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Gábor Kutasi*

External Imbalances in the EU: A REER-based Explanation

The debt crisis of the eurozone revealed a structural problem of the single market rooted in the external imbalance problem of indebted member states. The assumption of this paper is that the current account imbalances within the eurozone are based on an intra-eurozone competitiveness disparity originated in the single currency and the heterogeneity of member state development. The mix of infinite pegging and heterogeneity creates real effective exchange rate appreciation in the less competitive members, which further ruins their competitiveness in the EU.

The global financial crisis that began in the US shocked the EU in several ways, with the prolonged eurozone debt crisis being the biggest challenge facing the member countries. The period 2010-2012 proved that the eurozone periphery had complex structural problems. At first glance, many of these countries face an endless debt sustainability problem stemming from two parallel concerns, namely ongoing annual budget deficits and declining production. However, there is a deeper structural problem as well, namely their external imbalances. Moreover, this structural problem endangers those member states which appear to be the most stable among the eurozone peripheral countries.

Without doubt, several factors contributed to the European crisis, including the expansion of household indebtedness through the products of financial innovation, the speculative bubbles in the real estate market and service sector, and the abundance of liquidity due to expansionary monetary policy. However, Neményi and Oblath observed that it was not only those countries which had been subject to the EU's excessive deficit procedure that got into trouble.¹ The Baltic sudden stop in 2007 or the

Slovenian indebtedness problems in 2012 afflicted countries with sustainable budget balances. Divergences in inflation, competitiveness and relative wage costs were already observable among the eurozone countries. For example, the cumulative growth of unit labour costs (ULC) between 1999 and 2006 was just 1.5 per cent in Germany, but 25.2 per cent in Greece, 23.2 per cent in Spain and 27.7 per cent in Portugal.²

In the single European market, it seems that the individual external balances of member states became a neglected aspect of their economic health. In the catching-up member states with above-average inflation, the single interest rate set by the European Central Bank (ECB) proved to be too low, in the sense that very cheap credit made it preferable to spend in the present instead of saving for the future. Meanwhile, the single currency caused non-adjustable real appreciation in these countries. This higher inflation ruined the wage competitiveness of these countries by increasing wage demands. The additional inflation and the increasing wages originated in external credit, creating additional demand. The relatively cheap credit – which originated from non-local sources – primarily financed the consumption of imported products and services. The onset of the debt crisis, which stems from this external indebtedness, revealed the trap that the eurozone peripheral countries entered into, wasting the advantages offered by the single currency in order to finance cheap imports through the utilisation of foreign (public and private) credit. These countries can neither devalue their currencies to improve their current accounts nor depreciate their public debt through inflation. An exit from the currency union would also be no easy solution for these externally indebted countries, as their debts

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1 J. Neményi, G. Oblath: Az euró bevezetésének újragondolása, in: Közgazdasági Szemle, Vol. 59, No. 6, 2012, pp. 569-684.

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2 Ibid., Table 1.

would remain denominated in euros. Thus, it would only multiply their debt crises, since a sharp currency devaluation could be expected immediately following an exit from the eurozone.³

The ECB's single interest rate, despite the disparate levels of inflation in the member states, worked to the benefit of high-inflation countries in the loan market, but this also discouraged private savings in these countries. It can be demonstrated in time series of the effective exchange rates and unit labour costs in the eurozone that there has been real appreciation in the member states with high inflation in comparison to those with low inflation. This reverse Balassa-Samuelson effect would have been a motivation for excessive intra-community imports in externally indebted countries. The rise of wages in countries suffering from real appreciation explains the loss of competitiveness in their exports and the relative cheapness of imports there.

The external imbalance problem

As Alessandrini et al. argue, the eurozone crisis is not merely a debt crisis but also an external imbalance problem, which is particularly the result of a lack of fiscal discipline.⁴ The movement of products, services and capital within the eurozone is a homogeneous money market. This can be seen in two ways.

The first is based on nominal adjustment, according to which the flexible price level mechanism or the automatic monetary mechanism can be used to explain the balance of payment procedures in a homogeneous international money market situation.⁵ In this approach, which is built on the theories of David Hume and Milton Friedman, an external imbalance implies that some volume of euros has been accumulated by some of the eurozone members, and the rest of the members must have accumulated the products. There is no way to adjust for external imbalances, since there is no monetary autonomy in the euro community. Besides, there are tax and fiscal differences among the eurozone countries, as well as labour market imperfections. Thus, the assumptions of perfect equilibrium and the distortion-free movements of factors and commodities – on which the neoclassical model is based – are missing here.

The second way, based on real adjustment, can be a starting approach for further analysis of intra-eurozone imbalances. This is built on the Keynesian automatic income adjustment mechanism. It focuses on the imbalance of savings (S) and investment (I), and it derives the current account (CA) from the imbalance of trade, capital market and public sector.

$$Y = C + I + G + X - IM, \quad (1)$$

where Y is the output, C is the household consumption, G is public consumption, X is exports and IM is imports. Based on this equation, savings looks as follows:

$$S = Y - C - T, \quad (2)$$

where T is tax revenue of the government. T is equal to G if there is a balanced budget, but obviously, in the case of indebted eurozone countries, it is preferable to calculate with the assumption of a fiscal imbalance ($T < G$).

$$X - IM = (S - I) + (T - G) \quad (3)$$

$$CA = S - I + \text{Budget Balance}. \quad (4)$$

From Equation 4, the Keynesian conclusion is that if there is a current account deficit, adjustment can happen only through real terms. In other words, savings must be raised (with a parallel decrease in consumption), investments must be reduced or the public budget deficit should be reduced.⁶ This serves as a theoretical explanation as to why the crisis-stricken eurozone countries have to impose restrictions on public spending and private income in a single currency zone, where a currency devaluation is not an option.

There is an advanced eclectic variation of the Keynesian IS-LM model approach on external balances, which is called the Mundell–Fleming model. In the case of indebted countries in a single currency zone, the version of the model that uses a pegged foreign exchange rate and fiscal expansion is relevant (see Figure 1). In this theoretical model, the assumed process is that the fiscal expansion shifts the IS-curve right, and the IS-LM equilibrium moves from E_1 to E_2 . This leads to higher interest rates and thus to capital influx. To protect the pegged foreign exchange rate, monetary policy must expand the money supply, so the LM-curve is pushed right, moving the equilibrium to E_3 . This results in higher output (Y_1 to Y_3).

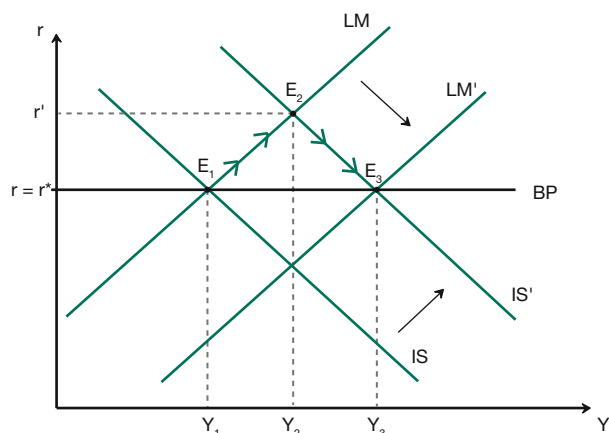
3 G. Kutasi: Kívül tágasabb?, in: *Közgazdasági Szemle*, Vol. 59, No. 6, 2012, pp. 715–718.

4 P. Alessandrini, M. Fratianni, A. Hughes Hallett, A.F. Presbitero: External imbalances and financial fragility in the euro area, in: MoFIR Working Paper No. 66, 2012, Money and Finance Research Group.

5 T. Szentes: *World Economics*, Vol. 1 (Comparative theories and methods of international and development economics), Budapest 2002, Akadémiai Kiadó.

6 A. Afonso, C. Rault: Budgetary and External Imbalances Relationship. A Panel Data Diagnostic, in: ECB Working Paper Series, No. 961, 2010, European Central Bank.

Figure 1
Fiscal expansion in the Mundell–Fleming model with a pegged foreign exchange rate



Source: I. Benczes, G. Kutasi: *Költségvetési pén*, Budapest 2010, Akadémiai Kiadó, Figure 2.9/b.

But why does the model version not work in the case of eurozone countries? As described in the optimum currency area models of Mundell, McKinnon and Kenen,⁷ national economies can adjust individually to asymmetric shocks in an economic community via flexible factor markets, monetary policy or community funds. The eurozone factor markets are not perfect, especially the workforce mobility. Monetary policy in the eurozone is an EU-level competence and thus is unable to consider the asymmetric impacts in its actions. Only fiscal instruments remain, but most of the fiscal actions must be taken at the national level, as there is no significant fiscal redistribution at the EU level.⁸

As Alessandrini et al. explain, only fiscal union can solve the external imbalance problem through the mechanism of redistribution, just as it is generally solved within a

country.⁹ Until there is a fiscal union, the credit and bond markets will continue to redistribute funds for countries with external deficits, but they do so in an uncontrolled way, which results in opportunities for speculative attacks against individual eurozone states. The foreign/national ratio in the composition of public and private debt influences the yield, and thus a cumulative current account imbalance leads to higher yields on debt. As Komáromi examined through empirical data, the net financing capability of a country depends on the current and the capital accounts.¹⁰ The higher the weight of demand for net financing through the current account – i.e. the debt-generating items – the more unfavourable is the structure of external indebtedness. As Garber describes, the fear of default and the fear of exit from the eurozone will ultimately result in a shortage of credit supply and thus in debt crisis.¹¹

It is worth emphasising that in an open economy it is very likely that savings and investments correlate very weakly with each other. This differs from the closed economy assumed by Keynes, in which savings and investments are supposed to be equal. In their “new open economy model”, Obstfeld and Rogoff emphasise the phenomenon of free international movement of national savings,¹² and thus the free international financing of investments, which is called the Feldstein-Horioka puzzle.¹³ In accordance with this puzzle, Afonso and Rault state that if savings and investments are not correlated, the budget deficit and the current account deficit “tend to move jointly”.¹⁴

As neither individual devaluation nor a federal bail-out mechanism have been employed, the unsolved external imbalances can result in divergence, regression and the degradation of externally indebted countries. This is known as the reverse Balassa-Samuelson effect.¹⁵ The Balassa-Samuelson effect views the higher inflation of

7 R. McKinnon: Optimum Currency Areas, in: *American Economic Review*, Vol. 53, No. 4, 1963, pp. 717–725; R.A. Mundell: A Theory of Optimum Currency Areas, in: *American Economic Review*, Vol. 51, No. 4, 1961, pp. 657–665; P. Kenen: The Theory of Optimum Currency Areas: An Eclectic View, in: R.A. Mundell, A.K. Swoboda (eds): *Monetary Problems of the International Economy*, Chicago 1969, University of Chicago Press, p. 41–60.

8 The Community budget – involving the transfers for members out of eurozone, too – amounts to 1.1 per cent of EU GDP. The MacDougall Report estimated five per cent of Community GDP as a minimum necessity for effective federal fiscal actions. The European Financial Stabilisation Mechanism, with €60 billion, the European Financial Stability Facility with €440 billion, and the European Stability Mechanism, with €500 billion, together equal approximately eight per cent of EU GDP, but they set apart as guarantee funds for several years instead of an annual redistribution fund. See MacDougall Report: Report of the Study Group on the Role of Public Finance in European Integration, Vol. I and II, Brussels, 1977, European Commission.

9 P. Alessandrini, M. Fratianni, A. Hughes Hallett, A.F. Presbitero, op. cit.

10 A. Komáromi: A külső forrásbevonás szerkezete: Kell-e félnünk az adóssággal való finanszírozástól?, in: *MNB Szemle*, Vol. 3, No. 1, 2008, National Bank of Hungary, p. 15.

11 P.M. Garber: The TARGET mechanism: will it propagate or stifle a stage III crisis?, in: *Carnegie-Rochester Conference Series on Public Policy*, Vol. 51, No. 1, 1999, pp. 195–220, here p. 211.

12 M. Obstfeld, K. Rogoff: The Intertemporal Approach to the Current Account, in: G. Grossman, K. Rogoff (eds.): *Handbook of International Economics*, Amsterdam 1995, Elsevier.

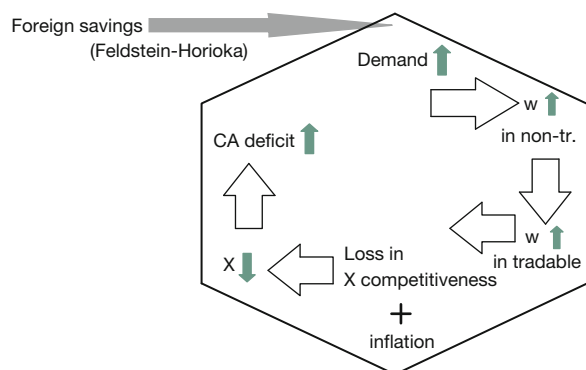
13 M. Feldstein, C. Horioka: Domestic Saving and International Capital Flows, in: *Economic Journal*, Vol. 90, No. 358, 1980, pp. 314–329.

14 A. Afonso, C. Rault, op. cit.

15 C. Grafe, C. Wyplosz: The Real Exchange Rate in Transition Economies, in: *CEPR Discussion Paper Series*, No. 1773, 1979, Centre for Economic Policy Research; M.Z. Jakab, M.A. Kovács: A reálárfolyam-ingadozások főbb meghatározói Magyarországon, in: *Közgazdasági Szemle*, Vol. 57, No. 2, 2000, pp. 136–156, here p. 144 and Figure 2.

Figure 2

Mechanism of the reverse Balassa-Samuelson effect in a national economy



Demand: demand of consumption, w in non-tr.: wage level in non-tradable sector, w in tradable: wage level in tradable sector, X: export, CA: current account; white arrows show the causal relations, green arrows show change of variable (↑ means increase, ↓ means decrease).

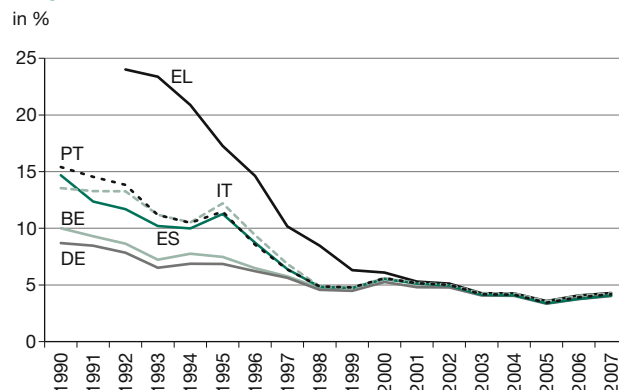
Source: Author's construction.

catching-up countries as the result of rising productivity in the catching-up tradable sector, which causes wage increases and thereby inflation pressure in the non-tradable sector.¹⁶ The reverse Balassa-Samuelson effect (see Figure 2) describes how the relative price changes among countries lead to productivity divergences in the following way: In the eurozone, the quick convergence of interest rates (see Figure 3) resulted in overheated consumption in the periphery economies of the eurozone. The expectations of households based on sharply decreasing interest rates were unfounded, but they resulted in fast-growing private indebtedness, particularly through the consumption of non-tradable services. This latter impact raised the wage demands in the local non-tradable sector, which spilled over to the tradable (export) sector. Consequently, the countries' export competitiveness deteriorated, while local inflation rose due to the higher wage costs.¹⁷

Moreover, Lane and Perotti, Beetsma et al., and Benetrix and Lane found that the increasing public spending in eurozone countries shifted demand towards the non-tradable sector, which logically led to increasing wages

Figure 3

Convergence of interest rates in the eurozone, 10-year bonds rates, 1990-2007



Source: I. Benczes, G. Kutasi: Költségvetési pénzügyek, Budapest, 2010, Akadémiai Kiadó, Figure 11.1.

there.¹⁸ In other words, the fiscal processes contributed to the emergence of the reverse Balassa-Samuelson effect. However, Lane and Milesi-Ferretti found limited correlation between public debt and external imbalances in highly developed countries.¹⁹

According to De Santis and Lüthmann and Gavilán et al.,²⁰ the current account is determined by the following factors:

- The demography impact on the structure of consumption and savings²¹ (C/S)

16 B. Balassa: Purchasing Power Parity Doctrine – A Reappraisal, in: *Journal of Political Economy*, Vol. 72, No. 6, 1964, pp. 584-596.

17 P. Mongelli, C. Wyplosz: The Euro at Ten. Unfulfilled Threats and Unexpected Challenges, in: B. Mackowiak, F.O. Moncelli, G. Noblet, F. Smets (ed.): *The Euro at Ten. Lessons and Challenges*. Fifth ECB Central Banking Conference, Frankfurt 2009, European Central Bank, pp. 23-58; J. Neményi, G. Oblath, op. cit.

18 P.R. Lane, R. Perotti: The Trade Balance and Fiscal Policy in the OECD, in: *European Economic Review*, Vol. 42, No. 3-5, 1998, pp. 887-895; R. Beetsma, M. Giuliodori, F. Klaassen: The Effects of Public Spending Shocks on Trade Balances and Budget Deficits in the European Union, in: *Journal of the European Economic Association*, Vol. 6, No. 2-3, 2008, pp. 414-423; A. Benetrix, P.R. Lane: Fiscal Shocks and the Real Exchange Rate, in: IIS Discussion Paper No. 286, 2009.

19 P.R. Lane, G.M. Milesi-Ferretti: Long-Term Capital Movements, in: *NBER Macroeconomics Annual* Vol. 16, No. 1, 2002, pp. 73-116.

20 R. De Santis, M. Lüthmann: On the Determinants of External Imbalances and Net International Portfolio Flows. A Global Perspective, in: *ECB Working Paper Series* No. 651, 2006, European Central Bank; Á. Gavilán, P.H. de Cos, J.F. Jimeno, J.A. Rojas: Fiscal Policy, Structural Reforms and External Imbalances: A Quantitative Evaluation for Spain, in: *Documentos de Trabajo* No. 1107, 2011, Banco de España.

21 A. Ando, F. Modigliani: The 'life cycle' hypothesis of savings: Aggregate implications and tests, in: *American Economic Review*, Vol. 53, No. 1, 1963, pp. 55-84.

- Real GDP growth and its impact on savings²² or on consumption, based on future income²³ (ΔGDP)
- International competitiveness based on real effective exchange rates (REER)
- Stages of development, as there is an assumed U-shape relationship between current account balance and relative per capita income ($GDP/capita$)
- Positive correlation of money stocks to GDP and savings²⁴ ($corr(M, S/GDP)$)
- The continuity/smoothness of labour productivity growth²⁵ ($\Delta Prod_L$)
- Inherited debt ($Debt_{t-1}$)
- The effect of transparency on lower risk ($TRANSP$)
- Restrictions on current accounts and capital accounts, for example capital controls (GC = government control)
- Deviation from uncovered interest rate parity ($IRPDEV$)
- Portfolio impact, i.e. the degree to which investors are rebalancing their portfolios by selling their low-risk bonds with high yields to counterbalance their losses on risky bonds²⁶ ($PORTF$)
- Market valuation impact, i.e. the degree to which investment products are overvalued according to P/E and fundamental value ratios (P/E)
- Effect of size of a company or a country, as less capitalised countries pay higher returns²⁷ ($SIZE$)
- The investment and capital demands of national industries (D_K)
- The external financing demands and crowding-out impact of public finances ($FNGBL$ = foreign net government borrowing or lending)
- The impact of crises, i.e. GDP contraction, a negative wealth shock on savings assets, increasing public spending and the end of an abundance of international credit ($CYCLE$).

The following function can thus be used to express the current account (CA):

$$CA = f\{C/S, \Delta GDP, REER, GDP/capita, corr(M, S/GDP), \Delta Prod_L, Debt_{t-1}, TRANSP, GC, IRPDEV, PORTF, P/E, SIZE, D_K, FNGBL, CYCLE\} \quad (5)$$

If the monetary union remains firmly opposed to fiscal union, there are some alternative currency union practices in the world economy. For example, in the CFA franc zones of West and Central Africa, there are criteria for external payment arrears and external deficits. In the planned Gulf Monetary Cooperation, there is a minimum criterion for foreign reserves.

Proof for problems of external imbalance and real appreciation in the eurozone

We now examine the imbalances of several countries. Both the centre-periphery imbalanced current accounts and the reverse Balassa-Samuelson effect are included in the data. As regards the eurozone periphery, it must be kept in mind that Slovenia (in 2007), Slovakia (in 2009) and Estonia (in 2010) adopted the euro much later than the other countries under analysis, which reduces their single currency time series. However, it should also be noted that Estonia began using a peg to the euro in 2004, making the country a quasi-participant in the single currency,

22 F. Modigliani: The life cycle hypothesis of saving and intercountry difference in the savings ratio, in: W.A. Eltis, M.F. Scott, J.N. Wolfe (eds.): Induction, growth and trade: Essays in honour of Dir Roy Harrod, Oxford 1970, Clarendon, pp. 197-225.

23 J. Tobin: Life cycle saving and balanced growth, in: I. Fisher, J. Wiley: Ten Economic Studies in the Tradition, New York 1967, Wiley and Sons, pp. 231-256; M.J. Farrell: The magnitude of 'rate-of-growth' effects on aggregate savings, in: Economic Journal, Vol. 80, No. 320, 1970, pp. 873-894.

24 S. Edwards: Why are Latin America's savings rates so low? An international comparative analysis, in: Journal of Development Economics, Vol. 51, No. 1, 1996, pp. 5-44; M.D. Chinn, E.S. Prasad: Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration, in: Journal of International Economics, Vol. 59, No. 1, 2003, pp. 47-76.

25 R. Glick, K. Rogoff: Global versus country-specific productivity shocks and the current account, in: Journal of Monetary Economics, Vol. 35, No. 1, 1995, pp. 159-192.

26 H. Bohn, L.L. Tesar: U.S. equity investment in foreign markets: Portfolio rebalancing or trend chasing, in: American Economic Review, Vol. 86, No. 1, 1996, pp. 77-81.

27 R.W. Banz: The relationship between return and market value of common stocks, in: Journal of Financial Economics, Vol. 9, No. 1, 1981, pp. 3-18; C.S. Asness, J.M. Liew, R.L. Stevens: Parallels between the cross-sectional predictability of stock returns and country returns, in: Journal of Portfolio Management, Vol. 23, No. 1, 1997, pp. 79-87; G. Bekaert, C. Erb, C.R. Harvey, T.E. Viskanta: What matters for emerging market investment?, in: Emerging Market Quarterly, Summer, 1997, pp. 17-46.

Table 1
Current accounts of selected eurozone countries, 2000-2011

in million euros

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
DE	-35 459	-12	42 669	40 524	102 368	112 590	144 739	180 912	153 634	140 559	150 669	146 564
EE	-331	-361	-825	-986	-1 095	-1 115	-2 053	-2 563	-1 486	470	420	339
EL	-10 618	-10 585	-10 201	-11 266	-10 718	-14 744	-23 759	-32 602	-34 798	-25 814	-22 501	-20 629
ES	-24 948	-26 823	-23 765	-27 476	-44 164	-66 861	-88 313	-105 265	-104 676	-50 539	-47 427	-37 497
IT	-2 402	3 424	-5 637	-10 415	-4 645	-12 603	-22 345	-19 916	-44 899	-30 174	-54 680	-48 444
PT	-13 167	-13 879	-11 574	-9 230	-12 432	-15 924	-17 186	-17 105	-21 736	-18 402	-17 226	-11 099
SI	-579	38	250	-195	-717	-498	-772	-1646	-2295	-246	-210	1
SK	-752	-1 951	-2 052	-1 748	-2 664	-3 262	-3 490	-2 912	-4 021	-1 627	-2 454	38

Note: Grey cells show surpluses.

Source: Eurostat database, 2012 October.

in the sense of a fixed foreign exchange base of prices, wages, ULC, nominal effective exchange rate, etc.²⁸

The analysis focuses on the current account imbalances of several eurozone peripheral countries – Estonia, Greece, Spain, Italy, Portugal, Slovenia and Slovakia – and compares them with a core country, Germany. Table 1 shows that the overall current account balances of the peripheral countries grew increasingly negative in the euro membership period of 2000-2008. Once the financial crisis erupted, local import consumption fell, which reduced these deficits. However, current accounts never returned to zero (let alone surplus) in Estonia, Greece, Spain and Portugal. Conversely, the German current account surplus remained at a high level following the outbreak of the crisis.

As can be clearly seen in Table 2, Slovakia is the only peripheral country that has competitive trade relations with Germany. A similar, although not so unambiguous conclusion can be drawn from the changes in terms of trade (see Figure 4). The price-based index expresses the relative increases in Portuguese, Spanish and Greek export prices compared to Germany. The rest of the surveyed group did not suffer from relative price disadvantages according to the terms of trade.

In terms of unit labour costs (ULC), in the years prior to the crisis, the peripheral countries lost wage competitiveness as the German ULC figures steadily grew more

competitive (see Figure 5). The crisis years, however, led to increased wage competitiveness in most of the peripheral countries, primarily because of decreases in nominal wages. While a similar crisis-prompted adjustment is evident in the reductions of current account imbalances, this rebalancing process is far from complete.

Empirical analysis

The model and data

The hypothesis is that in a single currency zone, the REER determines the CA balance of member states. According to Equation (5), it is possible to create a full procedure for regression on CA:

Table 2
German trade balance with selected eurozone peripheral countries, 2004-2007 and 2011

in million euros

	2004	2005	2006	2007	2011
EE	342	650	954	1 078	1 018
EL	4 677	4 696	5 282	5 980	3 130
ES	18 823	21 948	21 943	27 015	12 320
PT	2 190	3 321	3 282	3 692	2 319
IT	15 802	17 506	17 878	20 801	14 200
SI	297	472	402	573	-483
SK	-1 840	-919	265	-486	-349

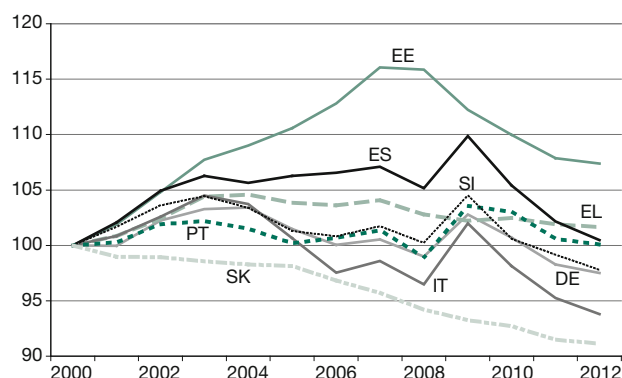
Note: A positive value means a German surplus, and a negative value means a German deficit.

Source: DESTAT Statistische Jahrbuch für die Bundesrepublik Deutschland 2008 and 2012.

28 We exclude Ireland from the analysis because the Irish economic crisis was substantially due to a broad banking crisis, which required public consolidation. This extreme shock made the country a special case in terms of external imbalances, which is worth a separate survey.

Figure 4
Terms of trade

Ratio of export price deflator to import price deflator



Source: DG-ECFIN AMECO, 2012 October.

$$CA = \beta_0 + \beta_1 C/S + \beta_2 \Delta GDP + \beta_3 REER + \beta_4 GDP/capita + \beta_5 corr(M, S/GDP) + \beta_6 DProd_L + \beta_7 Debt_{t-1} + \beta_8 TRANSP + \beta_9 GC + \beta_{10} IRPDEV + \beta_{11} PORTF + \beta_{12} P/E + \beta_{13} SIZE + \beta_{14} DK + \beta_{15} FNGBL + \beta_{16} CYCLE + \varepsilon_i \quad (6)$$

In the case of REER, the primary focus of this analysis, the calculation can be based on ULCs and the consumer price index (CPI), as calculated by deflating with the Harmonised Index of Consumer Prices (HICP). It is useful to calculate the strength of CA determination by all three REER types. That is, the regression functions applied in this study are the following:

$$CA = \beta_0 + \beta_1 REER_{CPI} + \varepsilon_i \quad (7)$$

$$CA = \beta_0 + \beta_1 REER_{ULC} + \varepsilon_i \quad (8)$$

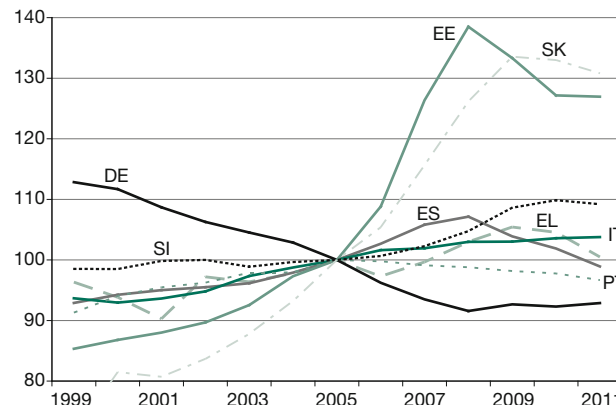
The REER data are from the European Commission, DG-ECFIN Price and Cost Competitiveness statistics, the CA data are from the Eurostat. The REER and CA data are in quarter breakdown. The regression analysis in SPSS includes all the states that were eurozone members in 2014 and covers the time period 1994Q1-2014Q1. As a control calculation, the regression analysis is extended to the EU28 countries for the same period.²⁹ Finally, a third analysis focuses on six of the periphery eurozone countries with external imbalance problems and covers only the irreversible pegging or currency board period.³⁰ The

²⁹ The 18 eurozone members plus Bulgaria, the Czech Republic, Denmark, Croatia, Lithuania, Hungary, Poland, Romania, Sweden and the United Kingdom.

³⁰ Estonia, Greece, Latvia, Portugal, Slovenia and Spain.

Figure 5
Nominal unit labour costs

Index: 2005 = 100



Source: DG-ECFIN Price and Cost Competitiveness, 2012 October.

limitations of the databases place certain restrictions on our findings.³¹

Theoretically, the relative development and productivity levels of countries are included in the REER, as their price and wage competitiveness levels form the basis of the REER calculation.³² Thus, valuation changes among developed member states with varying levels of development will not distort the relative competitiveness included in REER.

Analysis

The analysis of the EU28 and eurozone groups of countries showed no correlation between CA and $REER_{CPI}$ or $REER_{ULC}$. For a 20-year period, the r^2 is between 0.000 and 0.002. The significance is well under the acceptable level, and therefore we have to discard the hypothesis that the REER explains the CA of eurozone or EU28 countries generally. The one exception is for the EU28 if the $REER_{CPI}$ is used as the predictor (see Table 3). The regression analysis results show that the

³¹ The CA data for Belgium are available since 2002Q1; for Cyprus and Croatia since 1999Q1; for Luxembourg and Malta since 1995Q1; for Ireland until 2013Q3; for the Czech Republic, Greece, Lithuania, Hungary and Finland since 1995Q1; for Malta since 2000Q1; for Poland since 1998Q1; and for Romania since 1997Q1. It would have been preferable to calculate with intra-eurozone CA data, but such data is not available in Eurostat for most of the member states. However, price and wage competitiveness will prevail through the euro FX rate.

³² B. Lauro, M. Schmitz: Euro Area Exchange Rate-based Competitiveness Indicators: a Comparison of Methodological and Empirical Results, in: Sixth IFC Conference on "Statistical Issues and Activities in a Changing Environment", 2012, Bank for International Settlements; P. Turner, J. van't Dack: Measuring International Price and Cost Competitiveness, in: Bank for International Settlements Economic Papers, No. 39, 1993.

Table 3
Results of regression analyses

Group and predictor	r^2	SEE	Degree of freedom of residual	Residual sum of squares	F-test	Sig.	Constant	Beta
EU18 REER _{CPI}	0.001	7.2166	1350	70308	0.939	0.333	-3.182	0.019
EU18 REER _{ULC}	0.000	7.2192	1350	70356	0.002	0.961	-1.193	-0.001
EU28 REER _{CPI}	0.002	7.2759	2092	110747	4.920	0.027	-4.815	0.031
EU28 REER _{ULC}	0.000	7.2827	2092	110954	0.998	0.318	-2.936	0.012
Ext.Imb. REER _{CPI}	0.082	6.3043	292	11605	26.017	0.000	-30.215	0.230
Ext.Imb. REER _{ULC}	0.006	6.5604	292	12567	1.673	0.197	-9.534	0.031

Note: SEE = standard error of estimation, Ext.Imb. = group of countries with external imbalances (Estonia, Greece, Latvia, Portugal, Slovenia, Spain).

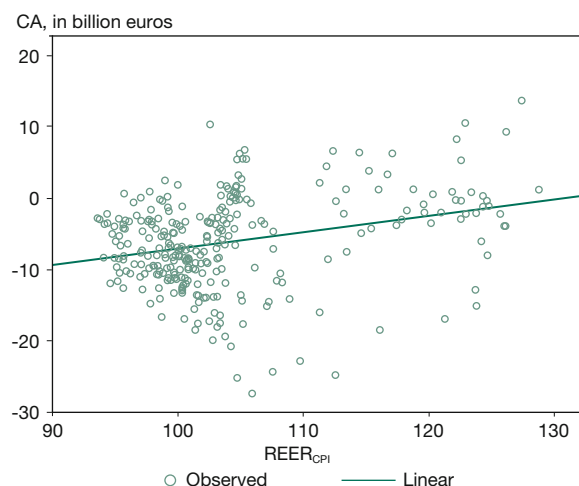
Source: Author's calculation from Eurostat and DG-ECFIN data.

REER has weak explanatory power for the CA. Hence, only the results for the countries with external imbalance problems (see footnote 30) are worth presenting here.

The analysis of these externally indebted periphery eurozone members during the single currency period shows an r^2 of 0.082 if the predictor used is REER_{CPI}. For this limited group, the result is that the REER_{CPI} is a predictor with significance and has explanatory power for the CA. The significance is < 0.001 , indicating that the co-movement of CA and REER_{CPI} is not due to random and incidental impacts. However, the r^2 value indicates that the regression curve only roughly fits the total cases (see Figure 6). Its estimating equation is:

$$CA = -30.215 + 0.23 \cdot REER_{CPI} \quad (9)$$

Figure 6
REER appreciation and current account deficit



Note: Estonia, Greece, Latvia, Portugal, Slovenia, Spain; period of peg; dependent: CA, predictor: REER_{CPI}.

Source: Author's calculation from Eurostat and DG-ECFIN data.

For the REER_{ULC}, the significance level did not confirm the hypothesis ($0.197 > 0.1$). Its r^2 is 0.006. Therefore, the hypothesis on the correlation between CA and REER_{ULC} must be discarded.

Conclusion

This study explores the national external imbalance problem in the eurozone. The explanation was based on the impact of pegged foreign exchange rates, the Feldstein-Horioka puzzle and the reverse Balassa-Samuelson effect. This means that the appreciating REERs turned the less productive eurozone economies into non-competitive actors, which can be seen in their current account and balance of payment deficits. This paper sought to find indications that there is a bias of disequilibrium in the intra-EU trade integration. In a non-adjustable single exchange rate regime, such disequilibrium will lead to the insolvency of externally indebted countries.

The regression analysis did not mirror unambiguously the hypotheses. The expected correlation between CA and REER could only be established with CPI-based data. However, the fact that a correlation could only be measured during the period of a fixed exchange rate regime and in the peripheral eurozone members strengthens the assumption of this study. More precisely, it indicates that the single currency regime with a fixed and non-adjustable exchange rate is disadvantageous for the peripheral member states with weaker economies.

However, from the residuum and constant of the estimation function (see Equation (9)), it can be established that REER is not a robust single factor that explains CA deficits. Rather, as shown in Equations (5) and (6), a combination of many economic and policy factors compose the final balance. It seems that structural and cyclical factors have more importance than REER.