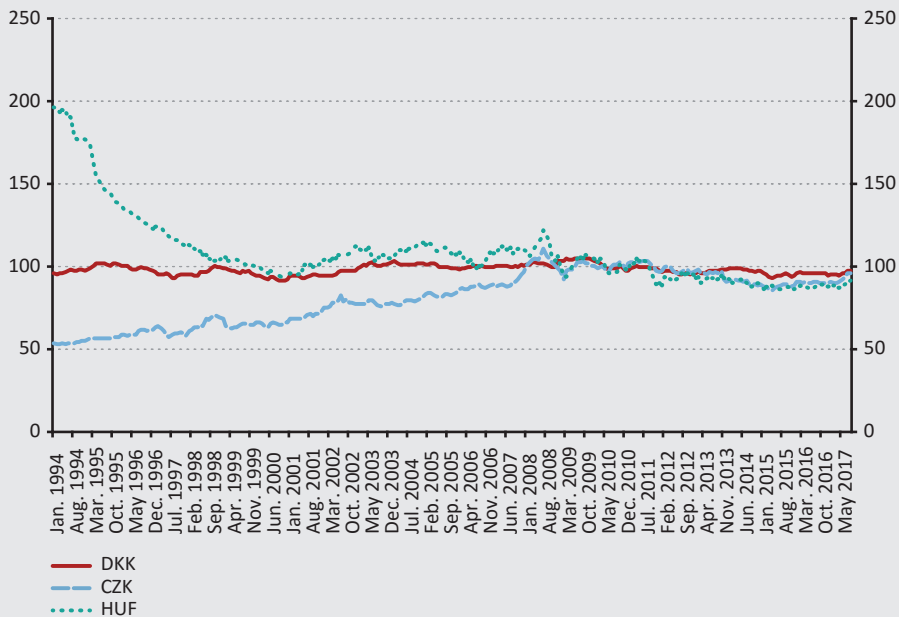
Israel also followed a different path; in this case it is worth observing that its monetary independence decreased substantially compared to the second half of the 1990s (*Figure A.1* in the Annex). The capital account of this Middle-Eastern country fully opened right before the crisis, in 2006. The exchange rate stability of the shekel was unable to remain persistently above 0.5, and exhibited substantial fluctuations after 2010 as well, depreciating significantly compared to the major currencies (EUR and USD).

Depreciation adjustment through the exchange rate was therefore not the path for the very developed but nevertheless export-oriented Denmark. It was, however, the road for small Central and Eastern European countries. Later on we will discuss this other case through the example of the Czech Republic and Hungary. Prior to that though, we will present a brief overview of the nominal and real effective historical exchange rate curves for the Hungarian forint and the Czech koruna and the Danish krone for the period 1994–2017 based on the official BIS exchange rate database (*Figures 6 and 7*). First and foremost, we need to clarify the definition of nominal and real effective exchange rates.

The nominal effective exchange rate is obtained by calculating the geometric mean of the bilateral foreign currency exchange rates weighted using the foreign trade turnover with the country's main trading partners (i.e. the square root of their product) expressed as an index with one base year=100. A number over 100 signifies appreciation, while numbers below 100 signify a weakening/depreciation.

According to *Figure 6,* which shows the changes in the nominal effective exchange rate for 1994–2017 compared to the base year 2000, from 1994 until the base year (2000), the Hungarian and the Czech economies, i.e. the forint and the Czech koruna, exhibited contrasting exchange-rate adjustments: while the Czech Republic's currency tended to appreciate compared to its key foreign trade partners, the Hungarian forint exhibited strong depreciation. The Czech koruna appreciated even further between 2000 and 2008 and the Hungarian forint switched between brief periods of appreciation and depreciation of 2 to 3 years, albeit small in size (5–8 per cent) However, after the 2008 crisis and for the entire period until the present day, the forint once again suffered marked nominal depreciation within an approximate range of 10–12 per cent. Meanwhile, the Czech koruna attempted a similar downwards adjustment, i.e. through depreciation, albeit in a much narrower range of 3–5 per cent. That said, *Figure 6* clearly shows that the stability of

Figure 6
Developments in the nominal EER, 1994–2017 the Czech koruna, the Danish krone and the Hungarian forint
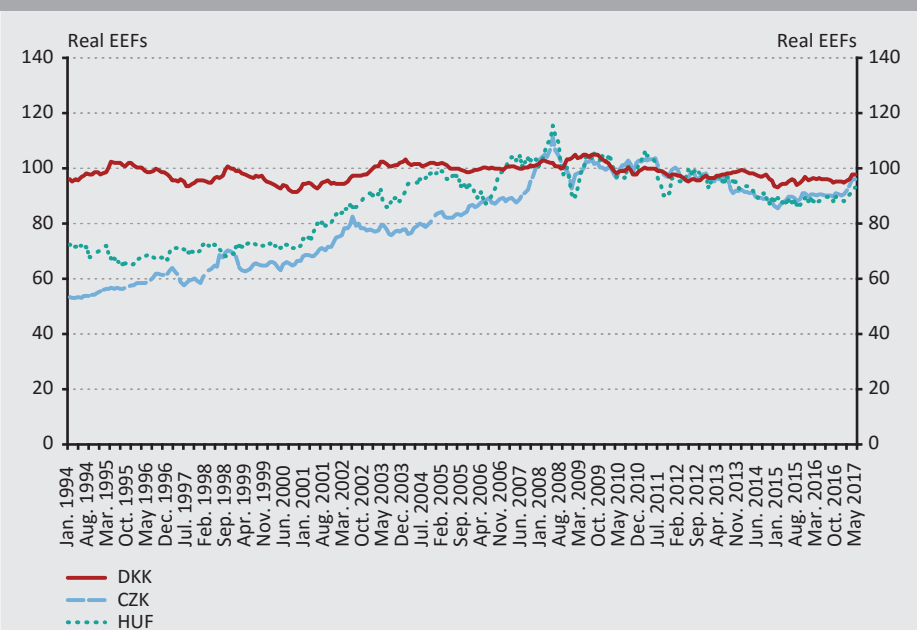*(the year 2010 = 100)*

Source: Edited based on the BIS database

the Danish krone compared to the two central European currencies was impressive, and even when it depreciated, it only weakened by a relatively small 1–4 per cent and always appreciated back towards the base value.

If we look at real effective exchange rate indices, i.e. the Effective Exchange Rate (EER) index expressing changes in price levels compared to main trading partners, which adjusts the nominal index with the proportion of changes in price levels, we see that based on this index the external adjustment trajectory followed by the Czech Republic and Hungary are much more similar: by the end of 2008, both currencies underwent a real appreciation followed by a real depreciation trend. This means that foreign currency markets overshot in terms of price setting in both countries compared to the level regarded as purchasing power parity. One of the reasons for this overshooting – albeit difficult to clearly and unequivocally separate – is that changes in the real exchange rates of the currencies at issue always reflect demand for financial instruments and property, albeit implicitly. Therefore what was beneficial for exports and made imports more expensive on the commodity market had the opposite effect on the property market: in other words, Hungarian and Czech instruments became relatively cheaper for the non-resident sector, while purchasing external assets became more expensive for resident foreign currency investors, at least from the perspective of exchange-rate developments.

Figure 7
Real EEFs the Czech koruna, the Danish krone and the Hungarian forint, 1994–2017
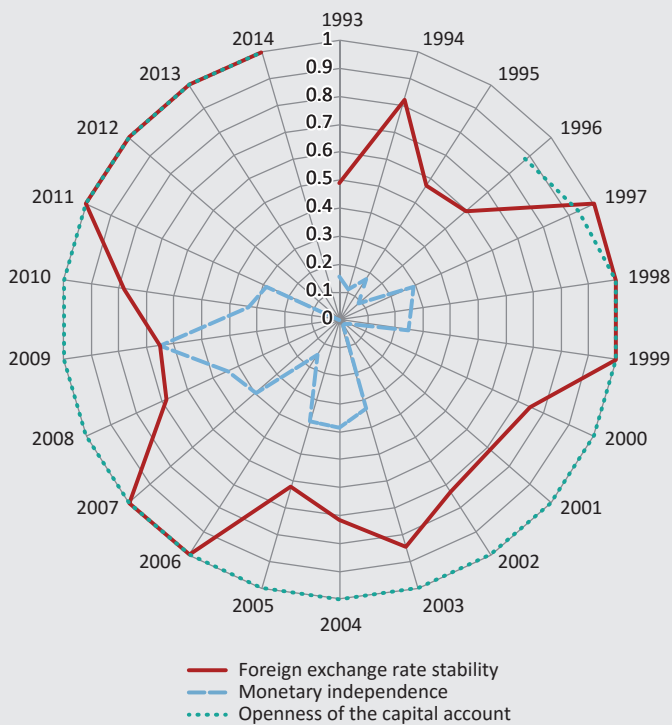*(the year 2010 = 100)*

Source: Based on the BIS database

By and large, from the perspective of the above and our own main topic, *i.e. in relation to the sustainability of the trilemma, flexible exchange-rate development was most certainly able to foster external adjustments with its own strength, but it was naturally unable to solve fundamental issues of structure, indebtedness and international competitiveness, at best alleviating them slightly.* In countries where there were no such issues regarding main trading partners (for example Denmark), exchange rate stability as an objective was attainable relatively easily.

The other subtype of external financial adjustment, version *B*, is represented by countries who are already members of the monetary union: Austria, Slovenia, Slovakia, Estonia, Portugal and Greece. Slovakia and Estonia are most relevant for this study, so our investigation will focus on these countries. The trilemma figures for the other countries are found in the annex for the sake of brevity (*Figures A.2, A.3, A.4, A.5*).

Countries that joined the euro area gradually had to relinquish their monetary independence, keeping financial integration within relatively narrow constraints. Thus for instance, the financial openness and exchange rate stability metrics of

Figure 8
Trilemma indices, Estonia, 1993–2014

Legend:
— Foreign exchange rate stability
– – Monetary independence
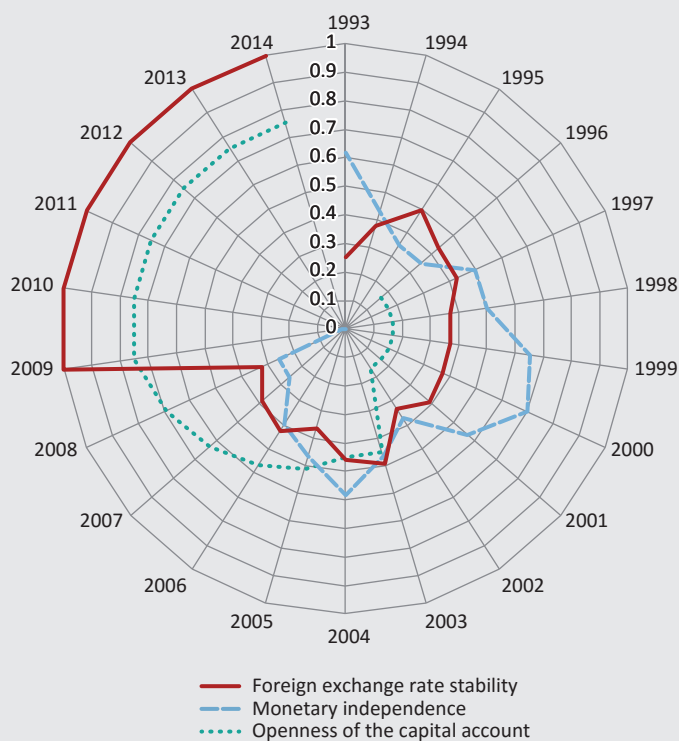····· Openness of the capital account

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

the Estonian economy trended outwards towards the perimeter of the circle early on, by the second half of the 1990s; the country gradually lost its monetary independence, which pulled in the opposite direction towards the middle of the circle before disappearing. This adjustment process was a precondition for joining the euro area according to the mandate, with the foreseeable end point of losing monetary independence completely.

As shown in *Figure 8*, deeper international financial integration with an open capital account started relatively early in Estonia, in 1998, and the former USSR member country exhibited quite a stable exchange-rate stability index of 0.7–0.8, despite its small size, and adopted the European single currency by 2011, abandoning its monetary independence.

Figure 9
Trilemma indices, Slovakia, 1993–2014

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

Slovakia's adjustment process to the euro area started in 2004 and became complete in 2010, with the interesting difference that its capital account did not become fully open, even after the introduction of the euro.

Austria's adjustment perhaps shows the most enviable version (*Figure A.2*) given that it fully opened up its capital account early on, in the second half of the 1990s, after pegging its own currency the Schilling to the German mark. This enabled the country to be in a sufficiently strong condition when joining the euro area, so giving up its own currency and monetary independence did not cause any major adjustment difficulty for it. Becoming a member of the euro area entailed no disadvantages for Austria, on the contrary, it helped to deepen its commercial relations with its main EU partner states and helped create a surplus in its current account.

Slovenia's external financial adjustment (*Figure A.3*) resembles the Austrian path the most, with the difference that for the former Yugoslav state this process, just as with joining the euro area, took place considerably later and after 2009 its capital account did not remain fully liberalised either.

Portugal's capital account (*Figure A.4*) gradually opened up from 1991 onwards, and became fully open by 1997. In 1999 it became a – founding – member of the euro area, and by doing so gave up its monetary independence. As the result of the US subprime mortgage crisis that unfolded in 2007 and 2008, and the ensuing euro crisis in 2010–2012, which unfortunately coincided with Portugal's own budgetary overspending, and the overstretched lending of its domestic banking system enabled by favourable euro interest rates, Portugal drifted close to a state bankruptcy. Portugal was only able to issue new euro debt very expensively, with a substantial CDS spread. It was bailed out on several occasions by the IMF and the European Stability Mechanism with some flexible loans considered cheap at the time of the crisis. Its resilience to external shocks became extremely low and it enjoyed protection only as a member of the euro area. Yet by the end of 2017 Portugal managed to keep its budgetary processes on track and the country's CDS spread also decreased substantially; the government's financing became balanced and relatively cheap thanks to the near zero interest rates internationally.

Greece's case (*Figure A.5*) with the euro and the EU itself represents a separate category. Even considering its protection mechanisms against external shocks it represents a separate class, in that its giving up of monetary independence introduced such restrictions in money creation and the operation of the banking system that the relatively underdeveloped Greek government, chronically and repeatedly "undisciplined" in its fiscal policy, was unable to manage. Its budget was struggling in the areas of tax collection, transfer payments, the pension system and the stimulation of the economy – as early as accession and for a long time thereafter – with a substantial shortfall compared to the more developed part of the EU. The sudden and lasting deterioration of the state's external financial perception, and the fate and the soundness of the debt held by third-party countries did not depend on the chosen instruments for alleviating the shock, but much more on the "distorted" internal fiscal processes. This seems to be supported by the fact the fiscal tightening

measures prescribed by the conditions of the last loan facility have already brought tangible results: by the end of 2017 Moody's sovereign debt classification for Greece had also improved, and was even given a positive outlook (CAA2).

However, what is crucially important for the purposes of our topic is that the Portugal and Greece case demonstrates that *the trilemma indices do not uncover all of the possible and actual difficulties of external adjustment*, they gloss over the very difficult adjustment process. All this means that *on their own, the trilemma indices cannot offer a full description of the external financial adjustment, they can only do so together with the fiscal processes.*
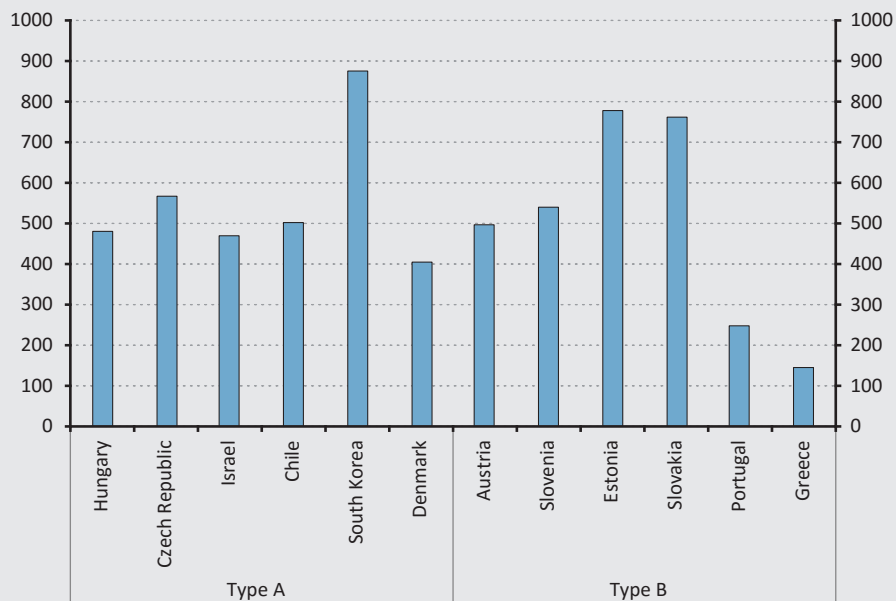
4. Summary and conclusion

To what extent can we say that the external financial adjustment of small open economies was uniform in the global economy in general and in the EU in particular, during the period from 1990 to 2014? The study argues that although the impossible trinity theorem, i.e. the impossibility of simultaneously asserting integration, exchange rate stability and monetary policy independence was valid, for the countries involved in the analysis we observed many different versions of the adjustment to external shocks and financial integration.

One of the results we intended to show is that in almost all of the examined countries, one of the core requirements of international capital market integration, the availability of open financial (capital) accounts, was achieved relatively soon. There were major differences only in the levels of monetary independence and foreign exchange rate stability, in the size of the stability indices. We were able to differentiate between two fundamental types of adjustment: one that opted for relative monetary independence and lower exchange rate stability (for example Hungary, the Czech Republic and Denmark of the EU Member States, and Israel as a non-EU member), and the other one that gave up monetary independence and also exchange rate stability, and opted for full financial integration (such as Austria, Slovenia, Slovakia, Estonia, Portugal and Greece). The exchange rate regime chosen for external financial adjustment is not decisive per se in terms of the ultimate success. The work of *Bohl et al.* (*2016*) based on an econometric model performed on a substantially larger G-20 country sample also confirms this opinion.

We did not intend to decide *which type of adjustment can really be considered a success* or failure, *since this dilemma can only be reassuringly answered following the analysis of other, additional macroeconomic variables (fiscal processes, debt service trends, and change in net foreign investment positions*). Yet if we want to identify concise but revealing data through statistics, jointly showing the external and internal adjustment steps of small, open Central European economies leading to the final outcome, then *Figure 10* provides some supporting evidence. It contains constant GDP per capita growth figures based on purchasing power measured in

constant 2011 US dollars, shown in identical currencies, for the period between 1995 and 2016. From this comparison we see that during the 21 years examined there was outstanding growth in both groups: i.e. group A, which kept its own currency such as South Korea, and group B using the common currency, the euro, such as Slovakia and Estonia, were able to produce the highest annual average, constant GDP/capita growth measured in USD: countries regularly producing outstanding growth were able to register nearly 1.5 times the per capita growth of the middle-range countries, where per capita growth was in excess of USD 400 per year. As to what extent the common currency, the euro, has helped the growth dynamic is not clear of course, and it is difficult to quantify. However, we can probably conclude that the common currency itself was not an obstacle to growth.

Figure 10
Annual average per capita growth measured in 2011 (constant) US dollars, for the period between 1995 and 2016

Source: World Bank: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD?year_low_desc=false

When analysing the data it also becomes clear that financial resilience to external shocks improved everywhere in the eight years following the 2007–2008 financial crisis, while the financial resilience of the Czech Republic, initially in the positive resistance range too, displayed marked growth. The same was observed in the case of three small, open non-European economies, all of them with different structures, i.e. Israel, Chile and South Korea. But *improving shock resistance cannot simply be explained by the evolution of trilemma variables for any country, because fiscal processes* – the change in the government's ability to take out loans, the evolution

of long-term foreign-currency debt classifications – *are just as important when assessing the final balance of external financial adjustment*. Exchange rate stability is a good thing, but is not a source of success in itself (Denmark), because a sufficiently flexible exchange rate (see the Czech crown) can also greatly facilitate adjustment. Moreover, Greece and Portugal, with a "stable", internationally shared common currency, i.e. the euro, were not able to avoid resorting to massive external help either, because during the external shocks experienced in 2008–2010 their internal capital buffers were not sufficient and their sovereign debt issuing capacity also became shaky. So there was no single recipe or royal road for adjustment, and the trilemma indices per se do not give guidance in terms of the actual financial strength and sustainable external payment processes, as demonstrated by the work of *Bohl et al.* (*2016: 203–207*).

And the even more difficult question, i.e. the specific quantifiable benefits or drawbacks for Hungary of fully giving up monetary independence and joining the euro area can only be answered by making reference to the cases of the countries presented above: *full financial integration per se along with membership of the euro area definitely do not represent any disadvantage for adjustment. On the contrary, they represent a greater level of protection*, as emphasised by *Neményi – Oblath* (*2012*) too*.* The cases of Austria, Slovenia, Slovakia and Estonia seem to confirm this. Yet a country can fall into a deep crisis even when using the euro, as in the case of Greece, and a country can develop excellent shock resilience even without the euro, as shown by the example of the Czech Republic. The disappearance of suggestibility regarding export competitiveness levels related to the depreciation of the foreign exchange rate can indeed bring some negative effects, if the countries within the euro area can only rely on the instruments of internal depreciation mechanisms, when needed. But compensating for competitive disadvantages or making them disappear simply through weaker foreign exchange rates is not recommended in the long run, not even on a theoretical level. *Financial stability and macroeconomic stability in general are defined by the levels of state indebtedness, foreign exchange reserves, the predictable nature of public finance management and the sustainable deficit-financing capacity of the budget, not by one of the favoured, currently selected versions of trinity theorem adjustment* (type A or type B). Therefore we dare to say that next to the considerably more stable Czech Republic, which is more resilient to external shocks, Hungary will also be able to reap more benefits in the euro area than the restrictions it would be forced to suffer with its financial independence, as explained by *Vígvári* (*2013*). Assuming, of course, that Hungary's productivity and income levels will be considerably closer to the EU average when joining the euro area than they currently are. One thing is certain: in the Economic and Monetary Union we will have to find clear institutional solutions to resolve our existing international competitiveness issues, going way beyond the strength of current monetary and exchange rate policy measures.
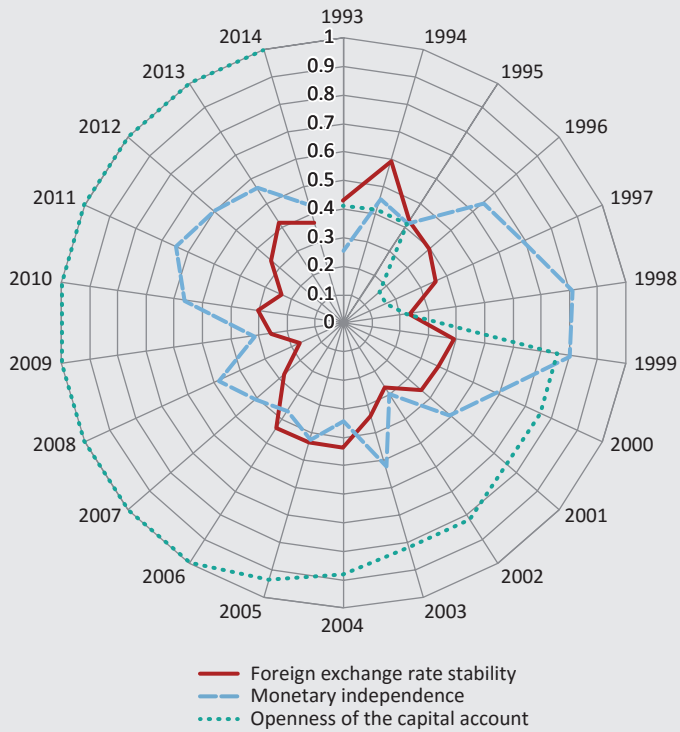
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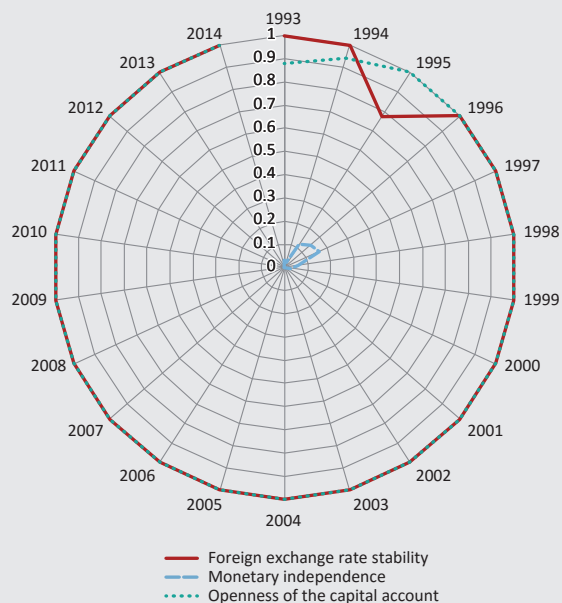CEPS Policy Brief 202. Institute of International Finance, 2015, "Capital Flows to Emerging Markets", January 15.

Annex

Figure A.1
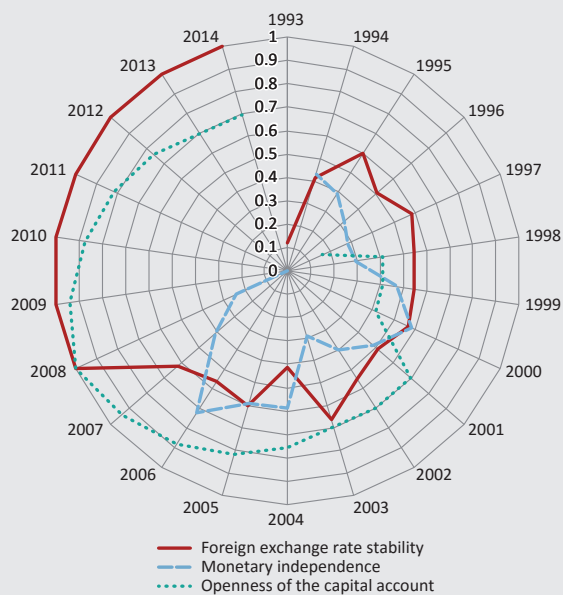**Trilemma indices, Israel, 1993–2014**

Foreign exchange rate stability
Monetary independence
Openness of the capital account

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

Figure A.2
Trilemma indices, Austria, 1993–2014

Foreign exchange rate stability
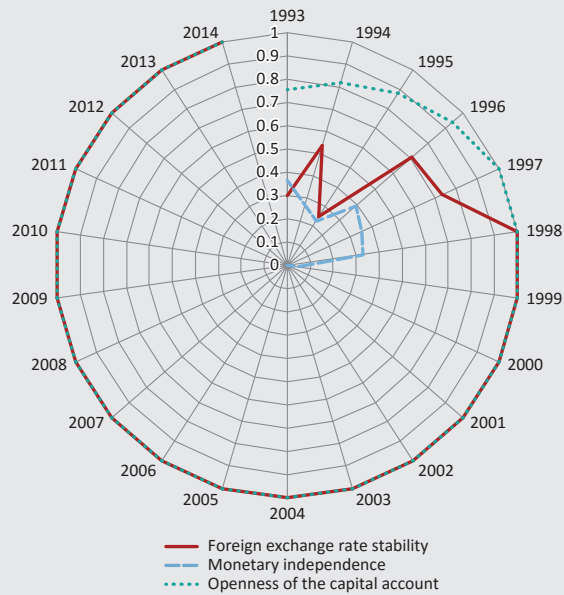Monetary independence
Openness of the capital account

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

Figure A.3
Trilemma indices, Slovenia, 1993–2014

Foreign exchange rate stability
Monetary independence
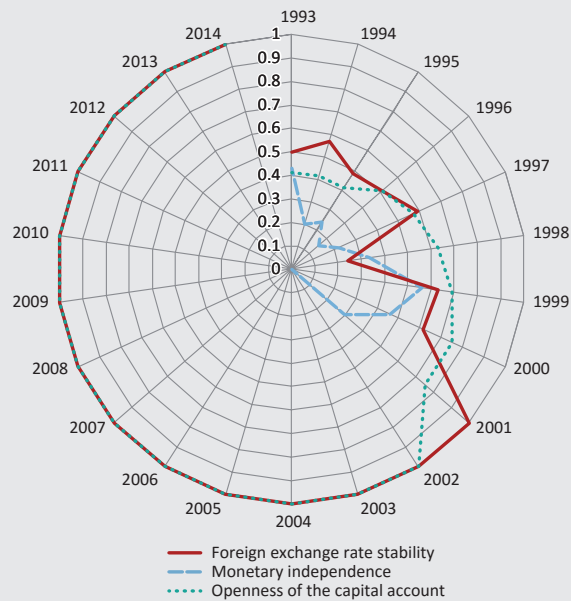Openness of the capital account

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

Figure A.4
Trilemma indices, Portugal, 1993–2014

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016

Figure A.5
Trilemma indices, Greece, 1993–2014

Source: Aizenman et al. (2013) edited based on indices and IMF AREAER 2015, 2016