Lending Booms in New EU Member States: Will Euro Adoption Matter?

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Abstract

In this paper we analyse the potential for lending booms in three biggest new EU member states (Czech Republic, Hungary and Poland) during the process of Euro adoption. Experience of old members (Greece, Ireland and Portugal) as well as econometric evidence speak in favour of strong increases of loans in Hungary and Poland but of smaller magnitude than those Ireland and Portugal witnessed recently. Due to estimation problems, the situation in the Czech Republic was more difficult to foresee, but given almost complete interest rate convergence with the euro area we should expect only modest increases in lending there. We state that, given the current data set, no substantial risk to the banking sectors of the new member states should be expected.

Keywords: lending booms, Euro area, banking sector stability, new member states

JEL: E51, E58, G21

Non-technical summary

During the process of Euro adoption some participating member states were faced with unprecedented lending booms. Loans to the private sector expanded at annual rates exceeding 20-30% in real terms. Mostly affected were the lower-income, catching-up countries, Greece, Portugal and Ireland. This fact suggests that a similar process may be underway in new EU member states. These countries have relatively low GDP per capita levels and underdeveloped loan markets. This creates a huge growth potential, which, triggered by interest rate convergence to the Euro area level could end up in a lending boom. Lending booms on their part can be considered as potential danger for the banking sectors. International evidence shows that periods of rapid credit growth have often been associated with banking crises. However, obviously not every period of strong loan creation has to be harmful for the banking sector.

In this paper we try to answer the following questions:
- What lending booms can be expected in new member states?
- How big is the risk to their banking sectors?
- What are the policy implications?

As a first step we analysed the situation in Greece, Ireland and Portugal. We found that the booms started generally 3-4 years before Euro adoption and peaked in the accession year. Despite the strong increase of loans, no adverse consequences were noted in the banking sectors. Banks remained profitable and well capitalised, non-performing loan ratios decreased. Accordingly we state that the strong increases in lending that these countries faced during euro area accession seem to be harmless by their character. This may result from two issues. First, with the process of interest rate declines, loan servicing costs decline as well. This allows agents borrow more without increasing the repayment burden. However, since the loan expansion outpaced interest rate declines, so that servicing costs increased, an additional explanation must be found. This can be the low initial loan servicing to GDP ratio in these economies, related to the low lending intermediation. As a result, even the strong lending booms increased the repayment burden only to a level (relative to income) that has been previously serviced without major problems in more advanced euro area countries.

As a second step we used econometric evidence to foresee the loan developments in three biggest Central-European countries during Euro area accession – Czech Republic, Hungary

and Poland. On the basis of estimated Vector Error Correction Models we constructed simulated patterns for loan developments in new member states. We found that significant increases in lending can be expected in Hungary and Poland. However, their magnitude should be substantially smaller than experienced previously by Ireland and Portugal. The main reasons are the substantial level of interest rate convergence between Hungary, Poland and the Euro area and the already very low level of interest rates in the Euro area. Accordingly there is not much room for downward interest rate adjustment during the years of these countries' euro area accession. Due to estimation problems the situation in the Czech Republic was more difficult to assess. However, given almost complete interest rate convergence between the Czech Republic and the Euro area we expect increases in lending related to Euro area accession to be even smaller than in Hungary and Poland.

Finally, we used the above evidence to assess, how much risk for the banking sectors in new member states is associated with the euro area accession process. Although it is clearly very difficult to identify *ex ante* a banking crisis, the experience of the analysed euro area countries, combined with the fact that Central-European countries show an even bigger initial underdevelopment of lending activities, have healthy banking sectors and can expect smaller loan increases, brought us to the conclusion that no substantial threat for their banking sectors is related to euro area entry. Nevertheless, supervisory agencies should remain vigilant, and have at their disposal several measures that could be applied in case of danger. These include for instance changes in regulatory minima, provisioning rules or loan-to-value ratios and - in the most serious cases – imposition of credit ceilings.

1   Introduction

During the process of Euro adoption some participating member states were faced with unprecedented lending booms[1]. Loans to the private sector expanded at rates exceeding 20-30% in real terms. Mostly affected were the lower-income, catching-up countries, Greece, Portugal and Ireland (further referred to as EMU-3). The sharp decline in interest rates, improving growth prospects and liberalisation of financial markets can be enumerated as main reasons for these developments.

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[1] Several definitions of lending booms can be found in the literature (e.g. Terrones, Mendoza (2004), Gourinchas et al. (2001)). We do not attempt to define this term precisely, but use it to describe growth rates (in real terms) of loans to the private sector of unprecedented (in the analysed sample) magnitude.

The stylised facts about lending booms in Greece, Portugal and Ireland make it obvious that a similar story may be underway in the new EU member states. These countries aim at joining the euro area in a few years, are poor relative to the rest of the Euro area and face currently higher nominal and real interest rates. Since lending booms have often preceded banking sector crises it seems to be of utmost importance to policymakers in member states to know in advance what they can expect in the near future, allowing them taking preventive measures.

In this paper we attempt to foresee developments on the loan markets of new member states during the process of Euro area accession. The analysis is concentrated on the three biggest new EU member states: Poland, the Czech Republic and Hungary (further referred to as CE-3). They add up to about 80% of the eight Central-European acceding countries' GDP and hence, should be paid the biggest attention. Being probably equally destructive for the home economy, a banking crisis in any of them would have more severe consequences for the stability and reputation of the Euro area than one happening in any of the smaller new member states[2]. In the analysis we concentrate only on the consequences of monetary integration, leaving out the problem of financial liberalisation and financial development (i.e. better access to credit markets, increased domestic and foreign competition etc.). The first is because banking sector regulations have been adjusted gradually since the early 1990's and are currently not diverging from EU standards. Hence, in this respect there is not much to be expected as a consequence of the process of Euro area accession. Financial development, on the other hand, will of course proceed in course of integration, deserves however a separate study.

This paper draws from the literature on lending booms and their possible consequences for micro- and macroeconomic stability and from the literature dealing explicitly with possible loan developments in new EU member states.

The first topic has been covered broadly, although without giving a broadly accepted conclusion. On the one hand, several empirical studies have pointed at the strong relationship between credit growth and banking sector/ balance of payments crises. For instance Honohan (1997) reviews cases of financial crises in 24 developed and emerging markets and considers regime changes as an important source of banking crisis. He also includes credit growth into

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[2] However, given the level of financial integration between Central European countries and the older member states even a collapse of a mayor bank would very unlikely seriously affect financial institutions from current euro area member states. For an analysis of links between current core and peripheral euro area countries' banks see Hartmann et al (2004).

his set of early warning indicators. Demirguc-Kunt and Detragiache (1998) after analysing banking sector crises in 29 countries conclude that credit growth (lagged two years) is highly significant for explaining a crisis. Kaminsky, Lizondo and Reinhart (1998) review 27 empirical studies and note, that most of them mention credit growth as one of the indicators of an upcoming banking sector/ balance of payments crisis. Similarly, Ball and Pain (2000), who review the literature on banking crises, state that domestic credit growth is consistently found as a significant indicator of an upcoming crisis. Terrones and Mendoza (2004) analyse credit booms in emerging market economies during the period from 1970 to 2002 and come to the conclusion that 75% of the credit booms were associated with a banking crisis, while 85% were associated with a currency crisis.

On the other hand some authors have argued that the relationship between loan expansions and crises is not that strong, as suggested by the previous studies. Gourinchas, Valdes and Landerrechte (2001) analyse a broad sample of lending boom episodes over a 40 year sample. They find that the link between lending booms and banking crises is significant only in the Latin American subsample. Once these countries are removed from the data set, the relationship disappears. Hernandez and Landerrechte (2002) after analysing 25 developed and 35 developing countries come to the conclusion that although lending booms are often followed by banking crisis, this phenomenon is in most cases related to poor regulatory and supervising activities. Tornell and Westermann (2002) analyse banking crises in 39 middle income countries and find that the probability that there is a banking crisis conditional on a lending boom is only between 5.7% and 8.9%.

Contrary, the topic of potential lending booms and related macroeconomic imbalances (eg. current account deficits) resulting from euro area accession of new EU member states, has not received much attention yet, only two papers related to this subject are known to the author.

Cottarelli et al. (2003) present a broad analysis of the Central European and Balkan countries' banking sectors. They also attempt to model the possible developments in loans to the private sectors of these countries in the near future. For this purpose the authors use an international panel of non-transition developing and industrialised countries, relating the ratio of credit to the private sector to GDP to a set of variables including the public debt-to-GDP ratio, GDP per capita, inflation and indices of financial liberalisation. From comparing the actual and theoretical values of credit to GDP in Central European countries the authors conclude that their loan markets are still substantially undersized. The deviation of the credit-to-GDP ratio from equilibrium has been estimated at 27 percentage points in the Czech Republic, 41 p.p. in Hungary and 42 p.p. in Poland. The authors conclude that fast credit growth should be

expected in Central European countries in the near future, without, however, pointing explicitly at euro-area accession as the main reason.

A more explicit approach to the consequences of euro area accession has been adopted by Schadler at al. (2005). This paper analyses various aspects of the prospective euro adoption in Central Europe. The simulations presented suggest a very strong loan expansion during the process of Euro adoption, with annual growth rates peaking at 30-45% in real terms. However, these results are based on the assumption that just after Euro adoption new member states will start converging to the equilibrium level, given by the error correction model of loan demand for the whole Euro area.

In our view, however, there is no reason to expect that the Euro adoption will immediately trigger a process of financial deepening consistent with the experience of old euro area members. Central European countries showed for many years relative underdevelopment of their financial markets (probably being a legacy of the old system) and the process of catching-up should be more related to financial liberalisation, EU entry and deeper market penetration by foreign banks, than to Euro area accession as such. Hence, in this paper we adopt a different approach towards predicting the potential for lending booms and possible adverse banking sector developments in new member states.

First, we analyse thoroughly the recent loan market history of relatively similar euro area countries, which witnessed strong loan expansions while adopting the common currency (Greece, Portugal and Ireland) together with policy measures adopted by their monetary/supervisory authorities. We postulate that the relative similarity of these countries before euro area accession and CE-3 countries today increases the likelihood of similar loan market developments in Central Europe. Second, we estimate simple models of the loan markets in CE-3 countries and, given exogenous assumptions about euro area accession, predict lending behaviour during the upcoming process of monetary integration.

It must be mentioned that both approaches have drawbacks. Drawing conclusions from past experience is warranted if no substantial changes to policy are expected in the future. However, joining a monetary union is a substantial policy change, and thus extrapolating past relationships into the future should be treated with much caution. On the other hand, drawing from the experience of other countries, that joined the common currency area earlier, can be risky as well. It cannot be taken for granted that even given some similarities, loan market developments in old and new member states will be alike. Nevertheless, at this point of time

we do not see any better way to predict lending patterns in new member states during euro area accession.

The rest of the paper is structured as follows. In section 2 stylised facts about old and new member states, their loan markets and banking sectors are given. In section 3 we use econometric evidence to simulate developments in lending in the new member states during Euro area accession. Section 4 contains policy recommendations for national central banks, section 5 concludes.

2 Stylised facts about selected Euro-area and New Member State countries

2.1 Portugal

Portugal adopted the Euro in 1999 and can be regarded as the model example of a Euro area accession driven lending boom. The expansion started around 1995-96 and reached its maximum in Q3 1999 at 28,6% (in real terms[3]), then returned within two years time to the 0-5% band (Fig. 1). It was accompanied by a relatively gradual reduction in real interest rates. The real short-term rate fell from 7.2% in Q1 1995 to zero in Q1 1999 and remained around this value for the next years. The expansion started in housing loans and was strongest in this area (the real growth rate peaked at 33.9%). Moreover, it should be taken into account that the expansion of mortgages is underestimated due to a large volume of securitisation transactions[4]. Most new loans were, however created for the corporate sector (EUR 59 bn) with housing loans closely behind (EUR 56 bn).

Figure 1: Real loans to the private sector (y-o-y) and real 3-month interest rate in Portugal (1985-2004)

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[3] Interest rates and loans have been deflated using the current GDP deflator.

[4] According to the estimates of the Banco de Portugal (BdP 2003), the growth rate of housing loans adjusted for securitisation was 11.7% in 2003 as compared to the balance sheet rate of 2.2%.
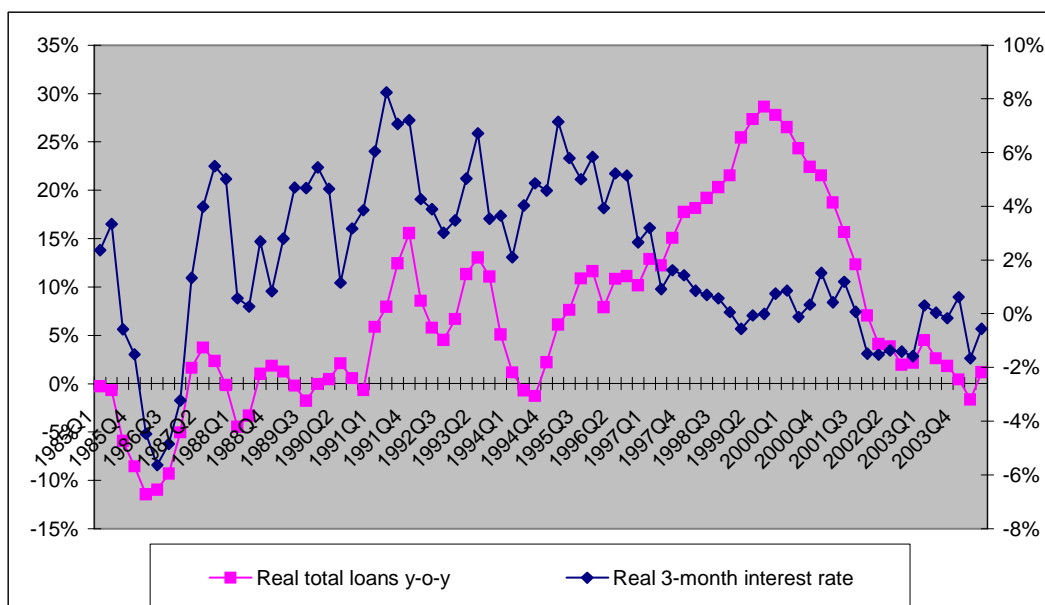
Source: Own calculations based on ECB and OECD data.

No substantial deterioration of the banking sector could be noted (tab. 1). Banks remained sufficiently capitalised as reflected by a relatively stable solvency ratio of 9.2-12.4%. Since 1999 non-performing loans have constituted only slightly above 2% of total loans. This indicator should however be regarded cautiously, since it tends to brighten the situation during loan expansions and to show the problem only with a substantial lag[5]. Profitability of the sector, as measured by return on assets (ROA), was stable, although not particularly high, only slightly above the Euro-area average. The prolonged expansion led to a significant increase in the loan-to-GDP ratio, which amounted to 136% in 2003, one of the highest in the Euro area. It is noteworthy that the lending boom did not lead to significant asset price increases. In particular, despite high growth rates of housing loans, the growth rate of real estate prices remained modest over the recent years (IMF 2003c).

Table 1: Selected indicators of the performance of the Portuguese banking sector (1995-2003)

Year	Capital adequacy ratio	Non-performing loan ratio	ROA	Loan to GDP ratio
1995	11.8%	5.9%	0.6%	63%
1996	11.4%	5.2%	0.6%	67%
1997	11.5%	4.0%	0.7%	76%
1998	12.4%	2.9%	0.8%	90%
1999	10.8%	2.2%	0.9%	109%

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[5] The obvious reason is that new loans granted are "good loans" for some time. Thus, in periods of fast credit growth, the denominator of the NPL ratio increases quickly, while the numerator shows a higher volume of bad loans only with a lag. Accordingly, during a boom the NPL ratio falls for some time and need not reflect the upcoming deterioration of the asset portfolio.

| 2000 | 9.2% | 2.2% | 0.9% | 128% |
2001	9.5%	2.1%	0.9%	132%
2002	9.8%	2.3%	0.7%	135%
2003	10.0%	2.4%	0.8%	136%

Source: IMF, Banco de Portugal and own calculations based on ECB and IMF data.

2.2 Ireland

The lending boom in the Irish banking sector started around 1995, i.e. four years before Euro area accession. Real total loans to the nonfinancial sector increased by 32,1% y-o-y at the peak in 1998 and by 31,9% at a second peak one year later. In these terms Ireland witnessed the most spectacular loan expansion among the Euro area countries. By 2002 the boom seemed to be over, however in 2004 another period of strong loan expansion started. Regarding the sector decomposition, sources of loan creation were relatively balanced. In the first expansion phase corporate loans was the major source of expansion, whereas after 2002 this role was taken over by housing loans. Even from looking at the data (Fig. 2) it is evident that the drop of real interest rates, which started in 1993, could have been a major reason behind the expansion. The real 3 month interest rate dropped from above 10% in 1993 to negative regions in 1998 and remained there with minor exceptions until 2004. In this respect it should be noted that the ERM crisis and the subsequent drop in interest rates from unnaturally high levels could have influenced the magnitude and time of occurrence of the lending boom in Ireland.

The loan expansion did not undermine the strength of the Irish banking sector. The capital adequacy ratio remained broadly stable over the analysed period and stayed securely above the minimum requirement of 8% (Tab. 2). Banking sector profitability, as measured by ROA, decreased slightly from 1.7% in 1995 to 1.3% in 2003. This process reflected falling interest margins, related to historically low interest rates and a shift away from deposits towards more expensive financing sources like loans from foreign banking institutions. Nevertheless, profitability remained much above the Euro area average of 0.7% in 2003. Finally, loan quality improved, the ratio of non-performing loans to total loans decreased from 2.8% in 1997 to 1.1% in 2003. As before it should however, be taken into account that this ratio is a lagged indicator of loan quality. Both, IMF missions (IMF (2001b), IMF (2003b)) and the Irish supervisory authorities seem to be satisfied with the performance of the banking sector, pointing however at one source of concern. The surge of mortgage loans brought about a boom of house prices, which over the last 6 years were growing at an annual rate of almost 20% (CBI (2001), CBI (2002), CBFA (2004)). Although there is no clear evidence of overvaluation, there is some risk that Ireland faces a price bubble at the property market.

Figure 2: Real loans to the private sector (y-o-y) and real 3-month interest rate in Ireland (1985-2004)
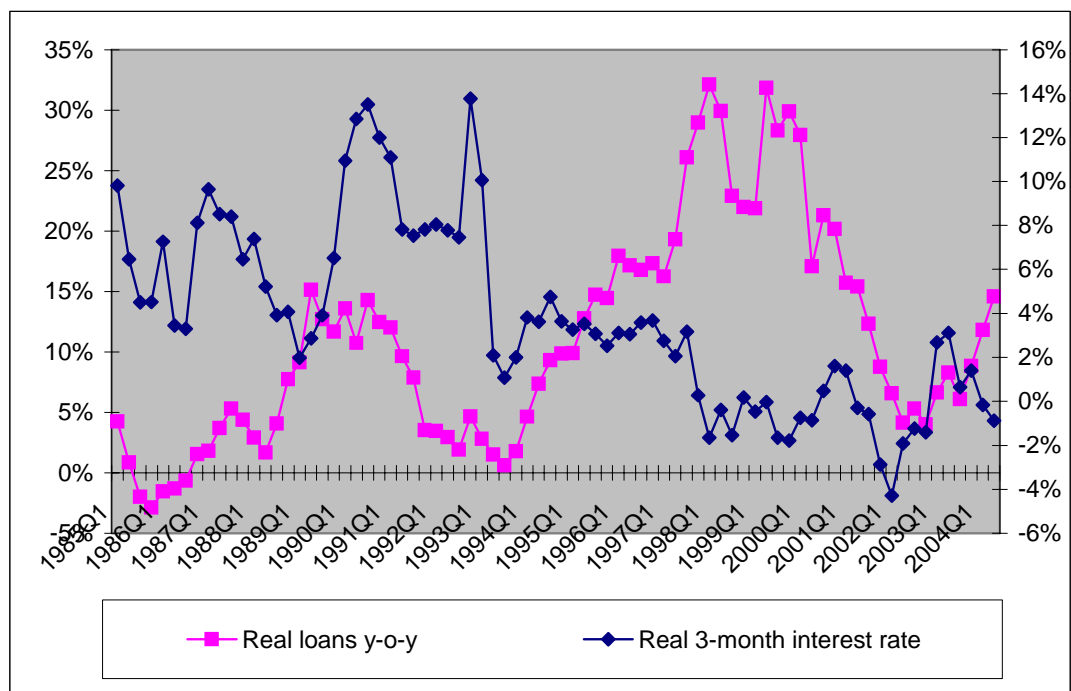
Source: Own calculations based on ECB, OECD and Reuters data.

Table 2: Selected indicators of the performance of the Irish banking sector (1995-2003)

Year	Capital adequacy ratio	Non-performing loan ratio	ROA	Loan to GDP ratio
1995	13.0%	NA	1.7%	67%
1996	11.6%	NA	1.8%	71%
1997	11.1%	2.8%	1.4%	89%
1998	11.0%	2.5%	1.7%	92%
1999	10.4%	1.8%	1.6%	111%
2000	9.7%	1.9%	1.5%	117%
2001	11.2%	1.9%	1.5%	123%
2002	12.5%	1.7%	1.5%	117%
2003	11.0%	1.1%	1.3%	127%

Source: IMF, Central Bank of Ireland and own calculations based on ECB and IMF data.

2.3   Greece

The case of Greece is not the most evident example of a Euro-accession driven loan expansion. It is not obvious, whether the lending boom, whose beginning can be observed around 1995 was related to monetary integration. No significant decrease in real rates could be observed before this event (Fig. 3), moreover it seems that at that time nobody could be sure at what point in time Greece would enter the euro area. The expansion can be rather explained by the removal of foreign exchange controls over 1993-94, which brought about a

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surge in foreign exchange lending (Honohan (1999), IMF (2001a)). Obviously the capital account liberalisation can be regarded as a step towards monetary union, but is not interesting from the point of view of possible occurrences in new member states, since capital controls have already been liberalised there. Having this in mind, one should probably concentrate on the last phase of expansion, visible since 2000. This followed an obvious drop in real rates from 5-6% in 1999 to about 1% in 2000 and further into negative regions in the subsequent years. Loan expansion of over 20% in real terms followed soon, peaking at 22% in Q2 2001 and remaining above 10% until the end of the available sample. Disaggregating the data shows a clear winner of the Greek lending boom: loans for housing purposes showed highest growth rates over the whole period. In real terms they exceeded 30% in 2001-2002 (BoG (2003b)). On the other hand, corporate loans' annual growth rate did not make it above the 20% mark. Nevertheless, due to the higher initial level, corporate loans added most to the expansion (EUR 18 bn) followed by mortgages (EUR 16,9 bn).

Figure 3: Real loans to the private sector (y-o-y) and real 3-month interest rate in Greece (1985-2004)
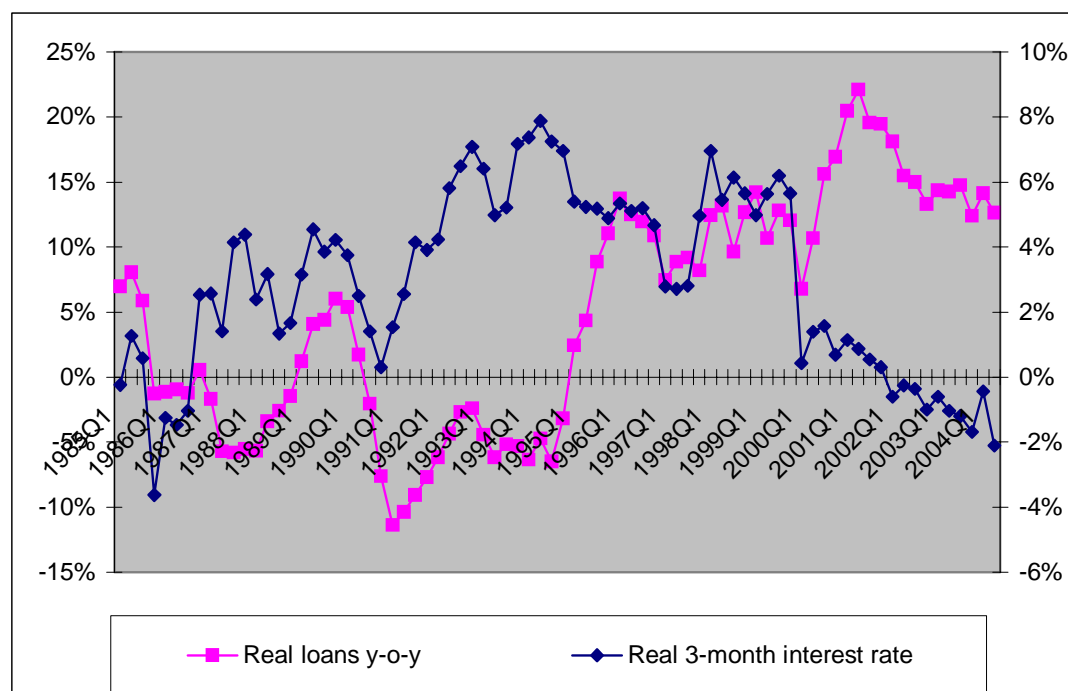
Source: Own calculations based on ECB and OECD data.

As it can be seen from the basic indicators presented in table 3, as in the previous cases, the prolonged loan expansion did not adversely affect the Greek banking sector. Solvency remained broadly stable at 10-13.6% as measured by the capital to risk adjusted asset ratio (capital adequacy ratio). The quality of the loan portfolio improved over time bringing the non-performing loan (NPL) ratio down to 8.1% in 2002 from over 19% in 1995. Only the

profitability of the sector decreased substantially over the last four years, reflecting mostly decreasing non-interest income due to weak equity markets performance (BoG (2000), BoG (2001), BoG (2002), BoG (2003a)). In general, no unwelcome developments were be noticed, the only exception being a steady increase of property prices, of about 10% per annum for several years (IMF (2003a)), driven by mortgage lending.

Table 3: Selected indicators of the performance of the Greek banking sector (1995-2003)

Year	Capital adequacy ratio	Non-performing loan ratio	ROA	Loan to GDP ratio
1995	12.8%	19.5%	NA	34%
1996	10.3%	19.0%	NA	36%
1997	10.3%	16.5%	0.7%	37%
1998	10.2%	13.6%	0.7%	40%
1999	16.2%	15.5%	2.4%	43%
2000	13.6%	12.3%	1.4%	49%
2001	12.5%	9.2%	1.0%	57%
2002	10.5%	8.1%	0.5%	61%
2003	11.9%	NA	0.9%	66%

Source: IMF, Bank of Greece and own calculations based on ECB and IMF data.

2.4 Common features

Several common features of loan expansions in the analysed countries can be found. These can be useful when drawing conclusions for the new member states.

Timing: Lending booms started 1-4 years before Euro area accession and peaked in all countries in the accession year. Despite a significant slowdown in all the countries it is not sure, whether the process has already fully terminated. There is, however no unique time pattern as regards the relative behaviour of corporate, household and housing loans.

Driving force: Highest growth ratios were noted in lending for housing purposes. However, due to the initial low amount of outstanding mortgage loans, in all countries most new loans were created for corporates. Nevertheless, the differences are only minor.

Side effects: As a general rule no significant side effects for the banking sectors have been noted. The sectors remained profitable and well capitalised, non-performing loan ratios declined. One notable exception is real estate prices, which increased substantially in Greece and Ireland. However there is no clear evidence of a price bubble in any of these countries. Although serious problems in the banking sector seem now unlikely, some trouble cannot be ruled out, since in two countries the booms are not over yet.

Financial deepening: Loan-to-GDP ratios increased substantially in all three countries, approximately 2 times between 1995 and 2003. However, while Portugal and Ireland overtook most Euro area countries, Greece's lending sector remained underdeveloped.

2.5 Stylised facts about new member states' loans and banking sectors

The banking sectors of CE-3 countries have undergone dramatic changes during the transition period. In the 1980's these countries did not have a two-tier banking sector at all. Their banking systems were dominated by a so called monobank, which combined the functions of central and commercial banks. In the late 1980's CE-3 countries decided to create a two-tier banking system, separating several commercial institutions from the central bank. This process, however carried from the very beginning a sort of "original sin". The newly created banks were heavily burdened by bad loans inherited from the past. They also lacked the know-how of modern banking (including the inability to properly asses risk), moreover young and inexperienced supervisory institutions were not prepared to enforce a restructuring process. As a result, in all CE-3 countries substantial aid from the public sector had to be given to rescue the banking systems.

Poland and Hungary started the restructuring process relatively early. Around 1992-1994 banks were recapitalised (Polański (2002), Varhegyi (2002)), in Hungary bad loans were also partially transferred to a specialised institution. Full restructuring costs are estimated to have been around 6% of GDP in Poland and 13% in Hungary (Szapary (2001)). When the restructuring process had given it's first positive effects, the privatisation process was started. As a result, the bulk of commercial banks have been sold to foreign financial institutions. In 2003 foreign ownership amounted to 68% of the banking system assets in Poland and to 83% in Hungary (ECB (2005)). The restructuring and privatisation processes in the Czech Republic were more troublesome than in Hungry and Poland. The restructuring process, which started in the early 1990's was followed by a the so called voucher privatisation, which did not change the *status quo* in most big banks, where the state retained majority ownership. As a result, when the economy was hit by a currency crisis and a recession in 1997-98, many poorly managed banks faced severe problems. At the end of 1999 more than 40% of loan granted by the large banks were classified (Tuma (2002)). As a result a huge restructuring program was introduced, it's cost are estimated at 18% of GDP (Szapary (2001)). Subsequently, the big banks have been privatised, so that in 2003 foreign ownership in the Czech banking system's assets amounted to 96%. However, the bad loan problem coupled with economic recession contributed to a substantial decrease of loans granted to the private sector around 1998-2001. This episode differentiates the Czech Republic from the other two

countries. While in Hungary and Poland, over the last decade a steady increase of the loan-to-GDP ratio could be observed, the Czech Republic faced a strong contraction (Figure 4). Being a legacy of the previous economic system, the ratio of total loans to GDP in CE-3 countries is relatively low compared to other euro area members, even controlling for differences in economic development (IMF (2004), Cottarelli et al (2003)).

Figure 4: Total loans to the private sector as percent of GDP in the Czech Republic, Hungary and Poland 1995-2004
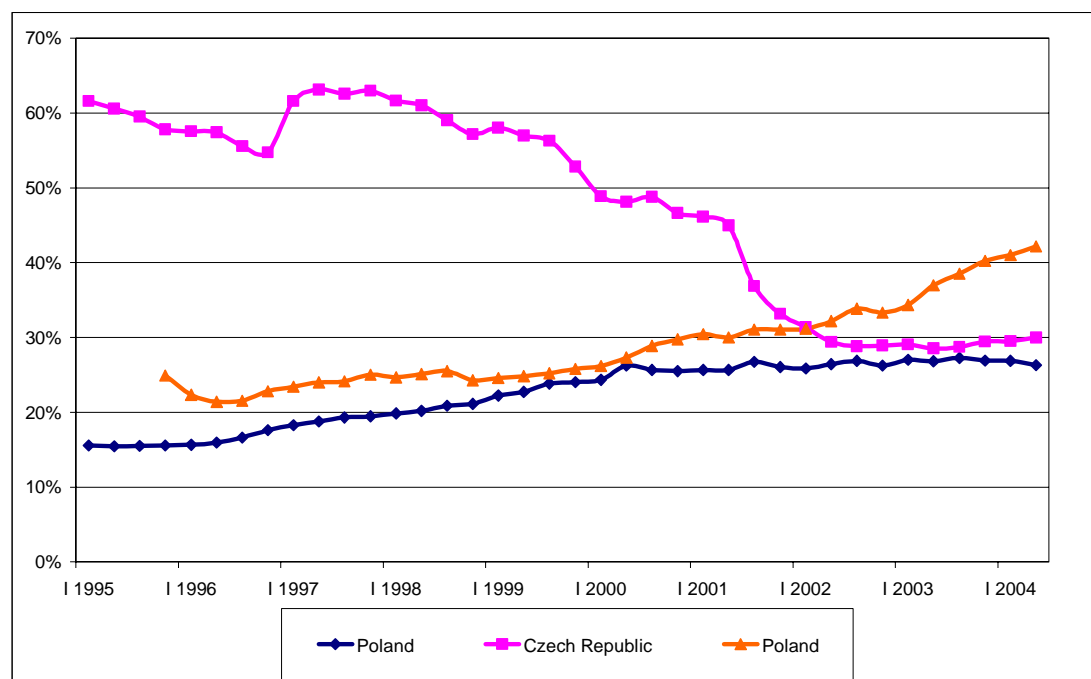
Source: Own calculations based on CNB, MNB, NBP and OECD data

Looking at disaggregated data, several observations can be made. First, foreign currency loans form a substantial, but not overwhelming part of the banks' portfolios. Over the last years the share of foreign currency in total loans varied between 15-28% in the Czech Republic, and increased from 25-35% in Hungary and from 14% to 25% in Poland (Fig. 5).

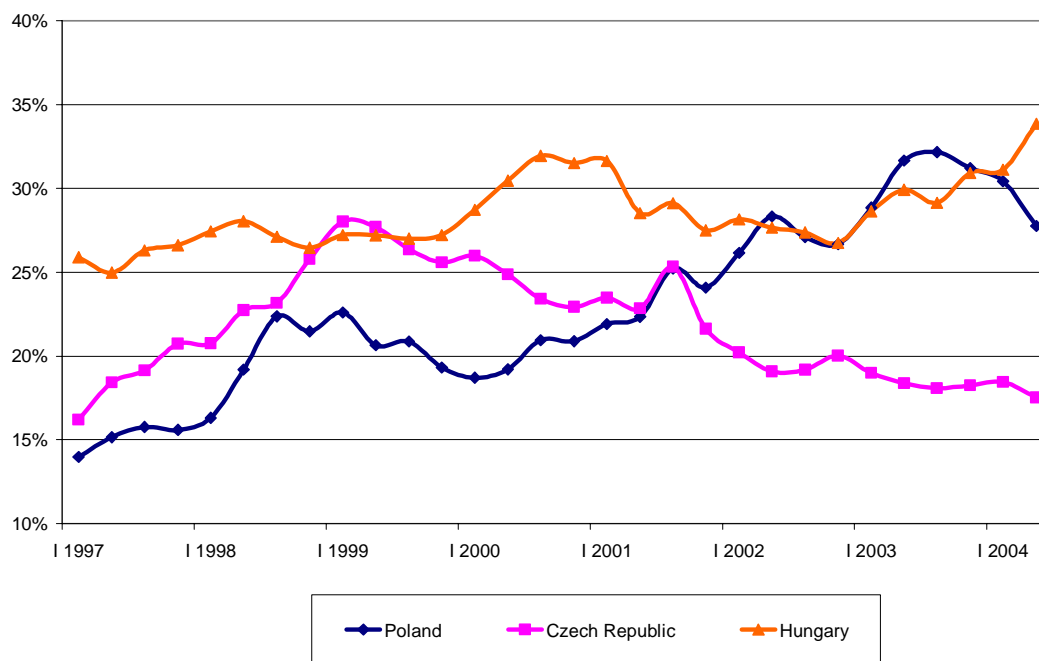Figure 5: Share of foreign currency loans in total loans to the private sector in the Czech Republic, Hungary and Poland 1997-2004

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Source: Own calculations based on CNB, MNB and NBP data

Second, regarding sector decomposition, a common tendency can be observed – a steady increase of the share of loans to households and a decline of the corporate loan share. By 2004 the share of households increased to almost 50% in Poland, about 35% in the Czech Republic and more than 30% in Hungary.

Looking at disaggregated data one more thing becomes apparent – the even deeper underdevelopment of the housing loan market. The ratio of housing to total loans amounted in June 2004 to 9.3% in Poland and 17.1% in the Czech Republic, only in Hungary it attained 31.1%. With exception of the latter, these numbers seem low as compared to 34% in Ireland, 38% in Portugal and 36% for the Union as a whole. Thus, whatever results for total loan expansions will emerge from the latter analysis, it should be remembered that the growth potential of selected categories might be much bigger than the average and that these areas should be paid special attention. Mortgage lending is a prominent example.

The current stance of the banking sectors in CE-3 countries is good. Banks are well capitalised and their loan portfolios are not excessively troubled by non-performing assets (Tab. 4). In the second case Poland, with its high NPL ratio may look as an outlier, however,

the numbers reflect the very strict classification and provisioning rules[6] that have been eased recently (NBP (2004a)), and hence the ratio is expected to decrease substantially in the near future. With the exception of the Hungarian mortgage market (MNB (2004)) there are no lending booms which could possibly threaten to result in substantial increases of bad loans. The macroeconomic outlook for all three countries seems bright, GDP is expected to grow at 3.5-5% in the near future (EC (2004)) and inflation remains low. Moreover, as already mentioned, most of the region's commercial banks have now big foreign credit institutions as majority shareholders. Hence, there is a chance that in case of trouble parent institutions would be ready to bailout the troubled bank[7].

Table 4: Non-performing loans and Capital adequacy ratios in CE-3 countries (June 2004)

	Czech Republic	Hungary	Poland
Non-performing loans/total loans	4.5%	3.4%	17.2%
Capital adequacy ratio	13.6%	11.5%	15.6%

Source: National Central Banks.

2.6 Comparing old and new member states

If predictions about lending patterns in new member states are to be made from the above experience, one should check whether the initial conditions are similar between the groups of countries. Table 5 presents a brief comparison of the economic and banking sector characteristics. Since, according to official declarations, it can be expected that the new members will join the Euro area around 2009-2010, we compare their current situation with that of the old members five years before accession, i.e. 1994 for Ireland and Portugal and 1996 for Greece.

The old members were a little bit more developed as measured by GDP per capita (especially as compared with Poland), Ireland and Portugal had also a much higher level of lending intermediation. Nevertheless, on average, the differences here are not overwhelming. The divergence becomes more pronounced if one regards interest rates, which are expected to be

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[6] For instance, until December 2003 Polish banks had no motivation to write-off lost loans. In case such loan had been repaid at a later date, it would have been treated as exceptional profit and become subject to heavy taxation (NBP 2003).

[7] Although the experience has been mix so far. In 2003 the Belgian owner KBC recapitalised the Polish Kredyt Bank when there was a serious threat of falling below the 8% margin for capital adequacy. On the other hand Bayerische Landesbank left the Croatian Rijecka Bank stranded in 2002, when it faced bankruptcy as a result of losses generated in the dealing room.

the main driving factor behind lending booms. New member states are more advanced as regards nominal convergence with the euro area (inflation, interest rates). This is not only true for absolute levels but also for spreads over German bonds and German/Euro area short term rates. Average real short term rate in CE-3 countries stood at 3.1% in 2004 as compared to 4.2% in EMU-3 countries in the mid 1990's. Spreads on long term bonds are lower in CE-3 countries by 0.5 percentage point, the spread on short term rates is lower by 1.7 percentage points. Moreover, one has to remember that in EMU-3 countries the convergence of spreads was accompanied by a substantial decline of German/Euro area interest rates. This need not happen at the time CE-3 countries enter the Euro area, since interest rates are currently at historically low levels there, probably below their long-run equilibrium level. Nevertheless it should be noted that CE-3 countries are not homogenous as regards interest rate levels. For instance real and nominal short rates are much higher in Poland and Hungary than in the Czech Republic. Thus, at the first sight it seems that the lending boom potential in new member states is smaller than in the old member states.

Table 5: Selected indicators for comparison of EMU-3 and CE-3 countries

	Greece 1996	Ireland 1994	Portugal 1994	Average EMU-3	Average CE-3	Czech Rep. 2004	Hungary 2004	Poland 2004
GDP per capita at PPP $ (constant prices)	15131	19231	15093	17181	14345	16265	15342	11427
Loans to private sector/GDP	35.6%	63.7%	59.0%	49.7%	36.0%	32.7%	44.9%	30.5%
Nominal 3M interest rate	13.8%	5.9%	11.1%	9.8%	6.3%	2.1%	11.3%	5.5%
Nominal 10Y interest rate	9.7%[a]	8.0%	10.5%	8.9%	6.3%	4.6%	7.8%	6.6%
Inflation rate (HICP)	7.9%	2.9%	5.0%	5.4%	3.1%	1.3%	6.1%	1.8%
Real 3M interest rate	5.5%	2.8%	5.8%	4.2%	3.1%	0.8%	4.9%	3.7%
Real 10Y interest rate	4.1%	5.0%	5.3%	4.5%	3.2%	3.3%	1.7%	4.7%
Spread to Germany – short rate	10.5%	0.6%	5.8%	5.5%	4.2%	0.0%	9.2%	3.4%
Spread to Germany – long rate	4.2%	1.2%	3.6%	2.7%	2.2%	0.5%	3.7%	2.5%
Non-performing loans/total loans	19.0%	2.8%	7.0%	10.9%	8.4%	4.5%	3.0%	17.2%
Capital adequacy ratio	10.3%	13.0%	11.8%[b]	11.7%	13.6%	13.6%	11.5%	15.6%

Data on inflation and interest rates are 12-month averages. For CE-3 countries the June 2004 data is presented, except GDP, where IMF estimates for 2004 are given. The averages are unweighted.
a) July – December 1997 data
b) 1995 data
Source: ECB, Eurostat, IMF, National Central Banks and Reuters.

Inferring from the statistical information, the following can be said about potential lending booms in new member states. First, in general they should be considered prone to substantial loan expansions. They will join the Euro-area with a big catching-up potential and relatively high interest rates. This means that there is room for real interest rate reductions. If the pattern of EMU-3 countries were to be repeated, one could expect the process starting around 2006-2008 and peaking in the year of accession. The EMU-3 experience does not allow drawing firm conclusions about the end of the boom. Second, taking into account the relative underdevelopment of mortgage lending, this area of bank activity can be expected to grow fastest. Third, the condition of the CE-3 countries banking sectors is good and, given the

experience of EMU-3 countries, provided that protective measures of similar power are applied and the booms do not exceed those experienced in these countries one should not expect substantial trouble.

3   The potential for lending booms in new member states

3.1   Model and data

In order to go beyond simple inference based on comparing statistics, we construct econometric models of loan developments. Although we want to forecast only the developments in CE-3 economies, we build models for all six countries. This is done for two reasons. First, since the new member states have undergone a deep transformation of their economic systems and their time series are not particularly long, models, especially based on quarterly data, are not always of top quality. Second, there is some risk that the accession to the Euro area is by itself such a deep change in economic conditions that it could result in a breakdown of the econometric relationship describing the loan behaviour. Therefore the relationships estimated for EMU-3 countries could be used as a supportive tool for forecasting loan expansions in CE-3 countries. Moreover these models can be used to check whether the relationships are stable subject to euro area entry.

For several reasons we try to keep the specification as simple as possible. First, the availability of time series for new member states is limited. A number of time series starts only very recently. Since we would like to have the same data set for all 3 new member states, this limits substantially our possibilities. Second, even the longest available series are relatively short (not longer than 10 years of quarterly observations). Limiting the data set helps saving the model's degrees of freedom. Third, the model will be used for building a conditional forecast of loan developments. Every variable, which would enter into the model, but would not be sufficiently explained within it, would require exogenous assumptions for the forecast horizon. This would obviously increase the level of discretion.

Having this in mind, we follow the approach taken recently by Hofmann (2001), Calza, Gartner and Sousa (2001) and Calza, Manrique and Sousa (2003) and build a vector error

correction model in real loans to the private sector, real GDP and real interest rate[8]. This is certainly not a complete list of loan determinants. However, since we still lack a widely accepted theory of loan evolution, we decided to concentrate on variables, which are considered as basic determinants of money and loan creation ie. output and interest rates (e.g. Laidler (1991), Borio and Lowe (2004)). Although one could think of additional determinants of loan development (e.g. indices of financial liberalisation, crowding-out, capital available to banks) it seems impossible to obtain consistent cross-country data on quarterly basis for these variables. It should be also born in mind, that since the quantity of loans is determined simultaneously by supply- and demand-side factors, the relationship we estimate should not be treated as a demand or supply equation. The time series used for estimation purposes have been plotted in Appendix 3.

The long run relationship is of the following form:

(1) $\quad l_t - \beta_0 - \beta_1 y_t - \beta_2 r_t = 0$

where l stands for the log of real loans, y for the log of real GDP and r for the real rate of interest. Accordingly the vector error correction model takes the form:

(2) $\quad \Delta x_t = \Gamma_1 \Delta x_{t-1} + ... + \Gamma_n \Delta x_{t-n} + \alpha \beta' x_{t-1} + c_t + \varepsilon_t$

where $x_t = [l_t, y_t, r_t]'$, Δ denotes the first difference, Γ are matrices of short-run coefficients, α is the load matrix of error correction coefficients, β is the matrix of long-run coefficients and ε denotes the vector of residual.

We use quarterly data starting Q1 1981 for Portugal, Q1 1983 for Greece and Ireland, Q1 1995 for the Czech Republic and Poland and Q4 1995 for Hungary, whereby the starting point is determined by data availability. All the series terminate in Q2 2004. Total, domestic currency denominated loans to the private sector are taken for CE-3 countries[9], total loans to

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[8] Since in CE-3 countries a significant part of lending is done in foreign exchange, we also tested a specification including the real effective exchange rate for these countries. However this resulted mainly in wrongly signed and unstable coefficients in the cointegrating vector.

[9] This is justified by the fact that interest rate declines (and resulting increases in lending) will affect only domestic rates. Unfortunately for EMU-3 countries long series on local currency denominated

the private sector for the EMU-3 countries. Since no consistent data on loan interest rates was available, we used the 3-month money market rate. Interest rates and loans were deflated using the GDP deflator. Moreover GDP at constant prices is used for all countries. A detailed description of data sources is presented in Appendix 1.

According to the model specification real loans, GDP at constant prices and real interest rates should be integrated of order one. From the theoretical point of view this is certainly not controversial as regards loans and GDP. However, as to real interest rates, it is not completely clear whether they should be treated as stationary or nonstationary variables (e.g. Lanne (2002)). However, since we are trying to model consequences of permanent shifts in real rates it seems more appropriate to include them into the cointegrating vector. The unit root tests (Tab. 7) tend to suggest that all the analysed variables are indeed integrated of order 1.

3.2   Estimation and simulation

We estimate a separate VEC model for each country. As a first step we determine the number of lags in each model. We use 3 information criteria (Akaike, Schwarz and Hannan-Quinn) and the LR sequential test (Tab. 8). If these are conclusive (at least 3 criteria indicating the same lag), we choose the indicated number of lags, if not (or if they indicate 0 lags as in the case of Hungary), we build a small model with well-behaved residuals (Tab. 10, 11). Inferring from the maximum eigenvalue and trace tests (Johansen 1991), we find one cointegrating vector at the 5% level in the cases of Hungary, Ireland, Poland and Portugal (Tab. 9). The null of zero vectors cannot be rejected in the case of Greece and the Czech Republic. A closer look at the data shows that in both cases the sample is dominated by flat or even falling amount of real loans, which explains why no long-run relationship to GDP can be found.

The four encountered cointegrating vectors show a positive relationship between GDP and real loans with elasticities between 1.45 for Ireland and 3.39 in Hungary (Tab. 12, 13). These numbers (especially those for Poland and Hungary) seem relatively high as compared to other studies[10]. However, since the financial intermediation in these economies is very low, they probably simply reflect the process of financial deepening that has been going on over the estimation period and can be expected to hold on over the foreseeable future. Real interest

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loans were not available. On the other hand only relatively short series of foreign currency lending in CE-3 countries have been available, thus impeding complete comparability of the models.

[10] Calza et al. (2003) report an elasticity of 1.6 for the EMU as a whole, Hofmann (2001) finds elasticities between 1.04 and 2.49 for a group of 16 industrial countries.

rates have in all models a negative impact on real lending, whereas the semi-elasticity varies between -4.42 in Hungary and -10.81 in Portugal. International comparisons are difficult in this respect, since substantial differences are found between studies[11].

The mayor diagnostic tests of the models are satisfactory. At the 5% level we cannot reject the hypothesis of normality and lack of autocorrelation in the residuals. Since the time series for the new member states are already very short we do not perform stability tests on them (which require truncating the sample further). The recursive estimates of the coefficients (Fig. 6-9) show substantial parameter stability for Ireland. On the other hand some shifts can be observed in Portugal during the process of Euro adoption. Since, however these are quantitatively modest and the parameter values stabilise after euro area accession we decided to proceed with the Portuguese model as well. These estimates, together with the finding in Calza, Manrique and Souza (2003) show, that parameter changes in loan equations changed in a modest way after Euro area accession. This gives support for our concept of using models estimated for CE-3 countries to forecast loan developments after Euro adoption.

The estimated models are now used to simulate possible loan developments in CE-3 countries during the process of Euro adoption. This means that we solve the models forward for the period Q3 2004 – Q4 2020 subject to the following assumptions.

- As a general rule we treat only the real interest rate as exogenous. Real lending to the private sector and GDP are determined within the model[12].
- Euro area accession is scheduled for all countries in 2009. This is in line with the objectives of the Hungarian and Polish Governments. The Czech Republic did not set any specific target for accession. However the simulation results can be simply "pushed ahead" if one assumes another date for Euro adoption.
- The real interest rate remains at its long-run equilibrium level[13] until the end of 2006, then starts declining linearly to the Euro area level in Q4 2008. This is assumed to be 2%, higher than the current 0%. The reasoning behind it is that real rates in the Euro

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[11] For instance Calza et al. (2001) find a semi-elasticity of –1.01 for the Euro area, on the other hand Calza et al. (2003) find -5.05 and Hoffman (2001) reports numbers between -0.01 and -0.08.

[12] With Poland being the exception, where the implausibly high long run growth rate of GDP (6.5% p.a.) is corrected exogenously to the sample average of 4.5%.

[13] The consensus estimate for the equilibrium level in Poland, based on Brzoza-Brzezina (2005) and BRE (2004) is 4%, in the Czech Republic 2% (CNB 2003). Since for Hungary no estimates are available, we take the average over Q3 2003 – Q2 2004, which is 4.5%.

area cannot remain forever much below their equilibrium level estimated at approximately 2-2.5% (Crespo-Cuaresma et al. (2003)). Our assumption of equal real rates between acceding members and the Euro area results from the following reasoning. First, at the day of accession nominal interest rates must be equal. Second, CE-3 countries will have to fulfil the inflation criterion, will be, however unwilling to depress inflation unnecessarily. According to simple calculations (Borowski, Brzoza-Brzezina (2004)), inflation close to the Euro area average should be sufficient to fulfil the criterion. Hence, with equal nominal rates and similar inflation, real rates will be similar as well.

- After Euro area accession the real interest rates in CE-3 countries declines further due to increasing inflation in these countries. We assume that this stems only from the Balassa-Samuelson effect and hence deduct its estimates from the real rate. This is assumed to happen linearly during the 4 quarters following accession. The estimates of the Balassa-Samuelson effect are taken from Chmielewski (2003) and Kovacs (2002). We assume 1,5% for Hungary and Poland and 1% for the Czech Republic. This means that the ultimate real interest rate since Q1 2010 is 0,5% for Hungary and Poland and 1% for the Czech Republic.

- The simulation process starts from the model's steady state, i.e. it ignores the initial disequilibrium. This implies that the simulation results should not be treated as a forecast for the near future but only as an approximation of the developments to be expected during Euro area accession.

The simulations are done on the basis of the estimated national model (for Hungary and Poland) and on the basis of the models estimated for Ireland and Portugal (for all CE-3 countries). As already mentioned the latter results are performed due to the relatively high uncertainty about the quality of the models estimated for CE-3 countries with short data samples. They give an answer to the question "how would the Irish (Portuguese) economy behave if it faced a drop in real interest rates that we assume for Poland (Czech Republic, Hungary)".

The results are presented in Appendix 3 (Fig. 10-12). Not surprisingly the patterns differ substantially between the models. In the cases of Hungary and Poland high growth rates of loans to the private sector during the accession period can be seen. However, it should be noted that in none of the models the growth rate of loans exceeds 25%. For Poland the peak estimates vary between 12% and 20%, in Hungary between 13% and 21%. Since for the Czech Republic we have only the Irish and Portuguese models, not much can be said about projected growth rates of loans to the private sector. However, the very decent humps that can

be observed on Fig. 10 suggest that the loan expansion resulting from Euro area accession will be very modelst in the Czech Republic. This is an obvious consequence of the already now very low natural rate of interest. Thus, according to the simulation results, only Poland and Hungary could expect relatively high growth rates of loans to the private sector during Euro area accession, their magnitude can be however expected to remain below those Ireland and Portugal witnessed in recent years. Of course, given the model uncertainty and the number of exogenous assumptions one should treat the results only as a very rough approximation. It should nevertheless be noted that they are consistent with the previously stated fact that the potential for interest rate decreases seems much smaller in CE-3 than in EMU-3 countries.

4   Policy recommendations for national central banks

It is very difficult to assess *ex ante* how dangerous a lending boom can be for the banking sector. In several countries sharp increases in bank lending have been followed by banking and currency crises. While a currency crisis in a member state of the monetary union is obviously unlikely, there is no reason why there should not emerge a local banking crisis. Texas in the 1980's can serve as an example. Imprudent lending to the soaring oil industry and to the real estate field, followed by a strong decline of oil prices, resulted in a dramatic increase in non performing assets of the banking sector. Between 1987 and 1990 seven out of ten largest Texan banks failed and had to be bailed out by the Federal Deposit Insurance Corporation (Crum (2002)).

Obviously not every lending boom needs to imply troubles for the banking sector. If for example agents react to lower interest rates and increase their indebtedness in such way that it does not affect their repayment burden, there is no reason to expect solvency problems. However, even in some cases where lending booms were associated with higher debt service ratios, the stance of the banking sector did not necessarily deteriorate (like in the cases of EMU-3 countries). It is worth seeing, to what extent this was caused by the character of the boom itself and to what by protective measures taken by the authorities.

Below we present an overview of protective measures taken by EMU-3 supervising institutions. As it can be seen from table 6, the actions were not drastic. Taking this into account one could risk the thesis that the observed lending booms had a rather harmless character, being probably related to the fact that EMU-3 countries had relatively underdeveloped loan markets and simply caught-up with more mature EMU economies. In

other words the lending intermediation and the respective repayment burden increased towards levels that have been tested as safe by other economies.

Table 6: Protective measures taken by the supervising authorities of EMU-3 countries

Country	Measure applied
Greece	• Tightening of provisioning rules for non performing loans and loans with limited collateral introduced • Holdings of nonremunarated deposits from excessive credit growth imposed on commercial banks
Ireland	• Letter of concern sent by the central bank to commercial banks • All credit institutions requested to arrange independent verification of their compliance with the best international standards of risk management and control • Inspections of mortgage and commercial property lenders to examine the quality of underwriting increased • Single financial markets regulatory and supervising institution established
Portugal	• Capital requirements for housing loans with loan-to-value ratio exceeding 75% increased • Provisions based on average loan performance over the economic cycle introduced • National council of supervisors, involving all financial markets supervisory agencies established

Source: CBI (2002), BoG (2003), IMF (2000), IMF (2003a)

Drawing conclusions from the experience of one group of countries for other countries can be regarded as risky. Still in our view, the recent history of loan market developments in EMU-3 countries is probably the best guess about how the situation can evolve in the analysed new Member States. Given a similar (or even less developed) starting point, a smaller expected growth rate of loans, and the relatively good condition of the banking sectors it seems that loan expansions should not affect drastically CE-3 countries' banking sectors.

If, however the situation threatened to go out of control, the supervisory authorities of CE-3 countries could think about using some of the following instruments to curb lending or diminish its adverse consequences.

- Expressing concern in letters to commercial banks,
- Moral suasion through domestic informal top management contacts,
- Moral suasion by courtesy of foreign supervisory institution (vs. foreign owner),

- Tightening of provisioning rules for non performing loans,
- Increasing capital adequacy requirements above the regulatory minimum of 8%,
- Imposing/decreasing the maximum loan-to-value ratio for housing loans,
- Imposing credit ceilings (possibly in implicit ways, e.g. by imposing maximum engagement in mortgage loans relative to other lending activities).

Nevertheless, it should be born in mind that measures that worked elsewhere, need not be successful in new Member States. One reason is the obvious risk of banks taking advantage of regulatory arbitrage. This would mean moving headquarters to another EU country, where supervisory conditions are less tough, and operating in Poland, Hungary or the Czech Republic via subsidiaries or the internet. Concluding, if a troublesome scenario for the banking sectors in CE-3 countries were to result from Euro area accession, monetary authorities could find themselves in a difficult situation. Still, at this point of time such developments seem relatively unlikely.

Conclusions

In the paper we analysed the potential for lending booms related to the process of monetary integration of three biggest new EU member states, the Czech Republic, Hungary and Poland. As a first step we described the lending patterns in three old EMU member states – Greece, Ireland and Portugal. In all countries substantial increases in lending took place in the years shortly before and after Euro area accession. In Ireland and Portugal annual growth rates of real loans exceeded 25%, the developments in Greece were slightly more modest. In all countries the loan to GDP ratio more than doubled since the mid 1990's. Surprisingly the strong expansions did not affect the stance of these countries' banking sectors. In fact, as a general rule, the quality of the loan portfolio improved, while profitability and solvency remained unchanged. Looking for reasons, we found that the relatively harmless character of the booms was probably related to the initially low level of financial intermediation in these countries. As a result, even the lending booms increased the repayment burden to a level (relative to income) that has been previously serviced without major problems in more advanced EMU countries.

As a second step we used econometric evidence to foresee the loan developments in CE-3 countries during Euro area accession. On the basis of Vector Error Correction Models estimated for Hungary, Ireland, Poland and Portugal we constructed simulated patterns for loan developments in new member states. We found that significant increases in lending can

be expected in Hungary and Poland. However, the magnitude of the booms should be substantially smaller than experienced previously by Ireland and Portugal. The main reasons are the high level of interest rate convergence between new member states and the Euro area and the already very low level of interest rates in the euro area. Accordingly there is not much room for downward interest rate adjustment during the years of CE-3 countries' euro area accession. Due to estimation problems the situation in the Czech Republic was more difficult to assess. However, given almost complete interest rate convergence between the Czech Republic and the Euro area we expect increases in lending related to Euro area accession to be even smaller than in Hungary and Poland.

Finally, we analysed the potential consequences of the encountered lending booms for banking sector stability and Euro area monetary policy. Although it is clearly very difficult to identify *ex ante* a banking crisis, the experience of the analysed euro area countries, combined with the fact that CE-3 countries show an even bigger initial underdevelopment of lending activities, have healthy banking sectors and can expect smaller increases in lending, drives us to the conclusion that no substantial threat for their banking sectors is related to euro area entry. Nevertheless, it should be made clear that the positive experience of old member states does not rule out the possibility of problems in CE-3 countries. Hence, supervisory agencies should remain vigilant and we enumerate a number of possible protective measures that could be applied in case of danger.

Due to the long time-span of the analysis, the presented results are relatively general and should be treated with appropriate caution. Given the uncertainty about the changes in the banking sectors (who heard about internet banking ten years ago?) as well as the exact euro area accession date it would probably not be of much value to go today into more detail, analysing the specific weaknesses and exposures of banking sectors or major individual banks. However, as time goes by and the accession strategy becomes clear such exercises should be undertaken. Another interesting and unexplored field, are macroeconomic consequences of lending booms in the new member states. Increased loan creation can result in demand and wage pressure, inflation, loss of competitiveness and higher current account deficits. All these are interesting topics for future research.

References

Ball, J., Pain, D. 2000. "Leading Indicator Models of Banking Crises", Financial Stability Review, Bank of England, December.

BoG 2000. "Annual Report 2000", Bank of Greece, Athens.

BoG 2001. "Annual Report 2001", Bank of Greece, Athens.

BoG 2002. "Annual Report 2002", Bank of Greece, Athens.

BoG 2003 a. "Monetary Policy 2002-2003", Bank of Greece, Athens.

BoG 2003b. "Annual Report 2003", Bank of Greece, Athens.

Borio, C., Lowe, P. 2004. "Securing Sustainable Price Stability: Should Credit Come Back from the Wilderness?", BIS Working Paper 157, Bank for International Settlements, Basle.

Borowski, J., Brzoza-Brzezina, M. 2004. „Designing Poland's Macroeconomic Strategy on the Way to the Euro Area", Working Paper 2004/10, European University Institute.

BdP 2003. "Annual Report", Banco de Portugal, Lisbon.

BRE 2004. "Naturalna stopa procentowa, jako indykator przyszłej inflacji", Miesięczny Przegląd Makroekonomiczny, Bank Rozwoju Eksportu, Warszawa

Brzoza-Brzezina, M. 2005. "The Information Content of the Natural Rate of Interest for Central Bankers: The Case of Poland", *Economics of Transition,* forthcoming.

Calza, A., Gartner, C., Sousa, J. 2001. "Modelling the Demand for Loans to the Private Sector in the Euro Area", Working Paper 55, ECB, Frankfurt.

Calza, A., Manrique, M., Sousa, J. 2003. "Aggregate Loans to the Euro Area Private Sector", Working Paper 202, ECB, Frankfurt.

CBI 2001. "Financial Stability Report", Central Bank of Ireland, Dublin.

CBI 2002. "Financial Stability Report", Central Bank of Ireland, Dublin.

CBFA 2004. "Financial Stability Report", Central Bank and Financial Services Authority of Ireland, Dublin.

Chmielewski, T. 2003. "Is the Balassa-Samuelson Effect a Serious Obstacle for an Accession Country?", in: D.Alpen and H.Luchtmeier (eds): *The Euro in Eastern Europe: Options for the monetary and currency regime*, INFER Studies vol. 8, Berlin, March 2003

Cottarelli, C., Dell'Ariccia, G., Vladkova-Hollar, I., 2003. "Early Birds, Late Risers and Sleeping Beauties: Bank Credit Growth to the Private Sector in Central and Eastern Europe and the Balkans", Working Paper 03/213, International Monetary Fund, Washington.

CNB 2003. "The Czech National Bank's Forecasting and Policy Analysis System", Czech National Bank, Prague.

Crespo-Cuaresma, J., Gnan, E., Ritzberger-Gruenwald, D. 2003. "Searching for the Natural Rate of Interest: A Euro-Area Perspective", Working Paper 84, Oesterreichische Nationalbank.

Crum, L.L. 2002. "Banks and Banking" in *The Handbook of Texas Online*, http://www.tsha.utexas.edu/handbook/online/articles/view/BB/czb1.html

Demirgüç-Kunt, A., Detragiache, E. 1998. "The Determinants of Banking Crises in Developing and Developed Countries", IMF Staff Papers, Vol. 45, No. 1.

EC 2005. "Economic Forecasts. Autumn 2004", European Commission, Brussels.

ECB 2005. "Banking Structures in the New EU Member States", European Central Bank, January.

GIBS 2004. "Summary Evaluation of the Financial Situation of Polish Banks – first half 2004", General Inspectorate of Banking Supervision, Warsaw.

Gourinchas, P.O., Valdes, R., Landerretche, O. 2001. "Lending Booms: Latin America and the World", NBER Working Paper 8249.

Hartmann, P., Straetmans, S., Vries, C.G. 2004. "Banking System Stability: A Cross-Atlantic Perspective", mimeo, European Central Bank.

Hernandez, L., Landerrechte, O. 2002 "Capital Inflows, Credit Booms and Macroeconomic Vulnerability: the Cross-Country Experience" in *Banking, Financial Integration and International Crises*, ed. L.Hernandez, K.Schidt-Hebbel, Santiago de Chile.

Hoffman, B. 2001, "The Determinants of Private Sector Credit in Industrialised Countries: do Property Prices Matter?", BIS Working Paper 108, Bank for International Settlements, Basle.

Honohan, P. 1997. "Banking System Failures in Developing and Transition Countries: Diagnosis and Prediction", BIS Working Paper No. 39, Bank for International Settlements, Basle.

Honohan, P. 1999. "Consequences for Greece and Portugal of the Opening-up of the European Banking Market", mimeo, World Bank.

IMF 2000. "Portugal. Staff Report for the 2000 Article IV Consultation", International Monetary Fund, Washington D.C.

IMF 2001a. "Greece. Staff Report for the 2001 Article IV Consultation", International Monetary Fund, Washington D.C.

IMF 2001b. "Ireland. Staff Report for the 2001 Article IV Consultation", International Monetary Fund, Washington D.C.

IMF 2003a. "Greece. Staff Report for the 2003 Article IV Consultation", International Monetary Fund, Washington D.C.

IMF 2003b. "Ireland. Staff Report for the 2003 Article IV Consultation", International Monetary Fund, Washington D.C.

IMF 2003c. "Portugal. Staff Report for the 2003 Article IV Consultation", International Monetary Fund, Washington D.C.

Johansen, S. 1991. „Estimation and Hypothesis Testing of Cointegrating Vectors in Gaussian Vector Autoregressive Models", *Econometrica* 59, pp.1551-1580.

Kaminsky, G., Lizondo, S., Reinhart, C. 1998. "Lending Indicators of Currency Crises", IMF Staff Papers, Vol. 5, No. 1, International Monetary Fund.

Kovacs, M.A. 2002. "On the Estimated Size of the Balassa-Samuelson Effect in Five Central and Eastern European Countries", NBH Working Paper 2002/5, National Bank of Hungary.

Laidler, D. 1991. „The Golden Age of the Quantity Theory", Harvester Wheatsheaf, New York.

Lanne, M. (2002). "Nonlinear Dynamics of Interest Rates and Inflation", Bank of Finland Discussion Papers No. 21/2002.

Lipschitz, L.J., Lane, T.D., Mourmouras, A.T. 2002. "Capital Flows to Transition Economies: Master or Servant?", WP 02/11, International Monetary Fund.

MacKinnon, J.G. 1996. "Numerical Distribution Functions for Unit Root and Cointegration Tests," *Journal of Applied Econometrics*, 11, 601-618.

MacKinnon, J.G., Haug, A.A., Michelis, L. 1999, "Numerical Distribution Functions of Likelihood Ratio Tests For Cointegration," *Journal of Applied Econometrics*, 14, pp. 563-577.

MNB 2004. "Report on Financial Stability", Magyar Nemzeti Bank, Budapest, June.

Mundell, R. 1961. "A Theory of Optimum Currency Areas", *American Economic Review* Vol. 51, No. 4, pp. 657-665.

NBP 2003, 2004a. "Financial Stability Review", National Bank of Poland, Warsaw, August.

NBP 2004b. "A Report on Costs and Benefits of Poland's Adoption of the Euro", ed. J.Borowski, National Bank of Poland.

Polański, Z. 2002. "Promoting Financial Development: Lessons from Poland", in: *Banking and Monetary Policy in Eastern Europe. The First Ten Years* (ed: A. Winkler), Palgrave, Houndmills, New York, pp. 104-124.

Schadler, S., Drummond, P.F.N., Kuijs, L., Murgasova, Z., Elkan van, R. 2005. "Adopting the Euro in Central Europe: Challenges of the Next Step in European Integration", Occasional Paper No. 234, International Monetary Fund, Washington.

Szapary, G. 2001. "Banking Sector Reform in Hungary: Lessons Learned, Current Trends and Prospects", paper for the conference "Current Issues in Emerging Market Economies", Croatian National Bank, Dubrovnik.

Terrones, M, Mendoza, E. 2004. "Are Credit Booms in Emerging Markets a Concern?", in World Economic Outlook, IMF, Washington.

Tornell, A., Westermann, F., 2002. "Boom-bust cycles in Middle-Income Countries:Facts and Explanation", IMF Staff Papers, Vol. 49, pp. 111-155.

Tuma, Z. 2002. "Banking Sector Development in the Czech Republic", paper for the "East-West Conference", Oesterreichische Nationalbank, Vienna.

Varhegyi, E. 2002. "Hungary's Banking Sector: Achievements and Challenges", EIB Papers, Vol. 7, No. 1, European Investment Bank.

Appendix 1: Data sources

The following sources of data for the econometric model were used:

1. Loans to the private sector:

Total loans (all currencies) to the private sector (households + non-financial corporations + non-profit institutions serving households) in Greece, Ireland, Portugal – source: ECB

Total loans (domestic currency) to the private sector (households + non-financial corporations + non-profit institutions serving households) in the Czech Republic – source: Czech National Bank – www.cnb.cz

Total loans (domestic currency) to the private sector (households + non-financial corporations + non-profit institutions serving households) in Hungary – source: National Bank of Hungary – www.mnb.hu

Total loans (domestic currency) to the private sector (individuals + non-financial corporations) in Poland – source: National Bank of Poland – www.nbp.pl

2. Nominal interest rate

Czech Republic – source: Czech National Bank (PRIBOR3M)

Greece, Portugal – source: OECD (short-term interest rate)

Hungary – source: ECB (BUIBOR3M)

Ireland – source: BIS (DIBOR3M, EURIBOR3M)

Poland - source: National Bank of Poland (WIBOR3M)

3. GDP at constant prices

All countries – source: OECD

4. GDP deflator

Czech Republic, Greece, Hungary, Ireland, Portugal – source: OECD

Poland – 1997-2004 GDP deflator (source: OECD); 1994-1996 GDP deflator substituted by domestic CPI (source: Central Statistical Office) due to questionable quality of deflator data;

Appendix 2: Tables

Table 7: Augmented Dickey-Fuller tests with constant for presence of unit roots

	Greece	Ireland	Portugal	Czech Republic	Hungary	Poland
l	0.29	1.13	1.22	-0.61	1.78	-2.46
Δl	-2.07	-2.73*	-3.19**	-5.20***	-5.10***	-3.26***
y	1.79	0.11	-1.00	0.76	-0.13	-1.25
Δy	-13.45***	-2.37	-2.63*	-2.79*	-4.39***	-7.73***
r	-1.85	-2.20	-1.91	-0.19	-2.45	-2.20
Δr	-8.43***	-8.31***	-9.27***	-3.30**	-6.22***	-5.02***

*, **, *** denote rejection of H_0 at the 1%, 5% and 10% level respectively. Number of lags was chosen in accordance with the Schwarz info criterion. Critical values are from McKinnon (1996).

Tab 8: Lag selection criteria

	Lag	LR	AIC	SC	HQ
GR	0	NA	-7.22	-7.13	-7.19
	1	684.37	-16.00	**-15.64**	-15.86
	2	31.04	-16.20	-15.58	**-15.95**
	3	11.15	-16.14	-15.24	-15.78
	4	22.97	-16.26	-15.09	-15.79
	5	**17.70**	**-16.30**	-14.88	-15.73
	6	5.10	-16.17	-14.47	-15.48
IRL	0	NA	-5.99	-5.72	-5.88
	1	763.07	-16.07	-15.54	-15.86
	2	56.04	**-16.64**	**-15.33**	**-16.31**
	3	15.18	-16.63	-15.56	-16.21
	4	9.38	-16.55	-15.21	-16.02
	5	14.18	-16.56	-14.95	-15.91
	6	**17.36**	-16.64	-14.76	-15.88
PT	0	NA	-4.96	-4.87	-4.92
	1	1054.39	-17.30	-16.97	-17.17
	2	64.73	-17.90	**-17.31**	-17.66
	3	28.22	-18.06	-17.21	-17.72
	4	21.45	-18.14	-17.04	-17.69
	5	**29.11**	**-18.34**	-16.99	**-17.79**
	6	3.92	-18.19	-16.59	-17.54
CZ	0	NA	-9.76	-9.63	-9.71
	1	213.62	-16.35	-15.81	-16.17
	2	**26.91**	**-16.82**	**-15.88**	**-16.50**
	3	9.73	-16.69	-15.35	-16.24
	4	13.60	-16.81	-15.06	-16.22
HU	0	NA	-9.26	-9.12	-9.21
	1	**240.07**	-17.57	**-17.01**	**-17.35**
	2	15.86	-17.65	-16.68	-17.33
	3	15.28	-17.80	-16.41	-17.34
	4	12.32	**-17.90**	-16.10	-17.31
PL	0	NA	-8.76	-8.63	-8.72
	1	268.05	-16.17	-15.66	-15.99
	2	**28.92**	-16.63	**-15.73**	**-16.31**
	3	15.92	**-16.73**	-15.43	-16.27
	4	9.32	-16.63	-14.95	-16.03

LR denotes sequential modified LR test statistic, AIC denotes Akaike information criterion, SC denotes Schwarz information criterion, HQ denotes Hannan-Quinn information criterion. Numbers in bold indicate lag order selected by the criterion for the VAR model.

Table 9: Cointegration tests

Country	Hyp. no of CE	Trace statistic	5% critical value		Hyp. no of CE	Max eigenvalue	5% critical value
Greece	0	20.56	29.80		0	12.99	21.13
	<=1	7.57	15.49		<=1	6.75	14.26
	<=2	0.82	3.84		<=2	0.82	3.84
Ireland	**0**	**34.04**	**29.80**		**0**	**24.17**	**21.13**
	<=1	9.87	15.49		<=1	9.13	14.26
	<=2	0.74	3.84		<=2	0.74	3.84
Portugal	**0**	**31.75**	**29.80**		**0**	**25.23**	**21.13**
	<=1	6.52	15.49		<=1	5.48	14.26
	<=2	1.04	3.84		<=2	1.04	3.84
Czech Rep.	0	20.46	29.80		0	12.82	21.13
	<=1	7.64	15.49		<=1	7.60	14.26
	<=2	0.04	3.84		<=2	0.04	3.84
Hungary	**0**	**37.23**	**29.80**		**0**	**27.71**	**21.13**
	<=1	9.51	15.49		<=1	6.24	14.26
	<=2	3.27	3.84		<=2	3.27	3.84
Poland	**0**	**32.12**	**29.80**		0	18.55	21.13
	<=1	13.57	15.49		<=1	11.95	14.26
	<=2	1.63	3.84		<=2	1.63	3.84

Numbers in bold denote rejection of H_0 at the 5% level. Critical values are from MacKinnon, Haug, Michelis (1999).

Tab 10: Tests for normality of residuals

		Chi square statistic	Probability				Chi square statistic	Probability
IRL	Skewness	0.72	0.86		HU	Skewness	3.77	0.28
	Kurtosis	1.55	0.66			Kurtosis	2.47	0.48
	Jarque-Berra	2.28	0.89			Jarque-Berra	6.25	0.39
PT	Skewness	3.46	0.32		PL	Skewness	1.62	0.65
	Kurtosis	5.70	0.12			Kurtosis	2.31	0.51
	Jarque-Berra	9.17	0.16			Jarque-Berra	3.93	0.68

H_o: residuals are multivariate normal.

Tab 11: LM test for presence of residual autocorrelation

Country	Lag	LM statistic	Probability		Country	Lag	LM statistic	Probability
Ireland	1	14.41	0.11		Hungary	1	8.30	0.50
	2	10.45	0.32			2	12.85	0.17
	3	14.47	0.11			3	9.65	0.38
	4	15.89	0.07			4	8.54	0.48
Portugal	1	5.93	0.75		Poland	1	10.62	0.30
	2	6.02	0.74			2	11.37	0.25
	3	8.76	0.46			3	10.57	0.31
	4	6.92	0.65			4	2.94	0.97

H_0: no autocorrelation present at lag n.

Table 12: VEC model for Hungary

Cointegrating Eq:	CointEq1		
RKRED(-1)	1.000000		
GDP_FIXED_SA(-1)	-3.391334		
	(0.24341)		
	[-13.9328]		
RINT(-1)	4.429280		
	(1.05327)		
	[4.20526]		
C	42.87768		
Error Correction:	D(RKRED)	D(GDP_FI	D(RINT)
CointEq1	-0.113619	0.011550	-0.026918
	(0.03230)	(0.00736)	(0.02985)
	[-3.51808]	[1.56914]	[-0.901192]
D(RKRED(-1))	-0.080560	0.128065	0.053080
	(0.17116)	(0.03901)	(0.15818)
	[-0.47066]	[3.28273]	[0.33558]
D(GDP_FIXED_SA(-1))	-0.150221	0.100513	-0.031833
	(0.69216)	(0.15776)	(0.63965)
	[-0.21703]	[0.63713]	[-0.04977]
D(RINT(-1))	0.282671	-0.086372	-0.036286
	(0.24561)	(0.05598)	(0.22697)
	[1.15090]	[-1.54292]	[-0.15987]
C	0.027935	0.005662	-0.000505
	(0.00812)	(0.00185)	(0.00750)
	[3.44064]	[3.05946]	[-0.06731]
R-squared	0.364282	0.313121	0.068578
Adj. R-squared	0.273465	0.214995	-0.064482
Sum sq. resids	0.014020	0.000728	0.011973
S.E. equation	0.022376	0.005100	0.020678

Tab 13: VEC model for Ireland

Cointegrating Eq:	CointEq1		
RKRED(-1)	1.000000		
GDP_FIXED_SA(-1)	-1.454953		
	(0.11953)		
	[-12.1728]		
RINT(-1)	6.266904		
	(1.20762)		
	[5.18946]		
C	18.47941		

Error Correction:	D(RKRED)	D(GDP_FIXED	D(RINT)
CointEq1	-0.025615	-0.022766	-0.042131
	(0.01218)	(0.00874)	(0.01050)
	[-2.10273]	[-2.60585]	[-4.01383]
D(RKRED(-1))	0.433655	0.259496	-0.201119
	(0.08296)	(0.05950)	(0.07148)
	[5.22746]	[4.36154]	[-2.81360]
D(GDP_FIXED_SA(-1))	0.649162	-0.192944	0.121974
	(0.14231)	(0.10206)	(0.12262)
	[4.56160]	[-1.89042]	[0.99470]
D(RINT(-1))	0.001629	0.131443	0.239240
	(0.11127)	(0.07981)	(0.09588)
	[0.01464]	[1.64705]	[2.49517]
C	0.005375	0.010293	0.002682
	(0.00317)	(0.00227)	(0.00273)
	[1.69480]	[4.52563]	[0.98150]
DUM_Q2_93	-0.004204	0.007898	-0.058824
	(0.01780)	(0.01277)	(0.01534)
	[-0.23613]	[0.61856]	[-3.83479]
DUM_Q4_92	0.002283	-0.002801	0.061499
	(0.01697)	(0.01217)	(0.01463)
	[0.13451]	[-0.23007]	[4.20480]
R-squared	0.537672	0.304835	0.461284
Adj. R-squared	0.501647	0.250666	0.419306
Sum sq. resids	0.021644	0.011133	0.016070
S.E. equation	0.016766	0.012024	0.014446

Tab 14: VEC model for Poland

Cointegrating Eq:	CointEq1		
RKRED(-1)	1.000000		
GDP_FIXED_SA(-1)	-3.169606		
	(0.91354)		
	[-3.46960]		
RINT(-1)	7.569300		
	(2.38630)		
	[3.17198]		
C	26.19142		

Error Correction:	D(RKRED)	D(GDP_FI	D(RINT)
CointEq1	-0.034423	-0.020601	-0.018821
	(0.01112)	(0.00665)	(0.00728)
	[-3.09660]	[-3.09681]	[-2.58484]
D(RKRED(-1))	0.558097	-0.006939	0.199533
	(0.13933)	(0.08338)	(0.09126)
	[4.00566]	[-0.08322]	[2.18643]
D(GDP_FIXED_SA(-1))	-0.564859	-0.640016	-0.576013
	(0.26949)	(0.16127)	(0.17652)
	[-2.09603]	[-3.96853]	[-3.26322]
D(RINT(-1))	0.272015	0.586848	0.321283
	(0.28257)	(0.16910)	(0.18508)
	[0.96264]	[3.47039]	[1.73587]
C	0.016826	0.017073	0.003195

	(0.00528)	(0.00316)	(0.00346)
	[3.18633]	[5.40260]	[0.92381]
R-squared	0.515223	0.411410	0.398339
Adj. R-squared	0.456462	0.340066	0.325411
Sum sq. resids	0.013237	0.004741	0.005679
S.E. equation	0.020028	0.011986	0.013118

Table 15: VEC model for Portugal

Cointegrating Eq:	CointEq1		
RKRED(-1)	1.000000		
GDP_FIXED_SA(-1)	-2.320529		
	(0.16645)		
	[-13.9411]		
RINT(-1)	10.81069		
	(1.06162)		
	[10.1832]		
C	36.41126		
Error Correction:	D(RKRED)	D(GDP_FIXED)	D(RINT)
CointEq1	-0.041439	-0.007780	-0.047317
	(0.01436)	(0.00511)	(0.01075)
	[-2.88512]	[-1.52108]	[-4.40326]
D(RKRED(-1))	0.418074	-0.029735	0.050574
	(0.10932)	(0.03893)	(0.08179)
	[3.82447]	[-0.76385]	[0.61837]
D(RKRED(-2))	0.117589	-0.034141	0.053350
	(0.11564)	(0.04118)	(0.08652)
	[1.01686]	[-0.82907]	[0.61664]
D(RKRED(-3))	0.042997	0.044715	0.120457
	(0.11657)	(0.04151)	(0.08722)
	[0.36884]	[1.07712]	[1.38114]
D(RKRED(-4))	0.279743	-0.001128	-0.275741
	(0.10761)	(0.03832)	(0.08051)
	[2.59969]	[-0.02943]	[-3.42509]
D(GDP_FIXED_SA(-1))	-0.157865	0.311065	0.163283
	(0.32447)	(0.11555)	(0.24275)
	[-0.48654]	[2.69212]	[0.67263]
D(GDP_FIXED_SA(-2))	0.366404	0.449150	-0.259900
	(0.33389)	(0.11890)	(0.24980)
	[1.09738]	[3.77748]	[-1.04042]
D(GDP_FIXED_SA(-3))	0.378838	0.080749	0.018446
	(0.34215)	(0.12184)	(0.25598)
	[1.10723]	[0.66273]	[0.07206]
D(GDP_FIXED_SA(-4))	-0.632562	-0.137648	-0.588911
	(0.32770)	(0.11670)	(0.24517)
	[-1.93031]	[-1.17953]	[-2.40205]
D(RINT(-1))	0.199419	0.053828	0.188078
	(0.13374)	(0.04763)	(0.10006)
	[1.49110]	[1.13022]	[1.87969]
D(RINT(-2))	0.153020	0.064525	0.289266
	(0.13334)	(0.04748)	(0.09976)
	[1.14763]	[1.35891]	[2.89973]
D(RINT(-3))	-0.086889	0.061844	0.177704
	(0.13232)	(0.04712)	(0.09900)
	[-0.65666]	[1.31246]	[1.79507]
D(RINT(-4))	-0.059665	0.028056	-0.104134
	(0.12100)	(0.04309)	(0.09053)
	[-0.49308]	[0.65109]	[-1.15027]
C	0.002422	0.002129	0.005425
	(0.00292)	(0.00104)	(0.00218)
	[0.83065]	[2.05021]	[2.48647]
R-squared	0.636319	0.533177	0.529121
Adj. R-squared	0.573281	0.452261	0.447503
Sum sq. resids	0.020334	0.002579	0.011381
S.E. equation	0.016466	0.005864	0.012319

Appendix 3: Figures

Figure 6: Recursive estimates of the GDP parameter (β_1) in the Irish model (initialisation at 60 obs.)
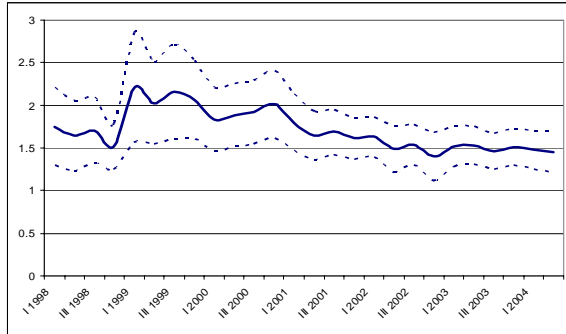
Figure 7: Recursive estimates of the GDP parameter (β_1) in the Portuguese model (initialisation at 60 obs.)
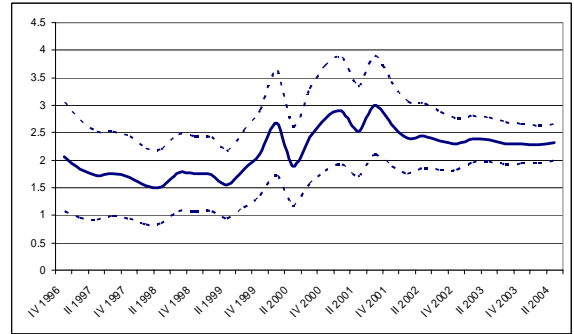
Figure 8: Recursive estimates of interest rate parameter (β_2) in the Irish model (initialisation at 60 obs.)
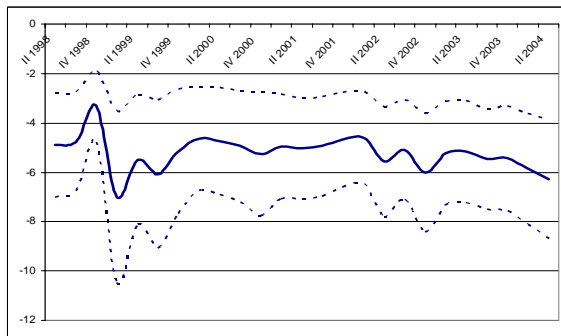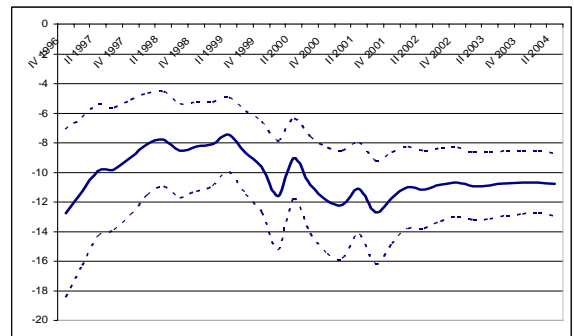
Figure 9: Recursive estimates of interest rate parameter (β_2) in the Portuguese model (initialisation at 60 obs.)

Figure 10: Simulation of loan expansion in the Czech Republic based on the Irish and Portuguese models
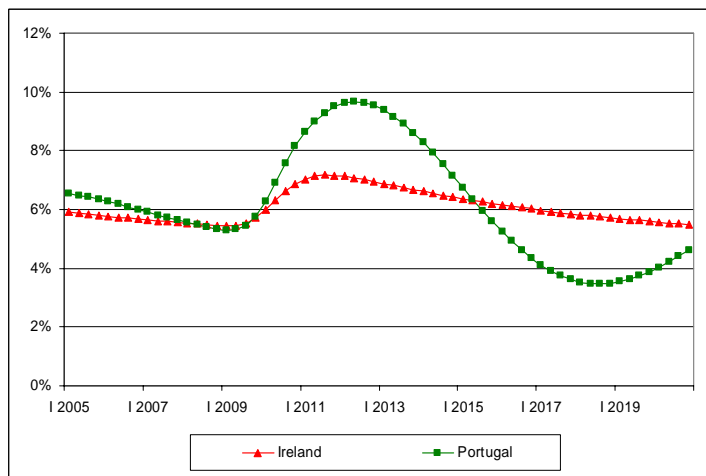
Figure 11: Simulation of loan expansion in Hungary based on the Hungarian, Irish and Portuguese models
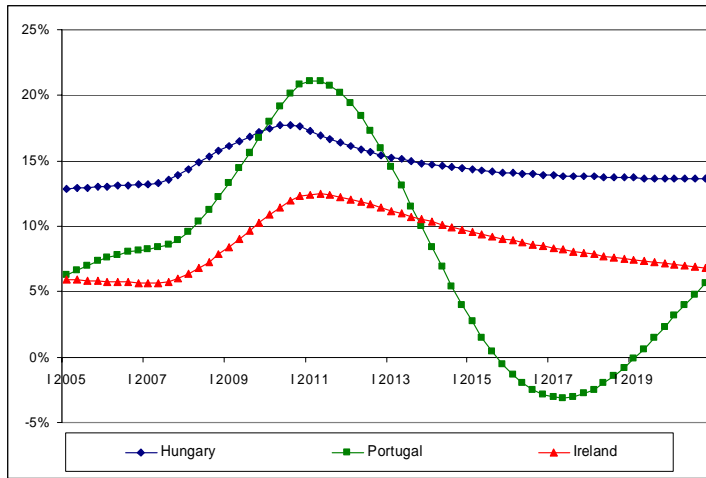
Figure 12: Simulation of loan expansion in Poland based on the Polish, Irish and Portuguese models
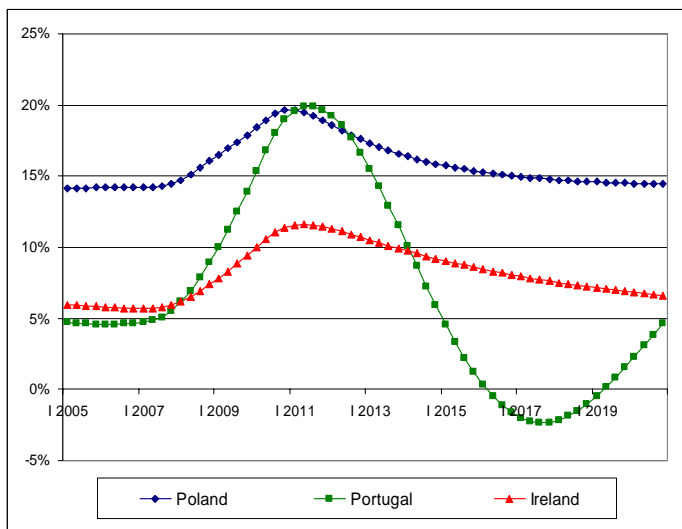
Figure 13: Log GDP, log real domestic currency loans and real interest rate in Greece
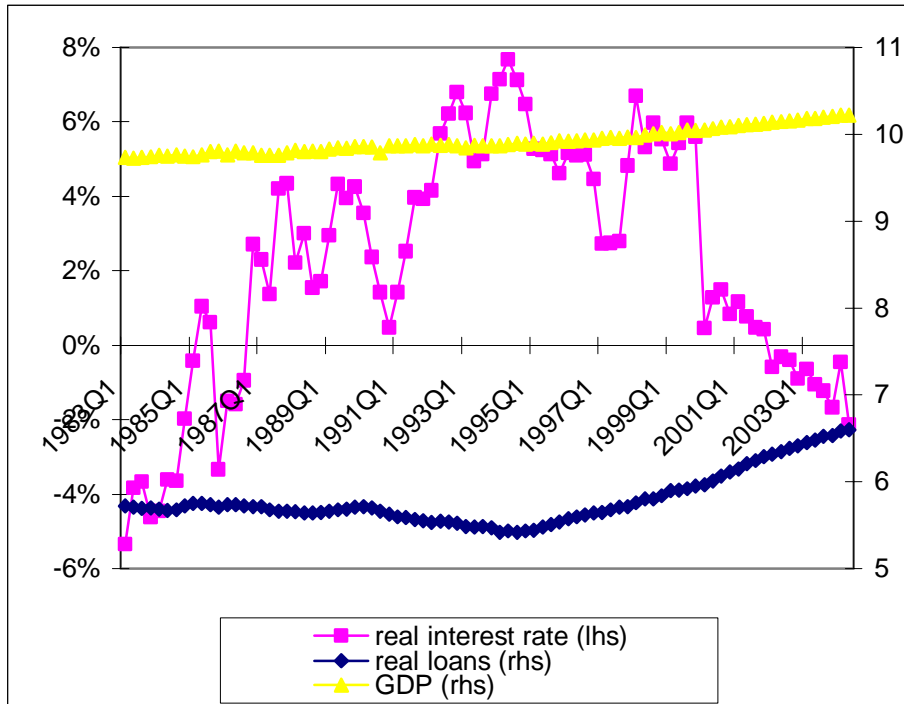
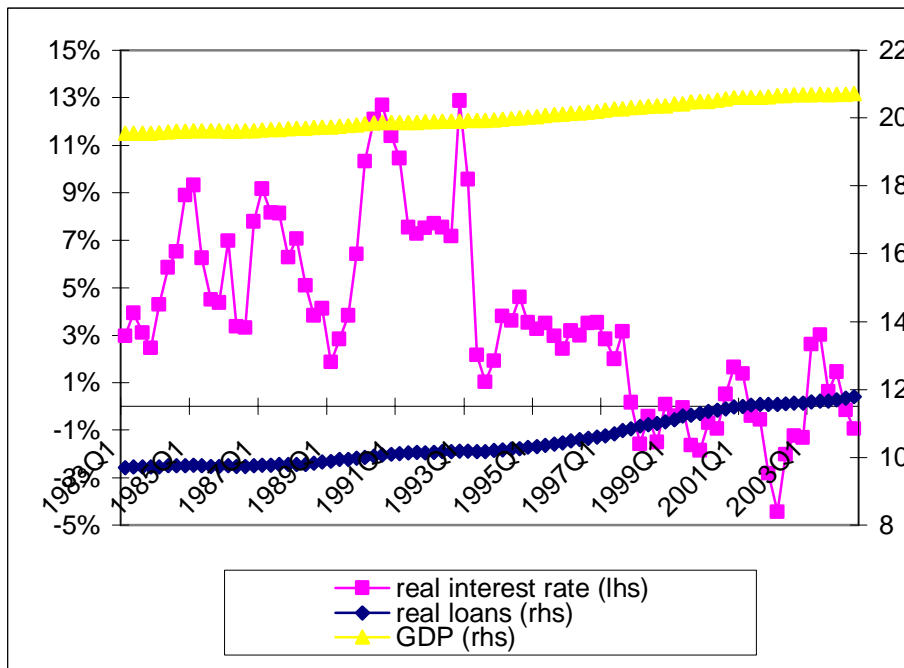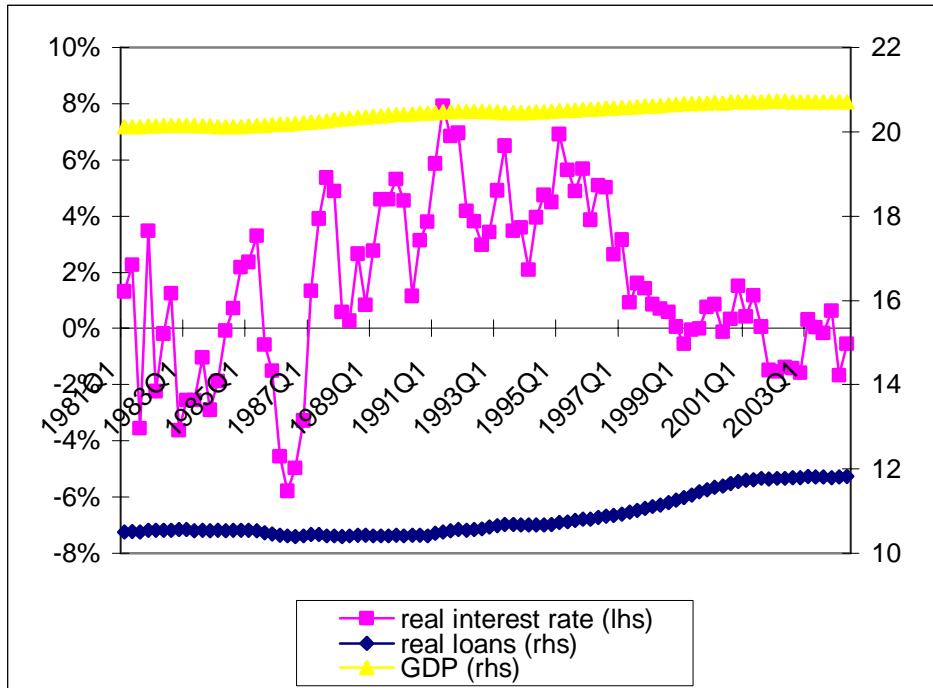Figure 14: Log GDP, log real domestic currency loans and real interest rate in Ireland

Figure 15: Log GDP, log real domestic currency loans and real interest rate in Portugal

Figure 16: Log GDP, log real domestic currency loans and real interest rate in the Czech Republic
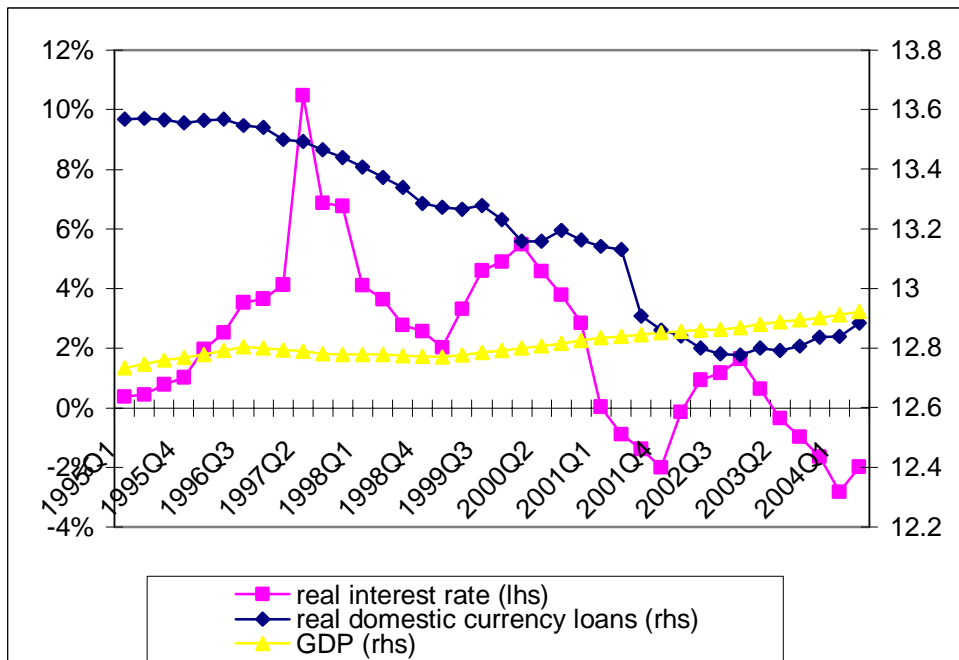

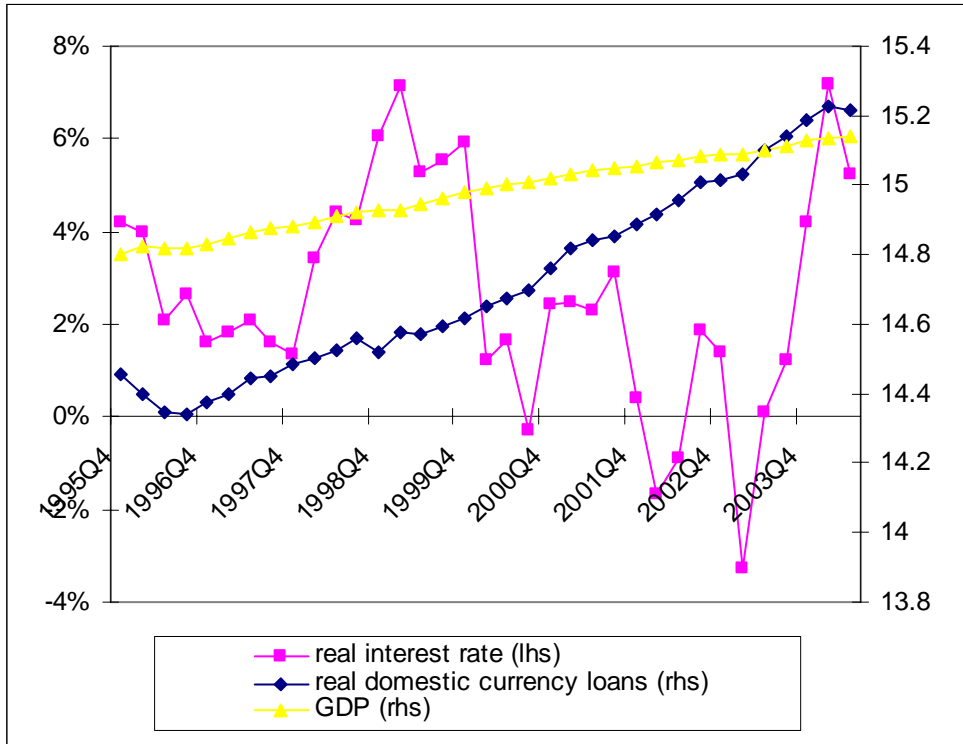Figure 17: Log GDP, log real domestic currency loans and real interest rate in Hungary

Figure 18: Log GDP, log real domestic currency loans and real interest rate in Poland