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By Maya Jollès

PhD news
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Editorial address: Baltic International Centre for Economic Policy Studies, Strelnieku iela 4a, Riga, LV-1010, Latvia; www.biceps.org/bje; e-mail: bje@biceps.org.

The Baltic Journal of Economics is a semi-annual peer-reviewed scientific journal in economics. The Journal is intended to provide a publication medium for original research in economics and selected fields for scholars working in the Baltic countries or those who are working with topics relevant for the Baltic countries or for transition economies in general. Papers may be theoretical or empirical in their emphasis and with relevance to the Baltic countries. Papers with policy relevance or which combine economic theory with empirical findings are particularly welcome.

Abstracting and indexing: EconLit, the Journal of Economic Literature electronic edition/CD-ROM, EBSCO, Scopus, GESIS, SSCI, Cabell’s directory and RePec.

Submissions: electronic submissions of manuscripts should be addressed to: bje@biceps.org. Instructions for authors see on www.biceps.org/bje.

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ISSN 1406-099X
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Editorial

The first issue of the twelfth volume of the Journal presents a number of papers within the broadly defined field of finance. The topics covered range from a discussion of the Baltic experience of financial engineering instruments as part of EU cohesion policy support to two articles with a European focus – one on the effects of Euro introduction on the Romanian economy and the other on competition in the EU banking sector – through to a final article with a focus on Baltic stock markets.

We would like to thank the Journal’s benefactors, the “Anne-Marie and Gustaf Anders Stiftelse för medieforskning” and the Bank of Latvia for their continued support of the Journal for 2012.

Zane Cunska

Anders Paalzow

Alf Vanags
Financial engineering instruments:  
the way forward for cohesion policy support? 
Recent experience from the Baltic states

Tarmo Kalvet, Alf Vanags, Klaudijus Maniokas

1. Introduction

Traditionally, EU cohesion policy support to businesses and local authorities has almost exclusively taken the form of non-repayable grants or subsidies. However, in the current structural funds programming period (2007-2013), financial engineering instruments (FEIs) have emerged as a significant support mechanism in addition to grant assistance. Thus, “in 2007-2013 the use of different modes of financial instruments has become more widespread. Financial instruments are quickly growing in variety, scope and amounts committed to them. In the 2014-2020 period an even wider application is envisaged – the financial instruments can be used in all policy areas where feasible” (European Commission 2012, p.1). Financial engineering instruments include the following: equity (venture capital), loans, loan guarantees, micro-finance, mezzanine finance and other forms of revolving assistance. The final recipients can be SMEs or other recipients of public funding, such as urban development funds and energy efficiency/renewable energy projects, and even individual citizens.

The European Union takes a rather favourable view of FEIs. The European Commission Staff Working Document puts it the following way: “The possibility of using the same funds several times through various revolving cycles contributes to the impact and sustainability of the instruments. As such, the impact of revolving funds can be many times greater than grant assistance, giving them a particular added value and relevance in times of budgetary constraints. The impact/multiplier effect is further strengthened by the accumulation of interest generated and dividends paid to the funds. The revolving character of such instruments creates enhanced incentives for better performance on the part of the final recipients – such as better quality of projects and greater financial discipline. Also, the participation of private

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1 Research for this paper was carried out as part of the Evaluation network delivering policy analysis on the performance of Cohesion policy 2007-2013 (EvalNet) see: http://ec.europa.eu/regional_policy/information/evaluations/index_en.cfm#1.

The work involved analysis of official documents, evaluation studies, etc. In addition interviews were carried out in 2012 in Estonia, Latvia and in Lithuania with policy-makers, representatives of managing authorities, banks and other financial intermediaries. For detailed country reports see Kalvet (2012), Maniokas and Miseliniene (2012), Vanags and Moore (2012).

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5 So-called ‘revolving assistance’ was available under cohesion policy in limited amounts in some countries in the previous programming period in particular for SMEs. For example Latvia had a cohesion policy financed venture capital programme in 2004-6.
sector funding guarantees the input of expertise and know-how. Specific expertise in supporting, for example start-up SMEs, can be invaluable. Drawing upon this expertise helps to improve the overall quality of projects.” (European Commission 2012, p.2). It should, however, be said that few of the above claims have been empirically tested though the EU policy document recognises the many challenges involved in the implementation of FEIs.

Furthermore, the academic literature on venture capital and the role of the public sector (see e.g. Lerner 2009) suggests that introduction of market conditions and market mechanisms might improve the efficiency of public SME funding from a resource allocation perspective, thereby strengthening the case for financial engineering instruments as policy tools.

During the first four years of the current programming period the use of FEIs has grown quickly. Thus as of the end of 2010 the scale of FEIs can be summarised as follows:

- Around 5% of European Regional Development Fund (ERDF) allocations have been committed in the form of different types of financial instruments.  
- Almost 400 funds have been set up. Most of these funds support businesses but assistance is also available to urban development fund, energy efficiency and renewable energy projects.  
- All Member States have at least one fund in place for enterprises.  
- 11 Member States have funds for urban development, and one Member State has set up a fund exclusively focused on renewable energy and energy efficiency activities.  
- Investments have been made in over 20,000 businesses (see European Commission 2012, p.3)

In short, there is a growing popularity in the use of FEIs in the implementation of EU cohesion policy, with the Baltic states (especially Lithuania and Latvia) in the vanguard of this trend (see Figure 1).

Hence, the three Baltic states offer an interesting case study in the use of FEIs in cohesion policy. Not only are the Baltic states among the more intensive users of FEIs to date but they have taken somewhat different approaches in terms of policy focus and implementation mechanisms. Moreover, their rather similar size, prosperity and productivity levels as well as rather similar economic problems as well as administrative capacities make their experience of FEIs something of a ‘quasi-experiment’ in the use of these instruments. The objective of this paper is to analyse the set-up and performance to date of FEIs in the Baltic states with a focus on ERDF funded instruments. Where possible we attempt to draw lessons for the future including for the next programming period. The analysis builds on hard empirical data supplemented by a number of interviews with stakeholders in the three Baltic states.

* Use of financial instruments in the European Social Fund (ESF) has been much more modest with thirteen Operational Programmes (OPs) in five Member States co-financing financial instruments with ESF resources, for a total amount of nearly 330 MEUR, representing about 0.7% of declared ESF expenditures. All three Baltic states have FEIs funded by the ESF as well as by the ERDF although in relatively small amounts (see Figure A and Tables A and B in Annex).
Figure 1. Allocation of ERDF to FEIs, 2007-2013

Hence, the three Baltic states offer an interesting case study in the use of FEIs in cohesion policy. Not only are the Baltic states among the more intensive users of FEIs to date but they have taken somewhat different approaches in terms of policy focus and implementation mechanisms. Moreover, their rather similar size, prosperity and productivity levels as well as rather similar economic problems as well as administrative capacities make their experience of FEIs something of a ‘quasi-experiment’ in the use of these instruments. The objective of this paper is to analyse the set-up and performance to date of FEIs in the Baltic states with a focus on ERDF funded instruments. Where possible we attempt to draw lessons for the future including for the next programming period. The analysis builds on hard empirical data supplemented by a number of interviews with stakeholders in the three Baltic states.

2. The holding fund methodology

Financial instruments require a rather different implementation mechanism than do classical non-repayable grants. This is reflected in the institutional and organisational set up of FEIs for the 2007-13 programming period which is characterised by the widespread use of holding funds as first stage intermediaries between the Managing Authority and the disbursement of funds to final beneficiaries. This applies in particular for the EU12, many of which started using FEIs for the first time. This form of management was promoted by the EC together with the European Investment Bank (EIB) and the European Investment Fund (EIF) both of which benefited from special treatment which bypassed the requirement for tendering. Figure 2 shows the typical structure for implementation of FEIs in the current programming period.

It can be seen that delivery of FEIs has two levels of intermediary between the Managing Authorities and final beneficiaries: the holding fund (HF) and the standard financial intermediaries such as banks or venture capital funds. In many cases, the holding fund is organised within
the framework of either JEREMIE (for SME support) or JESSICA (for urban development). This structure is important for at least two reasons: firstly, the involvement of commercial financial intermediaries means that loans, guarantees, and equity capital are subject to normal financial scrutiny by professionals in a way that does not happen with grants and secondly, the two-way flow between financial intermediaries and final recipients indicated in Figure 1 signals the ‘revolving’ characteristic of FEIs (see European Commission 2012).

Figure 2. Set-up of financial instruments in 2007-2013


3. FEIs in the Baltic states

A summary description of FEIs funded in the Baltic states from cohesion resources appears in Table 1. FEIs can be found in all three Baltic states, although the focus and the implementation mechanisms are different.

The commonality is that in all countries ERDF funds are used to support innovation and growth of enterprises and that all three have small scale ESF funding for start-up, self em-

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7 JEREMIE (Joint European Resources for Micro to Medium Enterprises) is a joint initiative of the European Commission and the European Investment Fund to promote the use of financial instruments to improve access to finance for SMEs via structural fund interventions. JESSICA (Joint European Support for Sustainable investment in City Areas) supports urban development through the structural funds. However, holding funds can be established independently of the JEREMIE and JESSICA frameworks.
Employment or micro-credit. The importance allocated to different FEIs varies. In Lithuania, soft loans, micro-loans, guarantees, credit insurance and venture capital are all available for SME assistance. Similarly, in Latvia all types of instrument are present: loans, guarantees and venture capital. Estonia has just two instruments: loan funds and two guarantee funds.

Cohesion policy-funded FEIs for SME development in Lithuania were employed for the first time during the 2007-2013 programming period and deployed within the “Economic Growth Operational Programme” within which about 15.5% of funding is allocated to FEIs. FEIs are deployed in two main directions: a) promotion of SMEs and b) increasing the energy efficiency of residential buildings (Figure A in the Annex).

Table 1. ERDF and ESF funding of financial engineering instruments in the Baltic states

<table>
<thead>
<tr>
<th></th>
<th>EE</th>
<th>LT</th>
<th>LV</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEIs in 2004-2006</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>FEIs in 2007-2013</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>FEIs for competitiveness and innovation (MEUR)</td>
<td>100.9</td>
<td>305.4*</td>
<td>184.3</td>
</tr>
<tr>
<td>Loan funds</td>
<td>70.3</td>
<td>138</td>
<td>72.5</td>
</tr>
<tr>
<td>Guarantee funds</td>
<td>30.6</td>
<td>49.4</td>
<td>28.5</td>
</tr>
<tr>
<td>Venture Capital (VC)</td>
<td>no</td>
<td>36</td>
<td>83.3</td>
</tr>
<tr>
<td>FEIs for energy efficiency (MEUR)</td>
<td>17.0</td>
<td>127**</td>
<td>no</td>
</tr>
<tr>
<td>FEIs for start-up and micro credit (ESF) (MEUR)</td>
<td>6.0</td>
<td>14.5</td>
<td>17.3</td>
</tr>
<tr>
<td>FEIs total</td>
<td>123.9</td>
<td>446.9</td>
<td>201.6</td>
</tr>
</tbody>
</table>

Source: Authors. * It has not yet been decided among which specific instruments Lithuanian JEREMIE HF funds will be distributed. The figures indicated for loan funds and venture capital funds are not final. ** In total, 227 MEUR are invested in the Lithuanian Jessica HF: EUR 127 million from the ERDF and EUR 100 million as the national contribution.

In Latvia, ERDF-funded FEIs are part of the Operational Programme (OP) “Entrepreneurship and Innovations”. Funding for FEIs from the ERDF stands at EUR 184.3 million and together with national and private funding total FEI funding for ERDF activities is EUR 293.5 million representing nearly 27% of total funding for this OP (Table A in Annex).

In Estonia, four instruments are allocated a total of EUR 100.9 million within the OP for the Development of Economic Environment, constituting 7.0% of the total budget of the OP and are associated with innovation and the growth capacity of enterprises (see Table B in the Annex). Public venture capital support is provided from national funds via the Estonian Development Fund established in 2007.

On the management side there are considerable differences (Table 2).
Table 2. Management of FEIs in the Baltic states

<table>
<thead>
<tr>
<th>Loan and guarantee fund manager</th>
<th>EE</th>
<th>LT</th>
<th>LV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kredex and KredEx Credit Insurance</td>
<td>INVEGA</td>
<td>Latvian* Guarantee Agency</td>
<td></td>
</tr>
<tr>
<td>Main VC fund manager</td>
<td>n/a</td>
<td>EIF</td>
<td>Latvian* Guarantee Agency</td>
</tr>
<tr>
<td>Energy efficiency fund manager</td>
<td>Kredex</td>
<td>EIB</td>
<td></td>
</tr>
<tr>
<td>Start-up fund/microcredit manager</td>
<td>Kredex</td>
<td>INVEGA</td>
<td>Mortgage and Land Bank</td>
</tr>
</tbody>
</table>

Source: Authors. * Until January 2012 the European Investment Fund managed the Latvian Holding Fund

Energy efficiency related FEIs can be found both in Lithuania and Estonia\(^{10}\). In Lithuania the allocations for investments in housing energy efficiency projects of multi-apartment buildings and student dormitories are financed through FEIs from the Cohesion Promotion OP from the ERDF in the amount of EUR 127 million. In Estonia, the OP for the Development of Living Environment has one instrument allocated in the amount of EUR 17 Million (constitutes 1.1% of the total budget of the OP) and is associated with energy efficiency in multi-apartment buildings (Figure 2 in Annex).

In Lithuania FEIs for business are mainly operated via a JEREMIE HF created in March 2009 with funding of EUR 210 million. The INVEGA HF manages funding of EUR 58 million and provides loans to SMEs and EUR 14.5 million is allocated to the ESF funded Entrepreneurship Promotion Fund. For urban development the JESSICA Holding Fund Lithuania was established in June 2009. This is managed by the EIB for the purpose of investing in energy efficiency projects intermediated by the banking sector in Lithuania. The total contribution envisaged in the JESSICA HF is EUR 227 million, of which EUR 127 million is ERDF funding.

In Latvia the main FEIs are implemented through the “Holding fund for the investment in guarantees, high-risk loans, and venture capital funds and other financial instruments” which at the next level is implemented by two banks and by two local venture capital fund management companies. The Holding Fund was established in mid-2008 as part of the JEREMIE programme with the EIF as the managing agency. In January 2012 the administration of the Holding Fund was transferred to the Latvian Guarantee Agency (LGA). Other ERDF programmes are the “Support by way of loans for development of enterprise competitiveness” (capital equipment) and is run by the state-owned Hipoteku un Zemes Banka (Mortgage and Land Bank) and the newly created mezzanine funding facility managed by the Latvian Guarantee Agency.

In Estonia, all FEIs for enterprises are managed by Fund KredEx, established in 2001 by the Ministry of Economic Affairs and Communications, and by the more recent KredEx Credit

\(^{10}\) Latvia also has an energy efficiency programme for residential buildings but this is financed by grants.
Insurance Inc. (KredEx Krediidikindlustus AS). Both are publicly owned holding funds and are established as legal persons governed by private law.

There are also differences on how actively the FEIs have been used. The most active use has been observed in Estonia, where high demand for FEIs operated by KredEx occurred in 2009 and 2010. For example, in 2009, KredEx guaranteed and financed 409 companies (with 24,000 employees in total) with subordinated loans and project-based loan resources totalling EUR 83 million (KredEx, 2010). In 2010, KredEx guaranteed and financed 470 enterprises (with 16,100 employees) with subordinated loan and credit lines totalling EUR 108 million (KredEx, 2011). However, in 2011 as the credit policies of the banks softened, the demand for FEIs decreased with a funding total of only EUR 67.4 million. The funds of the FEI for energy efficiency are expected to be used up in 2012 (KredEx 2012a).

In Lithuania, results are mixed. The Guarantee Fund and the INVEGA Fund show very good results. By 31st December 2011, the results of the Guarantee Fund exceeded expectations: the volume of guaranteed liabilities was 137% of the target, and the number of SMEs supported was 149% of the targeted number. Two FEIs implemented under the INVEGA Fund have also had high demand among SMEs: by 31st December 2011, the expected results of the FEI “Small Credit Scheme II” were 249% of the target (the number of SMEs supported by FEI); on the other hand the FEI “Open Credit Fund” had 81.5% of the target in terms of the amount of private investments attracted, and 190% in terms of the number of SMEs supported. 80% of the funds from the FEI “Open Credit Fund” are already lent.

The Lithuanian JEREMIE HF has experienced some difficulties, especially when implementing FEIs of portfolio guarantees as this measure was not popular among SMEs and the instrument has been redesigned. Energy efficiency measures have a dismal outturn: to date only 4 multi-apartment buildings have been renovated under the JESSICA programme, where the target is 1,000 buildings to be renovated by the end of 2015.

In Latvia, take-up of FEIs has been slow, especially for Holding Fund activities. As of end March 2012 only 15% of loan funds and about 21% of venture capital funds had been contracted to final recipients. By contrast the programme offering working capital loans was very active in 2010.

4. Discussion

4.1. Market gaps, market failure and FEIs vs grants

Two related issues in evaluating the role of FEIs in cohesion policy (or as instruments of public intervention in general) are: a) is there a gap in financing especially of SMEs that the market does not fill? And b) if there is such a gap, does it represent a ‘market failure’ that needs to be addressed and corrected?
In practice, the deployment of FEIs in the Baltic states cannot be said to have been based on clearly identified market gaps or market failures. Perhaps this is because gaps are difficult to quantify since demand is latent and unobservable until supply appears (see Vanags et al 2010). Similarly, the EIF (2007) argues that lack of data compromises the feasibility of measuring demand for FEIs. As a result, it has been difficult to define empirically a market failure in terms of an absolute or persistent financing gap.

Although hard empirical data are also not available in the Estonian case, all the Estonian stakeholders interviewed argued that the private market in Estonia did not offer adequate levels of capital to entrepreneurs who lacked sufficient collateral, self-financing and/or appropriate financial history. That is, the amount of collateral required from borrowers sometimes exceeded their asset endowment, and even reasonably good low-risk borrowers experienced ‘unfairly’ rationed credit. Furthermore the financial crisis caused serious problems in the operation of financial markets. Additionally, the overall low capitalisation level of the Estonian industrial sector and low investments – especially in traditional industries that could benefit from international technology transfer – suggests important market imperfections remain.

Similar qualitative arguments were provided as a justification for intervention in Lithuania. In quantitative terms, the first estimates of the relevance and effectiveness of intervention in the area of SME support in Lithuania appeared in 2010, in particular estimates of the amount of investment needed for venture capital and micro-credits. The rationale for intervention in energy efficiency measures in the housing sector was simply that there was no available and affordable market alternative.

Moreover, in none of the three countries has there been detailed discussion in the main policy documents of the merits of grants vs FEIs. One stated consideration for using FEIs over grants is that FEIs create fewer market distortions because FEIs are provided on commercial terms and are assessed by qualified and experienced financial intermediaries.

The need to better understand the merits of grants vs FEIs is illustrated by an Estonian case. From 2011 a technology loan, a special type of subordinated loan, has been offered to entrepreneurs. Through the technology loan, investments by entrepreneurs in machinery and equipment are co-financed in cooperation with a private bank or leasing company. This is funded by the ERDF in the amount of EUR 19.3 million (see Kredex 2012b for details). This FEI is interesting because of its close alignment with the objectives of Enterprise Estonia’s support to technology investments (Tööstusettevõtja tehnooloogiainvesteeringu toetamise tingimused ja kord (2008)), co-funded by the ERDF for EUR 73 million (Ministry of Finance, 2012).

The measure assists with acquisition of machinery and equipment, and intangible assets required for use of these machines and equipment and has been very popular. For example, in 2010 in response to the third call for the measure, 169 applications were received and 71 were funded with a budget of EUR 18.5 million. For the period 2009-2010, altogether 185 proposals were funded (Enterprise Estonia, 2011). A feasibility study on the measure was carried
out by Technopolis (2008) and alternatives (grants vs. loan support) were discussed. It was suggested that grant-based support mechanisms were potentially more effective. The authors also suggested that such investment support should be accompanied with in-depth consultations on best available technologies.

Both in Lithuania and in Estonia in the field of energy efficiency, the unaffordable cost of apartment building renovation is the main reason for public intervention, as was concluded in evaluations carried out in Lithuania (EIB 2009, EIB 2010). The main benefit of employing JESSICA-type instruments (FEI) versus traditional grant financing was perceived as located in the revolving nature of the fund. This enables multiplication of funds invested as well as leverage of additional public and private sector funding.

4.2. Evaluations of FEIs

In all three countries there is limited evidence-based evaluation of FEIs. The need for good quality evaluations is well illustrated by the case of Estonia: although an increasing number of policymakers support wider implementation of FEIs, less support comes from beneficiaries. There is an issue of path dependency with entrepreneurs continued expectations for support in the form of grants and lack of supporting argumentation to deviate from the current path. Also, from an economic policy perspective, it would be desirable to evaluate whether providing a large number of small loans to start-ups and small companies with growth potential is likely to be more effective than providing a small number of large(r) loans to existing medium-sized and larger companies. Such an evaluation could inform the next round of FEI development.

In Lithuania an evaluation for the Ministry of Economy was carried out to assess, among other things, the sufficiency and adequacy of existing FEIs to the changed economic situation generated by the economic crisis. The aims included: to identify market failures (if any), to assess the adequacy of particular FEIs for covering such failures, and identify the need for redistribution of structural fund resources. The study concluded that FEIs were satisfactory instruments for promoting SMEs during a time of economic downturn, but some new FEIs had an over-long deployment period. The need for additional interventions to promote exports (export insurance), venture capital development (especially at the pre-seed stage), and to increase funds for micro-credits was identified.

In Estonia two evaluations have been carried out on FEIs in relation to the innovation and growth capacity of enterprises but none on renovation loans for apartment buildings. An Estonian National Audit Office (2010) impact assessment of companies that had received support from 2004 to 2009 concluded that in terms of productivity, value-added, turnover and exports, the performance of these companies was not significantly different from that of businesses that had not received support. The report raised several methodological issues such as the appropriate time scale for measuring impact. Both the Ministry of Economic Affairs and Communications and KredEx disagreed with the main conclusions of the audit, as did some policy analysts and researchers. As a result of dissatisfaction with the National Audit Office
report an ongoing impact assessment of enterprise support measures is being carried out by the Ministry of Economic Affairs and Communications. Preliminary results show that clients of KredEx are mostly SMEs and that beneficiaries have grown more rapidly compared with the control group.

In Latvia, evaluations are being carried out by the Ministry of Finance, including a mid-term review and selected internal audits; however no reports for 2007-13 are yet publicly available.

4.3. FEIs and the financial crisis

The different nature of FEIs applied across the Baltic economies meant that the impact of the financial crisis on the uptake of FEIs has been different.

A perception emerging from many of the persons interviewed was that the more turmoil there is on the markets the higher the need for some intervention in the form of loans and loan guarantees. Thus quick and broad interventions were desired by local enterprises. This has been most successfully accomplished in Estonia where for 2009-2010 demand for enterprise-oriented FEIs increased as commercial banks cut back on lending. In response to this additional measures were introduced along with other changes.

For example, the “Additional support programme for the availability of entrepreneurs’ loan capital” was initiated in the spring of 2009 and additional loan capital was intermediated for exporting entrepreneurs via success-based subordinated loans, long-term loans for investment projects and credit lines for banks. Additionally, there was more provision of mid- and long-term export guarantees to entrepreneurs, in particular export insurance was extended to all countries (previously guarantees were limited to third countries located outside the EU and OECD due to EU State Aid rules). The time taken to introduce ERDF-funded FEIs has been rather similar to that of other policy instruments in Estonia as existing organisations have been largely used for implementation and delivery of new FEIs.

The SME Loan programmes offered in Latvia were originally designed as additional sources of funding for small and medium-sized manufacturing exporters in order to finance the purchase of new equipment and other longer-term investments. However, as the economic crisis evolved credit demand shifted from longer-term capital investment to short-term working capital needs. At the same time, the economic crisis caused most banks to become much more conservative in their lending and consequently, just when their need was most acute, many enterprises were not able to access bank credit for working capital. In contrast, capital loans from the Latvian Mortgage and Land Bank, albeit at relatively high cost to the borrowers, were a popular instrument in 2010, but with the resumption of more normal lending in 2011 this activity decreased. Because of limited co-funding options for investment projects, the pick-up of VC related measures has been slow in both Latvia and Lithuania. In Lithuania the Ministry of Economy is planning to reallocate EUR 40 million to FEIs most demanded by SMEs. Similarly, in Latvia a new EUR 25 million mezzanine activity was introduced at the end of 2011.
4.4. JEREMIE and JESSICA Holding Funds versus national funds

Involvement of both JEREMIE and JESSICA in delivery of FEIs has been less than smooth. In Latvia inclusion of JEREMIE led to lengthy policy discussions among government ministries, inter-ministerial negotiations and government approvals during the initial establishment in mid-2008 and through to subsequent implementation in 2010 of the Holding Fund managed by the EIF. As a consequence, for example, by the time loan FEIs with SEB and Swedbank were available, the market need (working capital loans for SMEs in general) had largely moved beyond the initial FEI eligibility criteria so deployment of loans to final beneficiaries was much lower than expected. Latvia was only the third country to engage the EIF as manager of its Holding Fund. Lack of EU fund experience meant that the EIF was “learning by doing” and, according to the managing authority in Latvia, the time and effort required for FEI implementation was substantially underestimated. Consequently deployment of FEIs started in mid-2010 rather than end 2008 or early 2009 as originally anticipated, significantly reducing the time available for full deployment prior to end-2013.

In Lithuania similar problems occurred. When implementing energy efficiency measures under JESSICA the agreement with the EIB lacked clear provisions on accountability and control. Only after two years, in May 2011, when JESSICA results were less than satisfactory were amendments to the Financing Agreement initiated. Changes include: a clearer responsibility for the EIB as HF manager, control measures for use of JESSICA funds and indicative results to be achieved. However, the responsibility of the EIB in terms of achieving results, checking the eligibility of expenditure, etc. remains limited.

In short, despite a huge need and potential for modernisation of multi-apartment buildings as well as the political will to implement JESSICA in Lithuania, the start of the programme was difficult, and its results remain disappointing. To date, only 4 multi-apartment buildings have been renovated under the JESSICA programme, 47 are being renovated, 80 tenders for construction contracts have been launched, and another 90 buildings are in the process of procuring technical renovation projects. The target of 1,000 buildings renovated by the end of 2015 as provided by amendments to the Financing Agreement with the EIB is unlikely to be achieved. When preparing the JESSICA Investment Strategy and programme, the complexity of the task was not properly assessed, nor was the time necessary for creating an institutional, legal, technical and financial infrastructure, and the building of administrative capacity in this area, nor was the specificity of the target group and its expectations sufficiently evaluated at the beginning. The financial crisis of 2008 added uncertainty to the banking system and to the target groups as the already low incomes of residents living in multi-apartment buildings were further reduced during the economic crisis.

4.5. Rigidity and lack of clarity in FEI programme rules

Since the ERDF is the primary source of public financing of FEIs, the ERDF rules on top of EC State Aid rules must be applied. This has implications for FEI implementation. For
example, all FEI monies must be fully deployed by the end of 2015 because that is the eligibility end date of the current EC budget period. That immediately distorts the loan crediting process of banks and the investment process of equity funds. In addition, State Aid rules prohibit FEIs from financing certain industries, such as agriculture, fisheries and some transport because these are supported through other EC subsidy programmes. If a final beneficiary has received *de minimis* State Aid support from other programmes, the amount of potential financing from FEIs is reduced.

Stakeholders in Estonia have pointed out that introduction of some ERDF-funded FEIs in Estonia were accompanied by negotiations with the European Commission so that FEIs suggested by the Estonian government could be approved. For example, this applied to renovation loans for apartment buildings, where approval of the specific design of the support instrument was needed to overcome design disagreements with the European Commission. Moreover, concern was expressed by those interviewed that the guidelines for FEIs from the European Commission published in 2011 should have been issued earlier.

Uncertainties regarding regulation of FEIs were also stressed by stakeholders in Lithuania. Several issues have not been fully addressed so far either in the Guidance Note on Financial Engineering Instruments (European Commission, 2011) or in the proposals for the next period. This, according to the view of the government officials, has increased the risk that part of the expenses incurred will not be considered eligible at the closure of the programmes and that incentives to use FEIs in the future will be compromised.

In Lithuania the difficulties of combining FEIs and grants has generated particular concern. Seemingly, the European Commission is using the same approach to FEIs as to the management of grants and applies the same control measures. While current EU legal acts (in particular EC, 2011) allow the combination of a preferential loan, guarantee and grant, its recent interpretation makes it virtually impossible: the EC has stated that the three instruments should not co-finance the same expenditures, and in all situations, at final maturity of the loan, total reimbursements by the borrower should be at least equal to the principal borrowed. At the same time the EC have imposed additional requirements for the combination of grants and FEIs. These require that grants and loans originate in different priority axes of the OP and are separately accounted for and documented. Although grants and loans may finance the same project, grants cannot be used to write off loans. In the view of Lithuanian officials, this interpretation narrows the potential use of FEIs and increases administrative burdens as well as contradicting earlier messages from the Commission. Contracts with financial intermediaries for implementation of FEIs were signed in 2009 or 2010, in full understanding and interpretation that loans issued can co-finance expenditure also co-financed by grants as long as state aid rules are respected. The current interpretation might punish countries like Lithuania who were the first to follow the invitation of the Commission for wider use of financial engineering measures as a means of mitigating the effects of the financial crisis, including combined use of grants and FEIs.
5. Conclusions

FEIs funded from cohesion policy resources can be found in all the Baltic states, although the focus and implementation mechanisms are different. The evidence from the Baltic states suggests that use of FEIs was encouraged by the European Commission with inadequate administrative preparation and inadequate understanding of the underlying economic problems that the instruments were meant to address and of why FEIs represent the preferred solution. The reasons for using FEIs are couched in terms of shortage of finance for SMEs and start-ups but very little explicit market gap analysis or market failure arguments to justify the scale of intervention has been offered and little concrete evidence exists of the expected benefits. Further research needs to be done in this respect. This applies also to analysis of the merits of grants vs FEIs.

Lack of experience in managing JEREMIE and JESSICA Holding Funds on the part of key participants combined with incomplete Commission rules led to significant delays in programme implementation both in Latvia and Lithuania. Thus, Latvia planned for quite extensive use of financial engineering instruments in the 2007-13 programming period, but implementation has been slow partly as a result of set-up delays and partly to do with the fact that the recession inhibited both lenders and borrowers.

In Lithuania the difficulties of implementing large scale renovation of multi-apartment buildings, problems of combining FEIs and grants and rules on eligibility of investment in risk capital have been the main implementation problems.

Estonia has had a more trouble-free ride compared with Latvia and Lithuania. Enterprise-related FEIs have become important policy instruments in Estonia, targeting what are regarded as important market failures. They supplement private sector instruments. The demand for such FEIs increased during the global financial crisis and funds were made available to meet the demand. There is an emerging consensus among Estonian policy-makers that more extensive use of FEIs should be considered for the next programming period (compared to grants) even if continued support in the form of grants might be expected or even preferred by businesses.

Thus, optimism remains regarding use of FEIs in the new programming period. A key factor in success will be more thorough feasibility studies and consistency in terms of explaining current rules and drafting new regulations. Uncertainties in regulation and the general tightening of rules make FEIs unattractive to financial intermediaries and to potential beneficiaries. At the same time, the evidence suggests that much of this period continues to represent a learning process and that if the lessons are taken on board there is hope for the next programming period.
Acknowledgements

The authors are grateful to all interviewees. Research for this paper was carried out under the Evaluation network delivering policy analysis on the performance of Cohesion policy 2007-2013 (EvalNet) and partially supported by the Estonian Science Foundation (grant ETF8423). The authors alone are responsible for the contents of the research, which does not necessarily reflect the views or opinions of the European Commission or the Estonian Science Foundation. We are also grateful for constructive comments by the anonymous reviewer(s).
**ANNEX**

**Figure A.** Structural Funds and FEIs in Lithuania, 2007-2013

- **Ministry of Economy**
  - Economic Growth OP Priority 2
  - Objective 3: Improving Access to Financing Sources for SMEs

- **Ministry of Social Security and Labour**
  - Human Resources Development OP Priority 1
  - Objective 1: Improving Adaptability of Workers and Enterprises to the Needs of the Market

- **Jeremie HF**
  - Manager EIF, up to €210 M

- **Invega Fund**
  - Manager INVEGA, up to €58 M

- **Entrepreneurship Promotion Fund**
  - Manager INVEGA, up to €14.5 M

- **Holding Funds**
  - up to €268 M

- **Guarantee Fund**
  - Manager INVEGA, €37.4 M

- **Risk Capital Fund**
  - €28 M

- **Business Angels Co-Investment Fund**
  - €8 M

- **Funded Risk Sharing Instrument**
  - €80 M

- **Portfolio Guarantees**
  - €12 M

- **Small Credit Scheme II**
  - €29 M

- **Open Credit Fund**
  - €29 M

- **Micro-Credit Scheme**
  - €14.5 M

**Source:** Maniokas and Miseliuniene (2012).

**NB1:** The Entrepreneurship Promotion Fund is financed exclusively from ESF.

**NB2:** Not all funds in JEREMIE HF are distributed between specific measures, and the scope of Funded Risk Sharing Instrument and Portfolio Guarantees are subject to change.

**Table A.** FEIs funded by the ERDF in Latvia in 2007-2013 (as of end of March 2012)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total funding EUR</th>
<th>ERDF</th>
<th>National Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity “Holding fund for investment in guarantee, high-risk loans, and venture capital funds and other financial instruments”</td>
<td>153,500,000</td>
<td>83,280,404</td>
<td>8,219,596</td>
<td>62,000,000</td>
</tr>
<tr>
<td>Activity “Guarantees for development of enterprise competitiveness”</td>
<td>28,457,436</td>
<td>28,457,436</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sub-activity “Support by way of loans for development of enterprise competitiveness” (capital equipment)</td>
<td>86,310,326</td>
<td>57,362,564</td>
<td>7,305,882</td>
<td>21,641,880</td>
</tr>
<tr>
<td>Sub-activity “Mezzanine investment loans for development of enterprise competitiveness”</td>
<td>25,239,694</td>
<td>15,184,734</td>
<td>10,054,960</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293,507,456</td>
<td>184,285,138</td>
<td>25,580,438</td>
<td>83,641,880</td>
</tr>
</tbody>
</table>

**Source:** Vanags and Moore (2012)
Table B. Structural Funds and FEIs in Estonia, 2007-2013

<table>
<thead>
<tr>
<th>FEI</th>
<th>EU contribution</th>
<th>Estonian public sector</th>
<th>Estonian private sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme of start-up loans and micro-loans</td>
<td>6.0</td>
<td>ESF</td>
<td></td>
<td>6.0</td>
</tr>
<tr>
<td>Total OP for Human Resource Development</td>
<td>351.4</td>
<td>53.7</td>
<td>23.2</td>
<td>428.2</td>
</tr>
<tr>
<td>Renovation loan for apartment buildings</td>
<td>17.0</td>
<td>ERDF</td>
<td>32.0</td>
<td>49.0</td>
</tr>
<tr>
<td>Total OP for the Living Environment</td>
<td>1,306.2</td>
<td>271.4</td>
<td>85.7</td>
<td>1,663.2</td>
</tr>
<tr>
<td>Additional Support Programme of Availability of Loan Capital by Entrepreneurs</td>
<td>43.0</td>
<td>ERDF</td>
<td>26.2</td>
<td>69.2</td>
</tr>
<tr>
<td>Export credit insurance programme</td>
<td>12.8</td>
<td>ERDF</td>
<td></td>
<td>12.8</td>
</tr>
<tr>
<td>Subordinated Loan Programme</td>
<td>27.3</td>
<td>ERDF</td>
<td></td>
<td>27.3</td>
</tr>
<tr>
<td>Business loan guarantees and capital loan programme</td>
<td>17.8</td>
<td>ERDF</td>
<td>0.2</td>
<td>18.0</td>
</tr>
<tr>
<td>Total OP for the Development of Economic Environment</td>
<td>1,307.3</td>
<td>197.1</td>
<td>318.0</td>
<td>1,822.3</td>
</tr>
</tbody>
</table>

Source: Ministry of finance of Estonia, 2012

Figure B. Renovation fund scheme in Estonia

ERDF funds to capital

SF 17 min €

Fund (KredEx) 49 min €

State guarantee, Foreign funds (loan)

Additional funds 28.8 min € CEB; 3.2 min € KredEx

Swedbank 2/3

SEB 1/3

Loan to banks with low interest rate

apartment building

Loans of banks to apartment buildings. Bank adds a margin and covers the credit risk

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Persons interviewed
Adler, M., Head of Housing Division, Fund KredEx.
Alhasova, I., Head of Entrepreneurship and Innovation Programming Unit, EU Funds Strategy Department, Latvian Ministry of Finance.
Bumelyte, J., European Investment Bank.
Danilov, D., Head of Economic Development Department, Estonian Ministry of Economic Affairs and Communications.
Kitsing, M., Economic Analysis Division, Estonian Ministry of Economic Affairs and Communications.
Līdaka, G., Deputy Head of Entrepreneurship and Innovation Programming Unit, EU Funds Strategy Department, Latvian Ministry of Finance.
Maskalioviene L. and other representatives of the Lithuanian Ministry of Finance. Round table discussion on financial engineering.
Mats, K., Expert, Estonian Ministry of Economic Affairs and Communications.
Miliauskiene, I., Lithuanian Ministry of Economy.
Poļanska, E., EU Structural Funds Implementation Department, Private Sector Unit, Latvian Economics Ministry.
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Representative of Hipotēku un Zemes Banka (Mortgage and Land Bank), Latvia, Board member.
Representative of Baltcap, Latvia.
Representative of Imprimatur Capital, Latvia.
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Perspectives on Euro introduction in the Romanian economy

Codruța Mare\(^1,3\) and Cristian Litan\(^2,3\)

Abstract

This paper offers a first quantitative glance at the possible effects of preparing for Euro adoption, as well as at the ex-post effects of actual adoption. Although the complexity of the models considered gradually increases, nevertheless all the simulations provide the same general picture in which (short and sometimes medium term) restrictiveness is revealed. The results show that for Romania, fulfilling the Maastricht criteria implies short-term economic slowdown and restrictiveness, followed by economic recovery and growth in the medium term and especially the long run. Quantitative estimates of these effects are provided. The most important negative evolutions are to be found for the labour market and investment.

**JEL classification codes:** E17, E27  
**Keywords:** effects of European monetary integration, models, simulations, impulse responses

1. Introduction and literature background

On 1 January 2007, Romania joined the European Union. As an implicit aspect, Romania will have to replace its own currency, the RON, with the Euro. The common currency raises a series of problems, both before and after adoption. It is important not only to fulfil the convergence criteria, but also to study the economic and social effects of this step.

For a country like Romania, situated at the end of most European rankings in the economic and social fields, a careful assessment of the monetary integration process is more needed than in the case of other EU countries. Romania is one of the biggest countries in the European Union, both in area and in population, being the second largest after Poland among the East

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3. Acknowledgements
Codruta Mare acknowledges the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under project number POSDRU 89/1.5/S/61104 entitled “Social sciences and humanities in the context of global development - development and implementation of postdoctoral research”.

Cristian Litan acknowledges financial support from CNCSIS-UEFISCSU, project number PNII RU code 298/2010.
European members. Therefore, controlling the efficiency of adoption policies is expected to be more difficult compared to a smaller country (for example Slovenia, Slovakia or Estonia). On the same lines, it is common understanding that a smaller country in the post-adoption era may benefit more from the protection umbrella provided by the Euro Area than a larger country (a size effect also occurs in the case of the economic problems a country might encounter). These specific features of Romania (compared to other Euro Area candidates) and the way they influence the convergence process are analyzed in studies such as Matiș and Nagy (2007). Mare and Marcu (2010) emphasize a lack of convergence at inflationary level between Romania and the Euro Area. The latter aspect is very important, as the inflation rate is the main criterion taken into account for assessing convergence; it is the cornerstone of monetary integration. And even though the international subprime crisis has led to discussions regarding changes in the way the inflation rate criterion is considered and computed (see Darvas and Szapary, 2008), Romania still has to put significant efforts towards fulfilling this particular criterion. The process has already proved to be very difficult, considering the fact that only in 2007 was the inflation rate in Romania within the targets of the NBR.

Yet, the nominal convergence criteria are a small part of the whole monetary integration process. Also important are aspects regarding real and structural convergence, as the evolution of real convergence may have a greater impact upon citizens. Trying to fulfil the nominal criteria may enter into contradiction with real convergence and lead to negative evolution of the national economy in many fields. The consequence might be represented by costs that would outbalance the benefits of a single European currency. Using the UK test related to economic integration, Mare (2010) has come to the conclusion that most sectors of the Romanian economy are not yet ready to join the Eurozone. In the same study, Mare (2010) also approximates that only around 20% of what should be done for monetary integration is complied with.

The present study subscribes to the economic literature that investigates the process of monetary integration of the candidate countries into the Euro Area. Such studies have now been conducted for several years for the newcomers in the European Union. The central banks of the candidate countries are in the front line of research that aims to provide a detailed picture of what the integration process really implies for the national economy (see the research conducted within the central banks of Poland, Latvia, and Hungary). In 2004, Bitans and Kauzens studied the effect of Euro adoption on the Latvian economy. Focusing on descriptive analysis combined with time series econometric methods, the authors emphasize the status of the Latvian economy and some possible effects of Euro adoption, at different levels. The main conclusion is that in the case of Latvia, a small economy, the indicators of real convergence differ substantially from those of the larger (Euro Area candidate) members, while the Latvian economy displays greater similarity to the Eurozone. The main conclusion is that, at the time of the study, monetary integration would have been a net benefit for Latvia. Relevant for the present study is the research conducted by Borowski et al. in 2004 for Poland. Also using a progressive approach, like the present paper, the authors investigate the status of the Polish economy and the effects that Euro adoption might have on different layers of the national economy, emphasizing both the costs and the benefits related to the process. An important conclusion drawn from the analysis is that fiscal impulses are more effective than
monetary impulses. Other relevant studies are the convergence process reports of the National Bank of Hungary (2006, 2008). From the methodological point of view, an interesting paper is that of Mojon and Peersman (2001). This emphasizes that the vector autoregressive (VAR) approach is the most widely used in assessing monetary issues in a country. Our study employs VECM analysis to assess the macroeconomic effects of preparing for euro adoption. The present work offers a first quantitative glance at the possible effects of preparing for Euro adoption, as well as at the ex-post effects for Romania of actual adoption. The complexity of the models considered gradually increases, although all the simulations provide the same general picture in which (short and sometimes medium term) restrictiveness is revealed. Nevertheless, this field of literature lacks studies on the Romanian economy. Moreover, the present study contributes to creating a general picture on the challenges that candidate countries face on their way to Euro adoption. It also provides a series of methodological steps and techniques that could be used to assess the effects of monetary integration, not only for Romania, but also for other candidates.

The rest of the paper is structured as follows. Section 2 presents the data and discusses methodological aspects. Section 3 presents the simulation results on all the models considered. Section 4 concludes the paper.

2. Data and methodology

2.1 Data

The data concern the Romanian economy from 1997 (q1) to 2009 (q4). In this analysis we used quarterly data from the Statistical Bureau of the European Union – Eurostat and OECD – concerning inflation rate, GDP, interest rate\(^4\), the RON/EUR exchange rate, real governmental expenditures\(^5\), the growth rate of real output, total employment, the monthly net wage, real investments, and net exports.

The data were seasonally adjusted and most of the variables are used in the analysis in their logarithmic form so that, where applicable, the first differences of the variables have the usual growth rates interpretation. The seasonal adjustment was based on the multiplicative moving average method, and the adjusted variables were afterwards transformed into their logarithmic form. This formatting of the data is used throughout all the following analysis.

Table A1 presents the way the variables are coded in the models analyzed in the Results section. The table is relegated to the Appendix.

2.2 Methodological aspects

The paper is based on a progressive approach, from simple (two variables) models to more complex models. The first part of the quantitative analysis deals with the very short and short

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\(^4\) For which the real money market interest rate for 12-month maturity is used as a proxy.

\(^5\) As a proxy for fiscal criteria.
term effects on GDP of fulfilling the inflation rate criterion. It is a partial equilibrium analysis of the relationship between the GDP gap and the inflationary gap (see equation 1 in the Results section). It has as a starting point the applied work of Borowski et al. (2004), with theoretical background represented by the work of Lucas (i.e., aggregate supply function, Lucas 1972, 1973) and Okun’s law (1962), which together are combined in a well known version of the Phillips curve. The aggregate supply function (Lucas, 1973) and the Phillips curve (Phillips, 1958) are expressed in terms of deviations of the actual values of the variables from the “natural”, expected ones. To approximate the latter, we use the Hodrick – Prescott (HP) filter (see Hodrick and Prescott (1997)). This procedure allows computing the gap (inflationary gap, output gap) by defining it as the deviation from the HP trend. (For example, when considering the GDP variable denoted by Yt, we compute the gap as: Y\_GAPt= Yt–HPTREND\_Yt.)

Generally, the HP filter has an end-point problem. Identification of an output gap is difficult as potentially an ‘outlier’ can have big effects on the output gap estimate. Kaiser and Maravall (1999) point to the aggravating influence of the end-point bias problem. One way to solve the problem is to extend the series, for example with ARIMA forecasts. Thus the interesting point is no longer at the end of the series. Applying this method to our data gives virtually identical results as with the simple application of the HP filter (see subsection 3.1 for results of the analysis of the relationship between the HP gaps of the GDP and inflation rate).

The second part of the quantitative analysis is a step forward, bringing for evaluation more complex relationships between the macroeconomic variables. This has theoretical roots in neo-Keynesian macroeconomic models in which several equilibrium equations are generated. The econometric model takes into account the five nominal criteria that have to be fulfilled by Romania in order to join the Eurozone (The Maastricht Treaty, 1992), plus other macroeconomic variables. The latter group consists of the most important real and structural criteria, such as output, total employment, wages, and investments.

The time series associated with the analyzed variables are usually non-stationary and this can affect the results of the econometric estimation by returning spurious relationships among them. However, the concept of cointegration indicates that while different variables have stochastic trends and associated short-run random divergences, they develop in a coherent way in the long run. Several time variables are cointegrated if they are individually non-stationary, but at least one combination of them is stationary (note that we consider only integration of at most order one for the variables). Thus, these variables cannot drift apart, having achieved a certain level of convergence.

We followed the standard steps of estimation of vector autoregressive models. First, the variables were tested for the integration order with the help of the Augmented Dickey-Fuller test (ADF). Second, cointegration tests were run (Engle-Granger (1987), Johansen (1988)). If variables are I(0), a VAR model in levels can be constructed, while if they are I(1), a vector

\* Also called the expectations – augmented Phillips curve.
error correction model (VECM) is estimated. Usual residual tests were employed to assess the appropriateness of the resulting models.\footnote{It is noteworthy that the residuals of the cointegration equations (which are the equations associated with long run equilibrium) were tested for stationarity using MacKinnon cointegration critical values (MacKinnon, 1991) and not the regular Dickey – Fuller values (see Greene, 2008). Many macroeconometric papers on Romanian data, and not only, neglect this aspect. The researchers simply use the ADF test and declare their equations and models valid, neglecting the cointegration aspect. That is, the residuals of the equations are values strictly influenced by the correlations and the interconnections in the original variables.}

The VAR and VECM models allow for impulse response and variance decomposition analysis. The impulse response function shows the evolution of one variable following a shock in another variable of the model. It relies on the assumption that a shock to a variable of the model not only affects the future evolution of the same variable, but also the future evolutions of all the other endogenous variables of the model. This is due to the dynamic characteristic of the VAR or VECM in time. If the impulse response function shows the intensity that a current innovation is transmitted into the model, the variance decomposition provides information regarding the relative importance of the innovations. That is, the variance decomposition shows how much of the variation in an endogenous variable is given by a shock in another variable of the model (the explained part) and how much of it depends on other variables or other shocks (the residual value).

The third part of the quantitative analysis considers a semi-structural model. It has as theoretical background the model of Gali and Monacelli (2005) and the implementable version offered by Furlani et al. (2009). (One can also see the semi-structural model in Bank of Poland, 2004). The model employed in the present paper maintains the behavioural equations between the variables, while the structural parameters have been dropped and replaced with estimated ones. With respect to the above mentioned related literature, the specifications have been slightly modified to incorporate more complex dynamics for the exchange rate, allowing for a direct impact of the terms of trade and of the interest rate, and also for a direct positive response of GDP to exchange rate depreciation (see Table A2 for the form and structure of the equations for this model).

The equation of the model that stands for the IS curve relates the GDP level to its expected future value, as well as to the real interest rate, the rate of increase of terms of trade and the exchange rate, and also to foreign GDP. The equation can be rewritten so that it relates the expected growth rate $\Delta Y_{t+1}$ (of national GDP) to the expected growth rate $\Delta Y^*_{t+1}$ (of the foreign GDP) and current growth rate $\Delta Y$, with positive expected signs. While terms of trade movements influence the exchange rate, we have included both factors for explaining GDP because the corresponding channels are qualitatively different. Moreover, although no reaction function is based on the exchange rate, in Romania this variable is not completely driven by the terms of trade variable. It sometimes plays the unofficially recognized role of a policy instrument. Inflation is represented by a neo-Keynesian Phillips curve, where prices react to excess demand, to terms of trade, although not to the exchange rate. The central bank’s reaction function closes the model and has a Taylor rule specification. The interest rate reacts positively and significantly to excess demand. It is noteworthy that the directions of the
causal relationships presented above are confirmed by the sign of the estimated parameters. That is, the expected signs from theory are confirmed by the data.

The next section discusses the qualitative and quantitative results of the econometric estimations and economic simulations of the present paper.

3. Results

Economic research has tried to emphasize the positive and negative effects of a common currency. On the one hand, the exchange rate implies a series of transaction costs which could be invested in other parts of the activity after entering the EMU. Additionally, employees involved in such operations would be relocated to more productive sectors and activities, leading to higher profits. Eliminating the exchange rate risk, the interest rate will diminish by an amount equal to the exchange rate risk premium and the direct effect will be lower cost of capital on the national financial market.

For Romania, giving up the RON means to be far less exposed to exchange rate crises. On the other hand, renouncing its own currency makes a country less prepared to manage (asymmetric) shocks in the real economy. In fact, these opposite effects may occur regardless of considering Romania, Poland, Latvia, or any other candidate country for the Euro Area. However, the positive effects of entering the EMU are very much emphasized by the Romanian authorities when compared with mentioning the possible negative effects of fulfilling the Maastricht criteria, for the short or medium term.

Based on several simulations, this section presents possible evolutions of Romanian economic life on its way to joining or after joining the EMU. As the main convergence criterion is the level of inflation rate, the first part of the section deals with the short term effects that fulfilment of this criterion would have on GDP. The goal of the second part is to estimate brief vector models of the Romanian economy, and based on these to analyze several possible evolutions caused by the monetary integration process. The shocks applied to the model are based on the convergence criteria that have to be fulfilled by Romania in order to enter the ERM II and then the EMU, as well as on the main lines drawn by different political and administrative entities in accordance with this goal. Emphasis is put on development of the labour market and evolution of investment flows on the way to and after euro adoption. At the end of the section we consider a stylized model driven from DSGE models. The model has been estimated and then simulations were performed in order to understand the medium term behaviour of the variables behind three nominal criteria (i.e., inflation, interest rate and exchange rate) in relation with real output components, on our path to Euro adoption.

3.1. The short term implications of fulfilling the inflation rate criterion

For each of the candidate countries to the Euro Area, one of the most difficult things to achieve is equilibrium between price stability (the inflation rate) and price convergence. The latter may show a fast pace, thus creating pressure upon the inflation rate criterion. Moreover,
countries have to combat speculative attacks that usually appear in a period of fixed exchange rates, therefore creating additional pressure on fulfilment of the inflation rate criterion. At the end of the ERM II period, the NBR has to find the proper way to reduce inflation in order to comply with the Maastricht reference value. But how would the Romanian economy react to such an evolution of inflation? This part of the analysis provides a snapshot of the very short and short term effects on Romania’s GDP of fulfilling the inflation rate criterion. Following the methodology used in the literature in the field (Borowski et al, 2004) we have obtained the GDP gaps and inflation rate using the Hodrick – Prescott filter and then used the gaps to model the effects.

When analyzing the relationship between GDP and the inflation rate in Romania, the following short term equation was obtained:

\[
\text{GDPGAP} = 0.69*\text{GDPGAP}(-1) + 0.0022*\text{HICPGAP}(-1) + 0.0035*(\text{HICPGAP-HICPGAP}(-1)) + \varepsilon \quad (\text{eq. 1})
\]

Table 1. Coefficients and their statistical significance for the short term equation:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPGAP(-1)</td>
<td>0.6900***</td>
<td>4.51</td>
</tr>
<tr>
<td>HICPGAP(-1)</td>
<td>0.0022**</td>
<td>1.97</td>
</tr>
<tr>
<td>HICPGAP-HICPGAP(-1)</td>
<td>0.0035**</td>
<td>1.97</td>
</tr>
</tbody>
</table>

Remarks on Table 1: ***significant at 1%, **significant at 5%, *significant at 10%.

The equation shows a positive relationship between the GDP gap level and the inflation rate gap in Romania. In the short term, a 1 percentage point decrease in inflation would lead to a 0.22 percentage points drop in the GDP gap. Thus, a delay of 1 quarter appears between changes in the inflation rate and changes in GDP.\(^8\) At the same time, the variation of the inflation rate from one quarter to the next would produce a variation of 0.35 in the GDP level. Therefore, bringing the inflation rate close to the target would lead GDP towards its natural, equilibrium value. The GDP results show that fulfilling the inflation rate criterion in the very short term would not result in a significant drop in national welfare.\(^9\) Thus, the relationship between the inflation rate and the GDP level in Romania does not appear to be quantitatively significant. This result might be explained by the fact that the historical data on Romania (on which our estimations were run) reveal high levels of inflation (above 200%) and low levels of GDP for certain periods.

Analysis of the residuals shows stationarity and non-serial correlation in the estimated residuals of the equation (the former is an obvious result since the HP gaps of the inflation and output variables are stationary in practice). The Q-statistics correlogram and the Q-statistics for squared residuals show no serial correlations for residual values up to high lags of more than 20 (with very high probabilities). The quantitative conclusion of the first estimated equation is that a constant decrease in the inflation rate (achieved by the authorities in order to

\(^8\) The lag of the dependent is chosen by AIC/SIC criteria.

\(^9\) Measured quarterly by GDP.
fulfill the price stability criterion) would not lead to a major economic slowdown in the short run. The variation in the inflation rate from one quarter to another would not be perceived as an unbearable burden by the population. In the very short term, fulfilling the inflation rate criterion would not be followed by too strong a loss of welfare.

3.2. Macroeconomic effects of preparing for Euro adoption - a VECM approach

The reaction of GDP to short term changes in inflation rate was assessed above. In this subsection we consider five variables that are associated with the five nominal convergence criteria – inflation rate, interest rate, exchange rate and public expenditure, together with real output, total employment, wages, and real investment. Clear reasons exist for our choice of variables of real convergence. First, real output is the most important variable expected to attain convergence in the long run: it is the main indicator of the status of a national economy. Second, Romania has to comply with the convergence criteria, but also other European regulations and targets have to be taken into account, among which the most important concern international competitiveness and development of the labour market. Moreover, integration theory clearly states that once monetary policy is lost as an adjustment mechanism, the labour market and fiscal policy remain as policy decision instruments.

Several scenarios were constructed based on differences between current levels in Romania for the nominal criteria and the theoretical values that should be achieved. The differences were then applied as impulses in the vector models to assess how the macroeconomic variables will react.

Romania is presently under the Excessive Deficit Procedure. This means it has to reduce its budget deficit according to the EU calendar. By 2012 the deficit has to decrease below 3% of GDP. Thus, in the hypothesis of constant evolutions of GDP and of budgetary revenues\textsuperscript{10}, the government should diminish budgetary expenditure by an average of 1.5% yearly. A monetary scenario is hard to define as not enough data are available for Romania to assess the long term interest rate criterion. What can be analyzed in relation to this criterion are the interest rate levels for different maturities and the effects of the NBR’s monetary policy decisions. However, some literature in the field suggests that the fiscal impulse of reducing governmental expenditure would have a more rapid and intense effect than increasing the degree of monetary policy restrictiveness (see the report of the National Bank of Poland, 2004). Usually, a reverse relationship exists between the two types of action – when monetary policy is more restrictive and the National Bank uses higher monetary policy interest rates, fiscal policy is more lax. An impulse of 1% per year was also applied to the interest rate.

For the main criterion, which is the inflation rate, its level in 2009 in Romania was 5.6%, above the NBR target of 3.5%, +/- 1 percentage point. In 2010, the inflation rate increased to 6.1%, according to Eurostat reports. The innovations applied to the inflation rate are based on two hypotheses. First is considered the NBR target of 3% in 2011, +/- 1 percentage point. In

\textsuperscript{10} Both international and national economic forecasting institutions forecast a very slow recovery of Romania from the crisis, meaning almost constant revenues to the general budget and an almost constant GDP.
this scenario, the reduction would be made slowly in the next couple of years, while proportionally accelerating as the established deadlines approach. The latest figures from the European Union render the average of the best three EU performers in terms of inflation at a level of -0.73% for 2010. Therefore, as a second scenario for inflation impulses we considered a constant reduction of the inflation rate by 2 percentage points a year in order to enter the ERM II in 2012 and by 1 percentage point yearly if the official deadline is postponed to 2014. The inflation rate is not a policy instrument for central banks, while controlled inflation is usually an output of their policy decisions. The reason for applying an impulse in the inflation rate is that very efficient laws to increase competition on the Romanian markets combined with NBR efforts to target inflation may be viewed as a direct influence of the authorities on this variable.

All the variables were tested for stationarity/non-stationarity and proved to be first order integrated. A VECM was constructed. The Johansen cointegration test found 2 cointegration equations between the variables, which are consistent and statistically significant. Moreover, the model is stable, as all the unit roots are within the unit circle. A decrease of public expenditure by 1.5% yearly implies a reduction by 0.375% quarterly. To such an innovation, the analyzed variables react differently. Thus, total employment would first drop by more than 0.016% in the next quarter after the impulse and then increase again, although to a lower value than before reduction of public expenditure. In three years time, it would stabilize at a level lower by 0.005% than the initial value. If, at the beginning, this innovation is not very important in the variation of total employment, its effect increases in time. Thus, after one year the shock would be responsible for almost 35% of the variation in the level of employment in Romania.

Negative evolutions can also be found in the case of investment and the inflation rate. The shock would cause a reduction in investment in general, with the lowest level of -0.16% in the first quarter. This is very important as the flow of FDI very much depends on the fiscal policy adopted by the national government. The intensity and rapidity with which the fiscal negative impulse affects the economy is best seen in the reaction of the inflation rate. Here appears the deepest drop – the inflation rate reduces by 0.2 percentage points in the quarters after the shock. The rest of the variables all react positively to the negative innovation in government expenditure. The variation of the average monthly net wage is quite negligible – with a peak of around 0.01% after more than a year from the innovation.

Except for an increase in the unemployment rate and in the interest rate, the Romanian economy would benefit from reduction of the budgetary deficit according to the European Commission’s provisions. It would help in reducing inflation towards the targets established for monetary integration, it would provide a positive growth rate of real GDP and an improvement in Romania’s position on international markets and of trust in the Romanian economy (in the medium term, the RON appreciates against the Euro).

11 The equations for the VECM are available upon request.
12 Almost 30%, according to variance decomposition analysis.
The difficulties of analyzing the effects of fulfilment of the interest rate criterion have been underlined above. However, the implications of an innovation of 1% per year, namely 0.25% quarterly, are analyzed below. When conducting this quantitative exercise, we assume that the NBR will use the interest rate as a trigger instrument for inflation adjustment, although it is well understood that an increase in the monetary policy interest rate may have detrimental effects on the interest rate criterion, besides the positive effects given by the fact that Romania may be credited with more trust. As expected, the response of the inflation rate to the monetary impulse is weaker than to the fiscal impulse described above. An increase in the level of interest rate has the expected effect – it restricts FDI flows and national investment. Consequently, both employment and real GDP fall. The effects of an innovation on all variables are not as strong as in the case of reducing the budgetary deficit.

The results of this part of the study show that monetary impulses need longer periods to be felt in the economy in comparison with fiscal ones. This statement is also sustained by the variance decomposition, which emphasizes low importance of interest rate innovations in affecting the variables in the model. For example, variations in the level of total employment are given only in a proportion lower than 0.15% by variations in the interest rate.
Perspectives on Euro introduction in the Romanian economy

Figure 2. Response of variables to a user specified innovation of 0.25 percentage points in the interest rate

As mentioned above, there are two possible ways to comply with the inflation criterion. The first implies a gradual approach, while in the second deflation is constant until ERM II entry. The nearest target for Romania is to enter the ERM II in 2012. This implies reduction of the inflation rate accordingly. Up to the moment, the inflation rate in Romania has been quite high compared to those of the other members. To reach this goal, the authorities should find ways to reduce inflation by 2% each year. The necessary impulse applied was of -0.5% a quarter. If the deadline for ERM II entry is postponed, the necessary innovation reduces and so do the short and medium term effects. As expected, such an action would have a beneficial impact upon the Romanian economy in the medium term. After a slowing down in the next quarters after the reduction (see Figure 4 for decrease of employment, of real GDP and of the monthly average net wage), the economy enters an ascending path in the medium term. The strongest reaction is the increase in investment by around 0.2%.

When simultaneously applying the above shocks, the reaction of total employment is the most severe in the first quarters after the impulse: a reduction by 0.023% in the next quarter and then a significant recovery. (We do not report here the impulse response graphics for such combined shocks; however they are available upon request.) While both the net wage and real
output react positively to the shock, investment shows a significant fluctuation. A contraction by 0.14% is followed by an increase in FDI by 0.16% towards the end of the analyzed period, when it stabilizes around this value.

**Figure 3.** Response of variables to a user specified innovation of -0.5 percentage points in the inflation rate

![Response of variables to a user specified innovation of -0.5 percentage points in the inflation rate](image)

Source: Authors’ illustration

### 3.3. Macroeconomic effects of preparing for Euro adoption – simulations on a semi-structural model

The particular forms of the equations, as derived from the data analysis, are presented in Table A2 in the Appendix. The codes used for solving and analyzing the model have been written in the programming language Matlab\(^{13}\) and the economic modelling specific functions are part of the Iris toolbox\(^{14}\).

We analyze reactions to different shocks around the steady state, where the impact of all past shocks has died out. At steady state, GDP growth with technology, the inflation rate, interest rate, exchange rate and terms of trade are constant. The steady state of the model is set

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\(^{13}\) Release 2006a.

to match the situation in which the economy fulfilled the nominal criteria. Impulses of 1 pp innovation in three Maastricht parameters were applied (inflation, interest rate and exchange rate). Interpretation of such positive innovations is simple: considering that we are away from the steady state at a “distance” represented by the innovation, then we are interested in development of the economy on its way to achieve the steady state. Therefore, combined shocks were also considered, starting from differences between Romania’s real levels and the target values of the EMU.15

**Figure 4.** Combined shock on interest rate and inflation rate in the semi-structural model (7.67 pp, 4.21 pp respectively)

As for the general properties of the model, the reaction function is very tight, which determines strong increases in the interest rate. Under high capital mobility, the exchange rate reacts quickly to changes in interest rates. These further negatively affect output growth. Under this model, increases in the interest rate determine persistent cyclical movements in the rest of the variables, due to strong monetary policy. From a policy perspective, it is very important how the economy adjusts after an interest rate shock. For temporary shocks, the inflation rate reacts temporarily as well, while the exchange rate appreciates for a long period

15 The variables were considered for their values in 2009.
due to persistence in exchange rate dynamics. We can see a drawback of the model, because
the terms of trade do not react to the exchange rate, even though exchange rate deviation from
the steady state is long lasting. Regarding exchange rate shocks, they impact GDP, which
further transmits them into inflation and interest rates.

Analyzing here just the effects of the combined shocks on inflation and interest rates, the
results are as expected. The large distance of the Romanian economy from the Maastricht
targets implies restrictions at national level in order to enter the EMU within the schedule.
The real output growth rate will decrease. For example, in the case of a combined shock on
inflation rate and interest rate as depicted in Figure 5, the growth rate of real output in the
first quarter after the innovation will decrease by 1.2 pp. The negative trend will continue in
the medium term, arriving in q3 at -1.5 pp. Bearing in mind that the analysis is made quarter-
on-quarter, the short term yearly effect will be significant. Only after one year of an abrupt
descending slope will output growth enter a positive path. Complying with the EMU criteria
diminishes the output gap (in the first quarter after the innovation by -3.5 pp), which indicates
restrictiveness as well.

4. Discussions and conclusions

Econometric analysis using the VAR/VECM methodology proposes certain scenarios about
the short term effects of preparing for Euro introduction and of effective Euro adoption. Mon-
etary integration has as outcomes in the short term a sensible economic slowdown, followed
in the medium term by recovery and economic growth. The most negatively affected among
the studied variables are investment flows. For example, a reduction of budgetary expendi-
tures by 0.375% in one quarter causes a rate of change of -0.18% in the volume of investment
in Romania in the following quarter. In conclusion, monetary integration may have important
influences upon the Romanian economy, and at least in the short term one should expect a
generalized restrictiveness in the economic environment. This image is also confirmed by a
simulations run on the stylized semi-structural model.

The results are much influenced by the degree of competitiveness present in the country. The
EU brings with it a series of convergence types that internationally affect the level of com-
petitiveness and the position of a country. The EU area is better ranked, which redounds upon
the members, too. But each member individually has to find ways of preserving its individual
position. For Romania this would be very hard. Wages are increasing gradually, tending to-
wards the levels in the rest of the Union. Consequently, the part of competitiveness related
to the cost of the labour force is lost. Investors will withdraw their funds from Romania un-
less they can find something else there to attract them. Fluctuations in employment may be
neutralized by increased specialization of the labour force that, for the moment, is too rigid.
This analysis focused on small models with emphasis on specific sectors of a national econ-
omy.

The goal for future research is to provide more complex models and see whether the conclu-
sion of the present study is preserved, that is replacing the RON with the EUR implies short
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term economic slowdown and restrictiveness, followed by economic recovery and growth in the medium term if the present premises are preserved. In this study, no matter the method used, this conclusion remained valid, at least in qualitative terms.

Reduction of the inflation rate has, as an immediate consequence, a drop in the level of GDP in the short term. After a while, based on income expectations and the price setting behaviour of firms, Romanian real output is expected to increase in the medium term. The stickiness of the labour market leads to significant employment reductions as a consequence of monetary integration. Rigid wages and wage legislation, combined with the demands of the unions, prevent the labour market from adapting through other channels than unemployment. Romanians are not willing to accept wage reductions against job creation. The most affected by the whole process will be the labour market, through a rise in unemployment, and a drop in investment.

The scenario analysis shows that the best channel for reducing inflation is fiscal. When applying fiscal impulses, the effects were more intense than in the case of monetary innovations. When budgetary expenditures are high, the national banks usually increase the monetary policy interest rate and vice-versa. And, as the present trend of the NBR is to reduce the interest rate in order to stimulate investment and economic growth, the best alternative is to restrict governmental expenditure (and decrease the budgetary deficit) by reducing the unproductive components of such expenditure.

A concluding policy implication that our results suggest is that for Romania it would be more suitable to postpone Euro adoption to a moment when the effects of such a decision are expected to be less harmful for the economy. In the case of adopting the Euro in the near future, the most affected in a negative way would be exactly the remaining adjustment mechanisms after losing the exchange rate – the labour market (directly) and investment (indirectly). Investment is needed in order to modernize the country and increase the value added in the economy, in order to pass from low value added sectors to high tech sectors. The goal is to strengthen the national economy, which should become less unstable in the face of international shocks. Moreover, in a labour intensive economy as in Romania, negative shocks on international markets have an appreciable pass-through effect on the national labour market. This fact, combined with restrictive actions taken in order to fulfil nominal convergence criteria, would increase unemployment, leading to a loss in welfare for the Romanian population. Moreover, on the above described picture the current crisis has an intensifying effect.

While in Romania the labour market and investment flows will be the most affected in a negative way, in Poland the Euro currency would generate an annual increase in investment ranging between 0.5 - 1 percentage points, according to Borowski et al. (2004). Bitans & Kauzens (2004) argue that on most dimensions, joining the monetary area is better than the hypothesis of preserving Latvia’s national currency (in the short term or the long term). On the other hand, a recommendation to postpone Euro Area accession is to be found in the latest convergence reports for the Czech Republic (National Bank of the Czech Republic, 2011).
Nevertheless, the recommendation of the National Bank of the Czech Republic has to do more with the current debt crisis of Western Europe. However, our study did not focus on crisis elements in the argumentation. It only tried to assert the idea that Romania is at a level of economic development that would imply too much restrictiveness in the case of Euro adoption. Thus, probably this step should be postponed for a future time in which Romania would already have reached a higher economic condition.
References


**Appendix:**

**Table A1.** Data description for the models presented:16

<table>
<thead>
<tr>
<th>Variable code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPGAP</td>
<td>GDP gap - authors’ calculations using the HP filter</td>
</tr>
<tr>
<td>HICPGAP</td>
<td>HICP gap - authors’ calculations using the HP filter</td>
</tr>
<tr>
<td>Y</td>
<td>Real output</td>
</tr>
<tr>
<td>R</td>
<td>Money market interest rate for 12-months maturity in Romania (as a proxy for the interest rate criterion)</td>
</tr>
<tr>
<td>Π</td>
<td>Inflation rate in Romania</td>
</tr>
<tr>
<td>X</td>
<td>Real net exports (terms of trade)</td>
</tr>
<tr>
<td>E</td>
<td>Exchange rate RON/EUR</td>
</tr>
<tr>
<td>Y*</td>
<td>Potential real output</td>
</tr>
<tr>
<td>πEA</td>
<td>Inflation rate in the Euro Area</td>
</tr>
<tr>
<td>Δ</td>
<td>Real output for the Euro Area</td>
</tr>
<tr>
<td>Δ</td>
<td>First difference of a variable</td>
</tr>
<tr>
<td>Shk</td>
<td>Shock</td>
</tr>
</tbody>
</table>

**Table A2.** The equations of the semistructural model:

Dynamic IS curve

\[ Y = 0.9Y_{t-1} + 0.1Y_{t+1} - 0.2(r - \pi_{t+1}) - 0.48\Delta X_{t+1} - 0.09\Delta Y_{t+1} + 0.1\Delta e_{t+1} + \text{shk}_{1}; \]

Newkeynesian Phillips curve

\[ \pi = 0.8\pi_{t-1} + 0.2\pi_{t+1} + 0.43\Delta X_{t+1} - 0.46\Delta X + 0.2(Y - \bar{Y}) + \text{shk}_{2}; \]

Taylor rule/Reaction function

\[ r = 0.8r_{t-1} + 1.2\pi + 1.5(Y - \bar{Y}) + \text{shk}_{3}; \]

Purchasing Power Parity function

\[ \pi = \Delta e + 0.53\Delta X + \pi^{\Delta X} + \text{shk}_{4}; \]

Terms of Trade dynamics

\[ \Delta X = 0.36\Delta X_{t-1} + \text{shk}_{6}; \]

\[ \Delta X = (1/1.04)^* (\Delta Y* - \Delta Y) + \text{shk}_{7}; \]

Definition of GDP growth

\[ \Delta Y = Y - Y_{t-1}; \]

\[ \bar{Y} = \bar{Y}_{t-1} + \text{shk}_{8}. \]

**Remark:** The index -1 means the first lag of the variable, the index +1 means the first future value of the variable, the coefficients are reported as rounded values with two decimals. The coefficients in bold are estimated or imposed by the steady state existence.

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16 For high-frequency data quarterly averages were used. The levels of \( Y, X, \bar{Y}, Y^* \) are in logarithmic form.
Competition and efficiency in EU27 banking systems

Alin Marius Andrieş and Bogdan Căpraru

Abstract

In our study, we investigate competition in the banking systems of the EU27 as a whole, but also in both old EU member states and new EU member states, in the context of European Union integration and enlargement. Specifically, we construct 2 measures of competition, the Lerner Index and H-statistics, using bank-level data for a panel of 923 commercial banks from the 27 countries that are member states of the EU. The results show a significant increase in competition in new EU members between 2001 and 2006, while in old member states we see a notable decrease in competition between 2005 and 2007. As a whole, competition in the EU27 increases comparatively with 2001, and we consider adoption of the euro and continuing European integration to be the main factors for this issue. Additionally, empirical results provide evidence of convergence in terms of banking competition among the member states of the EU.

JEL classification codes: G21; L11
Keywords: bank competition, Lerner Index, H-statistic, convergence, european integration

Acknowledgements

This work was cofinanced by the European Social Fund through Sectoral Operational Programme Human Resources Development 2007 – 2013, project number POSDRU/89/1.5/S/59184 “Performance and excellence in postdoctoral research in Romanian economics science domain” and by the project “Studii Post-Doctorale in Economie: program de formare continuă a cercetătorilor de elită – SPODE”, project number POSDRU/89/1.5/S/61755.

Helpful comments and suggestions from anonymous referees are gratefully acknowledged.

1. Introduction

Recent turmoil in the global financial system has impacted severely on the banking sector, with many banks suffering large losses and being forced to raise additional capital privately or through their national governments. Failure by investors, depositors, and supervisors to appropriately discipline banks has led academics and policy-makers to reconsider the links

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among bank performance, risk and changes in the competitive environment. Moreover, in recent years, indicators of banking competition have been used by researchers to explain performance and risk differentials across banks.

Intensified competition is one expected benefit of economic integration in the European Union. Competition is generally accepted as a positive influence in most industries, in that it is supposed to have a positive impact on an industry’s efficiency. In 1957, the Treaty of Rome set a Single European Market for all goods and services. All discrimination based on nationality was to disappear. The 1992 Maastricht Treaty consolidated the single-market programme. A single European financial market implies that in any of the member states a financial institution of a European Union country is able to function on the basis of the functioning authorization issued by its own country. The First Banking Directive removed obstacles to providing services and establishing branches across the borders of EU member states, harmonized rules for bank licensing and established EU-wide supervisory arrangements. Later, in 1989, the Second Banking Directive on coordination of laws, regulations and administrative provisions dealt with the start-up and development of activity by credit institutions and aimed to create a single banking market by establishing the principle of mutual recognition of banking permits. The main advantages of the single market are: a) reduced prices for banking and financial services as a consequence of the increase of concurrency among financial institutions; b) general growth of economic efficiency as a result of reduction of the cost for banking and financial services used by companies; c) increase of access to larger categories of markets, instruments and services under the conditions of portfolio diversification and better risk monitoring; and d) greater efficiency of use of capital flows due to free movement. In other words, the single European market would produce many dynamic gains in the form of economies of scale, increased competition resulting in reduction in X-inefficiency and international price discrimination, and an increase in the variety of products available across the market (Howells and Bain, 2007).

Besides, in recent years the reform of banking systems due to European Union accession and the transition phenomenon from centralized economy to market-based economy in Central and Eastern European countries has involved ample liberalization, privatization and recapitalization of the banking sector. This has resulted in giving much consideration to analysis of competition in banking sectors.

In our study, we investigate competition in banking systems in the EU27 as a whole, but also in both old EU member states and new EU member states, in the context of European Union integration and enlargement. Since 2004, total EU membership has increased twice: in 2004, 10 new member states (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia) joined the EU, while in 2007, another 2 (Bulgaria and Romania) entered. The originality of this study consists in assessing competition not only for the EU27 banking systems as a whole, but also for old members’ banking systems compared with new members’ banking systems. We also take into consideration some effects of the present international financial crisis during the period 2008-2009.
After that, we test for convergence on non-structural measures of bank competition. We also assess the relationship between competition and efficiency in EU banking systems using Granger-type causality tests in a comparative manner: old EU members versus new EU members.

The rest of the paper is organized as follows: Section 2 reviews previous literature on banking competition and the relationship between banks’ efficiency and competition. In Section 3 we explain the methodology we have used in our analysis and discuss data and variable selection. Section 4 presents and discusses the results of the empirical analysis. Section 5 presents the main conclusions.

2. Literature review

The literature includes some empirical approaches concerning evaluation of competition, the most well-known being “the Structure-Conduct-Performance Hypothesis” (SCP) and the “Efficient Structure Hypothesis” (ESH). The structural approach, as the name suggests, assesses bank competition by examining measures of market structure such as concentration ratios (the share of assets held by the top 3 or 5 institutions) or indices (e.g., the Herfindhal-Hirschman Index) and supposes that higher concentration in the banking market causes less competitive bank conduct, leading to higher bank profitability. The SCP model was originally developed by Bain (1956).

The second approach, ESH, developed by Demsetz (1973) and Peltzmann (1977), suggests that the superior performance of the market leaders determines market structure, implying that higher efficiency produces both higher concentration and greater profitability. “Non-structural models” do not infer competitive conduct of banks through analysis of market structure. Rather, the New Empirical Industrial Organization approach recognizes that banks behave differently depending on the market structure in which they operate. Non-structural indicators of competition are mainly based on the measures of monopoly power developed by Lerner (1934). The Lerner Index suggests the mark-up of price over marginal cost: the higher the mark-up, the greater the realized market power. A broad range of studies use the Lerner Index such as Angelini and Cetorelli (1999), Padoa-Schioppa (2001), Carbó et al (2003), Maudos and Perez (2003), Toolsema (2003), Fernandez de Guevara and Maudos (2004), Carbó et al (2005), Carbó et al (2006), Humphrey et al (2006), Fernandez de Guevara et al (2007), Carbó and Rodriguez (2007), Maudos and Fernandez de Guevara (2007), and Carbó et al (2009). A number of studies have used the Lerner Index in order to try to determine the trend in competitive behavior over time.

An alternative non-structural indicator of the degree of market competition is the Panzar and Rosse (1987) H-statistic. The H-statistic measures the extent to which changes in banking costs are reflected in changes in banking revenues. It is calculated as the sum of the ratios of the percentage change in total revenue (from all sources) to the percentage change in the three input prices (funding, labor and capital costs), holding constant total banking output (total assets), leverage, and two balance-sheet composition variables (loans-to-assets and deposits-


Previous research that focuses on the link between competition and bank performance has a long empirical tradition. Some studies assess the influence of banks’ market power on efficiency. Hicks (1935) first argued the evidence of a negative relationship between market power and efficiency as a consequence of managers’ ‘quiet life’. This ‘quiet life’ hypothesis (QLH) considers that monopoly power allows managers to enjoy a share of monopoly rents in the form of discretionary expenses or a reduction of their effort, which generates inefficiencies. Thus, this slack management determines that firms with greater market power are more inefficient. Berger and Hannan (1998) first demonstrated that banks operating in more concentrated markets exhibit lower cost efficiency as a consequence of slack management. They tested this hypothesis on a sample of about 5000 US banks for the years from 1980 to 1989, using the Herfindahl-Hirschman Index (HHI) as a proxy for market power. Other studies replaced the Herfindahl-Hirschman Index (HHI) with the Lerner Index or H-statistics as a proxy for market power. Some of them support the QLH (Tu and Chen 2000, for Taiwan; Casu and Girardone 2009, for European countries; Koetter and Vins 2008, for Germany; Schaeck and Čihák 2008, for European countries and USA; Delis and Tsonias 2009, for European countries; and Coccorese and Pellecchia 2010, for Italy). Others reject the QLH (Weill 2004 and Maudos and Fernandez de Guevara 2007, for European countries; Koetter et
al 2008, for the USA; Pruteanu-Podpiera et al 2008, for the Czech Republic; Andries 2011, for Central and Eastern European countries; Al-Muharrami and Matthews 2009, for the Arab Gulf; and Fu and Heffernan 2009, for China). Others have both results (support and rejection), such as Solis and Maudos (2008) for Mexico: analysis of the Deposit market rejects the QLH and analysis of the Loans market supports the QLH; Turk Ariss (2010) for his sample of developing countries using cost efficiency, finds that the results support the QLH, but for Profit efficiency the QLH is rejected; and Färe et al (2010) for the Spanish banking system show that the relationship \( varies \) according to the level of market power, the component of efficiency evaluated (cost, technical or allocative) and the type of banking firm (commercial bank or savings bank), suggesting that the ‘quiet life’ might be a reality only for some banks.

Comparatively with previous studies on EU countries, we use both non-structural indicators (Lerner Index and H-statistics) across new European Union members and old European Union members over 2001-2009, as well as for the whole EU. Additionally, we go forward and analyze the convergence of banking-competition levels across the EU member states. Finally, we assess the influence of banks’ market power on EU banks’ efficiency in terms of cost efficiency, testing which hypothesis is confirmed.

3. Methodology and data

In this section we discuss the empirical model used to assess the level and convergence of competition and we investigate the relationship between competition and efficiency in EU banking systems.

3.1. Competition measures

The purpose of this study is to analyze, comparatively, competitive conditions in the banking sectors of European Union countries, both old member countries and new member countries, in light of the reforms implemented in these countries and the tremendous changes in their banking systems using bank-level data.

In the first empirical part of this paper, we estimate the non-structural indicators of competition in order to examine the evolution and level of competition and market power of banks across member states of the European Union for the period 2001-2009. In particular, we measure competition using the Lerner Index and the H-statistic, indicators that are estimated using bank-level data. In the second part of the paper we will assess the convergence of banking-competition levels at the European Union level.

In order to estimate the degree of bank market power we use bank-level data, the approach followed being similar to that of Maudos and Fernandez de Guevara (2007) and Delis and Tsionas (2009) who defined the Lerner Index as:

\[
L_{it} = \frac{(p_{it} - mc_{it})}{p_{it}}
\]  
(1)
where \( p \) is the price of total assets computed as the ratio of total revenue to total assets, \( mc \) is the marginal cost of total assets, and subscripts \( i \) and \( t \) denote bank and time, respectively. To calculate the Lerner Index, we first estimate the following translog cost function with one output (total assets), three input factors (labor, deposits, and capital), and three netputs (fixed assets, loan loss provisions, equity capital) (Schaeck and Čihák 2008).

\[
\ln C_{it} = \alpha_0 + \alpha_1 \ln Y_{it} + \frac{1}{2} \alpha_2 \ln Y_{it}^2 + \sum_{k=1}^{2} \beta_k \ln W_{k,it} + \sum_{h=1}^{2} \mu_h \ln E_{h,it} \\
+ \frac{1}{2} \sum_{k=1}^{2} \sum_{m=1}^{2} \gamma_{km} \ln W_{k,it} \ln W_{m,it} + \sum_{k=1}^{2} \rho_k \ln Y_{it} \ln W_{k,it} + \sum_{h=1}^{2} \epsilon_h \ln Y_{it} \ln E_{h,it} \\
+ \sum_{k=1}^{2} \sum_{h=1}^{2} \lambda_{kh} \ln W_{k,it} \ln E_{h,it} + \frac{1}{2} \sum_{h=1}^{2} \sum_{i=1}^{2} \psi \ln E_{h,it} \ln E_{n,it} + \epsilon_{it},
\]

(2)

where \( C \) denotes total cost, and \( Y \) is total assets. \( W \) is the vector of inputs (labor, funding, and other costs), and \( E \) is the vector of netputs (fixed assets, loan loss provisions, and equity capital).

To obtain marginal cost, we differentiate Eq. (2) with respect to \( Y \) as follows:

\[
mc_{it} = \frac{\partial C_{it}}{\partial Y_{it}} = \left[ \alpha_0 + \alpha_2 \ln Y_{it} + \rho_1 \ln W_{1,it} + \rho_2 \ln W_{2,it} + \epsilon_1 \ln E_{1,it} + \epsilon_2 \ln E_{2,it} \right] \frac{C_{it}}{Y_{it}}.
\]

(3)

To impose standard homogeneity conditions, we scale all profits and input prices by labor costs, and adjust for heteroskedasticity and scale biases by scaling by equity capital. In the case of perfect competition, \( L=0 \); under pure monopoly, \( L = 1 \); for monopolistic competition \( L \) ranges between 0 and 1; and \( L < 0 \), implies pricing below marginal cost and could result, for example, in non-optimizing behavior of banks.

Following the empirical strategy pursued by Claessens and Laeven (2004) and Anzoategui et al (2010), we obtain the H-statistic by estimating the equation

\[
\ln TR_{it} = \alpha_0 + \beta_1 \ln W_{1,it} + \beta_2 \ln W_{2,it} + \beta_3 \ln W_{3,it} + \gamma \ln Z_{it} + \delta D_t + \epsilon_{it},
\]

(4)

where \( TR \) is total revenue over total assets, \( W_k \) is the unit price of input \( k \), \( Z \) is a matrix of controls, \( D \) is a matrix of year dummies, \( \alpha_0 \) denotes bank-level fixed effects, and \( i \) and \( t \) denote bank and time, respectively.

\[
H = \beta_1 + \beta_2 + \beta_3.
\]

(5)

Panzar and Rosse (1987) showed that the H-statistic indicates the nature of market structure under the following assumptions: a) banks are profit maximizing; b) banks produce revenue using labor, capital and intermediated funds as inputs; and c) higher input prices are not associated with higher quality services that generate higher revenue.
Competition and efficiency in EU27 banking systems

For accurate identification of the H-statistic using an estimated revenue equation based on a static equilibrium model, it is necessary to assume that markets are in a long-run equilibrium at each point in time when the data are observed. Accordingly, the equilibrium profit rate should be uncorrelated with factor input prices. To test the market equilibrium assumption we estimated the following equation:

\[
\ln(1 + R_{it}) = \alpha_0 + \beta_1 \ln W_{1,it} + \beta_2 \ln W_{2,lt} + \beta_3 \ln W_{3,lt} + \gamma \ln Z_{it} + \delta D_t + \epsilon_{it},
\]

where \( R_{it} \) is the return on assets of bank \( i \) in year \( t \), and because it can take on negative values, we compute the dependent variable as \( \ln(1 + R_{it}) \).

The log specification is used to improve the regression’s goodness of fit and to reduce possible simultaneity bias (De Bandt and Davis 2000).

The estimated value of the H-statistic ranges between \(-\infty\) and 1. The H-statistic is smaller than 0 if the underlying market is a monopoly; it ranges between 0 and 1 for monopolistic competition; and an H-statistic of unity indicates perfect competition.

3.2. Convergence measures

In order to analyze the convergence of banking-competition levels across the EU member states over the 2001-2009 period, we used the concepts of \( \beta \)-convergence and \( \sigma \)-convergence proposed by Barro and Sala-i-Martin (1991). The seminal papers by Barro and Sala-i-Martin (1992) and Mankiw et al (1992) have triggered a huge amount of literature attempting to empirically detect and measure convergence in various contexts.

While \( \beta \)-convergence focuses on detecting possible catching-up processes, \( \sigma \)-convergence simply refers to a reduction of disparities among regions in time. The two concepts are, of course, closely related. \( \beta \)-convergence is necessary but not sufficient for \( \sigma \)-convergence.

Recently, a number of studies have emerged examining convergence of bank performance (see Fung 2006; Fernandez de Guevara et al 2007; Mamatzakis et al 2008; Evans et al 2008; Weill 2009; Casu and Girardone 2010; Matthews and Zhang 2010).

In the case of European countries, studies check whether financial integration takes place in the EU banking markets and whether, as a result, it improves banking sector performance. The studies also check whether convergence is occurring in the banking sector. Fernandez de Guevara et al (2007) analyze both the evolution of convergence in interest rates and the level of competition and its inequalities among the European banking systems for the period 1993-2001. Using \( \beta \)-convergence and \( \sigma \)-convergence, Weill (2009) investigates convergence in banking efficiency for 10 European countries between 1994 and 2005. By applying dynamic panel-data models to the concepts of \( \beta \)-convergence and \( \sigma \)-convergence, Casu and Girardone (2010) assess the speed at which EU-15 area banking markets integrated between 1997 and 2003. Mamatzakis et al (2008), using \( \beta \)- and \( \sigma \)-convergence, examine convergence in cost and profit efficiency across the banking systems of the ten new European Union member states.
over the period 1998-2003. Evans et al (2008) investigate whether a deregulatory process was associated with increasing similarity, or convergence, of banking industries across the European Union.

To estimate unconditional $\beta$-convergence, we use the following equation:

$$\Delta \ln LERNER_{j,t} = \alpha + \beta \ln LERNER_{j,t-1} + \gamma (\Delta \ln LERNER_{j,t-1}) + \varepsilon_{j,t}$$

$$\Delta LERNER_{j,t} = LERNER_{j,t} - LERNER_{j,t-1},$$  \hspace{1cm} (7)

where $LERNER_{j,t}$ is the mean level of competition, measured using the Lerner Index, in country $j$ in year $t$; $LERNER_{j,t-1}$ is the level of competition in country $j$ in year $t-1$; $j = 1,2,...,27$ and $t = 1,2,...,9$; $\alpha$, $\beta$ and $\gamma$ are the parameters to be estimated; and $\varepsilon_{j,t}$ is the error term. Then, there is $\beta$-convergence if the coefficient $\beta$ is negative: the higher the coefficient in relative terms, the greater the tendency for convergence.

$\sigma$-convergence is investigated through estimation of the following equation:

$$\Delta W_{j,t} = \alpha + \sigma W_{j,t-1} + \gamma (\Delta W_{j,t-1}) + \varepsilon_{j,t}$$

$$W_{j,t} = \ln LERNER_{j,t} - \ln \overline{LERNER}_t,$$

$$\Delta W_{j,t} = W_{j,t} - W_{j,t-1},$$  \hspace{1cm} (8)

where, estimated using the Lerner Index, $\overline{LERNER}_t$ is the mean level of competition of the banking systems from the European Union at time $t$; $\alpha$, $\sigma$ and $\gamma$ are parameters to be estimated; and $\varepsilon_{j,t}$ is the error term. A negative value for $\sigma$ parameter implies convergence of $LERNER_{j,t}$ toward to $\overline{LERNER}_t$.

The empirical models specified in equations (1) – (8) are estimated using the panel least square fixed-effect methodology.

### 3.3. Cost Efficiency measures

In the analysis of the efficiency of the banks in EU member states we used the SFA Method (Stochastic Frontier Analysis). According to the SFA, total cost takes the following specification:

$$TC_{it} = f(P_{it}, Y_{it}) + \nu_{it} + u_{it},$$  \hspace{1cm} (9)

where $TC_{it}$ denotes observed total cost for bank $i$ at year $t$, $P$ is a vector of input prices and $Y$ is a vector of outputs. This approach disentangles the error term into two components. The first, $\nu_{it}$, corresponds to random fluctuations and the second, $u_{it}$, accounts for the firm’s inefficiency.
For the cost-efficiency function, we apply a translog specification. Restrictions regarding the function of the stochastic frontier are more flexible when a functional form of the translog-type production function is applied than when a functional Cobb-Douglas-type form is applied. The translog form does not impose the hypothesis regarding constant elasticity of the production function or of elasticity of substitution between inputs. Another advantage of the translog form is that it allows data to indicate the real value of the curvature of the function rather than impose prior hypotheses regarding its value.

In order to calculate the level of cost efficiency we apply the following equation:

\[ \ln(C_{it}/W_{1, it}) = \alpha + \sum_{n=1}^{3} \beta_n \ln(Y_{n, it}) + \sum_{m=2}^{3} \beta_m \ln(W_{m, it}/W_{1, it}) + v_{it} + u_{it}, \]  

(10)

where: \( C \) is total cost, \( Y \) is outputs, and \( W \) is price of inputs.

The cost-efficiency level is given by the ratio between the minimum cost and the cost registered by the decisional unit and is calculated as:

\[ EFF_{it} = \exp(-u_{it}). \]  

(11)

The SFA method assumes that the inefficiency component of the error term is positive and thus high costs are associated with a high level of inefficiency.

### 3.4. Methodology used to test the relationship and causality between competition and efficiency

In a similar vein to Schaeck and Čihák (2008) and Casu and Girardone (2009) we analyze the link between competition and efficiency in the European banking systems in a Granger-causality manner, formally specified in equation (12) as follows:

\[ EFF_{it} = c + \alpha_1 LERNER_{it-1} + \alpha_2 LERNER_{it-2} + \beta_1 EFF_{it-1} + \beta_2 EFF_{it-2} + \theta_1 + \theta_2 + \varepsilon_{it}, \]

\[ LERNER_{it} = c + \alpha_1 EFF_{it-1} + \alpha_2 EFF_{it-2} + \beta_1 LERNER_{it-1} + \beta_2 LERNER_{it-2} + \theta_1 + \theta_2 + \varepsilon_{it}. \]  

(12)

where \( EFF_{it} \) is the level of cost efficiency for bank \( i \) in year \( t \), \( LERNER_{it} \) represents the measure of the Lerner Index. \( c \) is the intercept, \( \alpha \) and \( \beta \) are parameters to be estimated, \( \theta \) is a common time effect, \( \nu \) is an individual bank specific effect, and \( \varepsilon \) is a disturbance term.

### 3.5. Data

The model is estimated on a panel of 923 commercial banks from the 27 member states of the European Union for the period 2001-2009. In our sample we included only active banks with information available for at least 5 years, and we excluded those banks with missing, negative or zero values for inputs or outputs used in estimation of cost efficiency. In order to estimate non-structural indicators of competition we used the following data set: a) inputs: personnel expenses (PE), fixed assets (FA) and financial capital (sum of total deposits (TD), total money market and short term funding (TMMSTF), and equity (EQ); b) input prices: total personnel expenses over total assets (w1), other operating expenses over fixed assets (w2) and interest expenses over financial capital (w3); c) control microeconomic variables: total capital ratio
(TCR), equity to total assets ratio (EQ_TA), credit risk measured as the ratio of loan-loss provisions to total loans (CRISK), liquidity risk measured as the ratio of liquid assets to total deposits and short term funds (LA_DSTF); and d) control macroeconomic variables: GDP growth rate – growth in real GDP in per cent, inflation rate – change in annual average retail/consumer price level in per cent (IR), and level of financial intermediation – domestic credit provided by banking sector percentage of GDP (FINT).

Table 1 shows the country averages of the variables used for estimating competition and efficiency measures.

### Table 1 Means of variables used

<table>
<thead>
<tr>
<th>Country</th>
<th>No of banks</th>
<th>Total assets</th>
<th>Total cost</th>
<th>Total income</th>
<th>Cost of Labor</th>
<th>Cost of Physical Capital</th>
<th>Cost of Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>62</td>
<td>5508.614</td>
<td>270.059</td>
<td>142.783</td>
<td>0.023</td>
<td>5.592</td>
<td>0.059</td>
</tr>
<tr>
<td>Belgium</td>
<td>24</td>
<td>40507.970</td>
<td>3087.668</td>
<td>641.338</td>
<td>0.011</td>
<td>3.704</td>
<td>0.039</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>14</td>
<td>686.455</td>
<td>39.906</td>
<td>38.736</td>
<td>0.013</td>
<td>1.171</td>
<td>0.047</td>
</tr>
<tr>
<td>Cyprus</td>
<td>7</td>
<td>8168.755</td>
<td>396.392</td>
<td>275.995</td>
<td>0.016</td>
<td>0.756</td>
<td>0.053</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>14</td>
<td>6464.830</td>
<td>272.503</td>
<td>273.291</td>
<td>0.008</td>
<td>2.415</td>
<td>0.064</td>
</tr>
<tr>
<td>Denmark</td>
<td>44</td>
<td>14935.950</td>
<td>539.051</td>
<td>232.880</td>
<td>0.018</td>
<td>5.915</td>
<td>0.058</td>
</tr>
<tr>
<td>Estonia</td>
<td>4</td>
<td>967.617</td>
<td>41.835</td>
<td>34.751</td>
<td>0.020</td>
<td>1.613</td>
<td>0.030</td>
</tr>
<tr>
<td>Finland</td>
<td>6</td>
<td>36758.010</td>
<td>1203.630</td>
<td>685.663</td>
<td>0.013</td>
<td>3.694</td>
<td>0.048</td>
</tr>
<tr>
<td>France</td>
<td>113</td>
<td>40090.510</td>
<td>1526.593</td>
<td>717.482</td>
<td>0.018</td>
<td>8.906</td>
<td>0.026</td>
</tr>
<tr>
<td>Germany</td>
<td>157</td>
<td>12143.040</td>
<td>517.082</td>
<td>238.017</td>
<td>0.028</td>
<td>10.501</td>
<td>0.054</td>
</tr>
<tr>
<td>Greece</td>
<td>15</td>
<td>20747.040</td>
<td>1138.161</td>
<td>808.022</td>
<td>0.014</td>
<td>1.127</td>
<td>0.033</td>
</tr>
<tr>
<td>Hungary</td>
<td>14</td>
<td>5020.972</td>
<td>398.592</td>
<td>315.449</td>
<td>0.017</td>
<td>4.198</td>
<td>0.056</td>
</tr>
<tr>
<td>Ireland</td>
<td>20</td>
<td>40562.640</td>
<td>1437.369</td>
<td>558.336</td>
<td>0.002</td>
<td>14.046</td>
<td>0.051</td>
</tr>
<tr>
<td>Italy</td>
<td>88</td>
<td>25228.910</td>
<td>1002.469</td>
<td>724.985</td>
<td>0.014</td>
<td>6.439</td>
<td>0.035</td>
</tr>
<tr>
<td>Latvia</td>
<td>18</td>
<td>1082.915</td>
<td>54.042</td>
<td>46.606</td>
<td>0.014</td>
<td>1.811</td>
<td>0.025</td>
</tr>
<tr>
<td>Lithuania</td>
<td>9</td>
<td>1709.636</td>
<td>76.537</td>
<td>60.317</td>
<td>0.015</td>
<td>1.361</td>
<td>0.028</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>52</td>
<td>7521.229</td>
<td>377.874</td>
<td>110.532</td>
<td>0.007</td>
<td>5.964</td>
<td>0.054</td>
</tr>
<tr>
<td>Malta</td>
<td>8</td>
<td>2203.565</td>
<td>80.837</td>
<td>58.109</td>
<td>0.007</td>
<td>3.953</td>
<td>0.031</td>
</tr>
<tr>
<td>Netherlands</td>
<td>22</td>
<td>81754.950</td>
<td>3253.605</td>
<td>1251.428</td>
<td>0.008</td>
<td>5.916</td>
<td>0.061</td>
</tr>
<tr>
<td>Poland</td>
<td>26</td>
<td>4429.315</td>
<td>262.759</td>
<td>227.427</td>
<td>0.014</td>
<td>5.187</td>
<td>0.044</td>
</tr>
<tr>
<td>Portugal</td>
<td>16</td>
<td>11907.830</td>
<td>650.445</td>
<td>354.636</td>
<td>0.010</td>
<td>3.051</td>
<td>0.061</td>
</tr>
<tr>
<td>Romania</td>
<td>17</td>
<td>1776.378</td>
<td>148.381</td>
<td>118.250</td>
<td>0.027</td>
<td>1.219</td>
<td>0.057</td>
</tr>
<tr>
<td>Slovakia</td>
<td>11</td>
<td>3364.041</td>
<td>163.722</td>
<td>142.008</td>
<td>0.011</td>
<td>1.661</td>
<td>0.031</td>
</tr>
<tr>
<td>Slovenia</td>
<td>15</td>
<td>2560.603</td>
<td>132.974</td>
<td>98.026</td>
<td>0.011</td>
<td>1.163</td>
<td>0.040</td>
</tr>
<tr>
<td>Spain</td>
<td>27</td>
<td>86225.470</td>
<td>3232.884</td>
<td>2631.003</td>
<td>0.010</td>
<td>2.449</td>
<td>0.032</td>
</tr>
<tr>
<td>Sweden</td>
<td>16</td>
<td>17815.200</td>
<td>619.540</td>
<td>321.277</td>
<td>0.013</td>
<td>10.510</td>
<td>0.026</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>104</td>
<td>55101.910</td>
<td>1759.921</td>
<td>1163.685</td>
<td>0.019</td>
<td>18.382</td>
<td>0.046</td>
</tr>
<tr>
<td>All</td>
<td>923</td>
<td>23751.540</td>
<td>927.075</td>
<td>503.315</td>
<td>0.018</td>
<td>7.689</td>
<td>0.047</td>
</tr>
</tbody>
</table>

All bank-level data used are obtained from the BankScope database and are reported in millions of euro while data regarding banking system characteristics and macroeconomic variables have been taken from the EBRD, the World Bank and ECB reports.
In order to estimate cost-efficiency scores, bank inputs and outputs are defined according to the value-added approach: a) Outputs: loans (Q1), other earning assets (Q2) and demand deposits (Q3); b) Inputs: personnel expenses (PE), fixed assets (FA) and financial capital (FC); c) Input prices: Cost of Labor (W1), calculated by dividing Personnel Expenses by Total Assets, and Cost of Physical Capital (W2), calculated by dividing other operating expenses by fixed assets; and d) Cost of Funds (W3), calculated as the ratio of interest expenses over financial capital.

4. Empirical results

4.1. Competition results

The Lerner Index – the mark-up of price over marginal cost – is used as an indicator of banking competition and varies considerably across European countries. Table 2 shows the means of the Lerner Index – the mark-up of price over marginal cost – across new European Union members and old European Union members over 2001-2009, as well as for the whole EU. Significant cross-country differences exist in these competition measures.

<table>
<thead>
<tr>
<th>Period</th>
<th>EU members</th>
<th>Old EU members</th>
<th>New EU members</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0.8101</td>
<td>0.7797</td>
<td>0.8445</td>
</tr>
<tr>
<td>2002</td>
<td>0.6921</td>
<td>0.7074</td>
<td>0.7423</td>
</tr>
<tr>
<td>2003</td>
<td>0.6967</td>
<td>0.7332</td>
<td>0.6208</td>
</tr>
<tr>
<td>2004</td>
<td>0.7288</td>
<td>0.7692</td>
<td>0.5093</td>
</tr>
<tr>
<td>2005</td>
<td>0.7121</td>
<td>0.7504</td>
<td>0.5581</td>
</tr>
<tr>
<td>2006</td>
<td>0.7699</td>
<td>0.8196</td>
<td>0.4893</td>
</tr>
<tr>
<td>2007</td>
<td>0.7750</td>
<td>0.8315</td>
<td>0.5181</td>
</tr>
<tr>
<td>2008</td>
<td>0.6729</td>
<td>0.7134</td>
<td>0.4862</td>
</tr>
<tr>
<td>2009</td>
<td>0.7252</td>
<td>0.7376</td>
<td>0.6619</td>
</tr>
<tr>
<td>Average</td>
<td>0.7314</td>
<td>0.7602</td>
<td>0.6034</td>
</tr>
</tbody>
</table>

Based on the Lerner Index, we observe a significant increase of competition in new EU members between 2001 and 2006, while in old EU members we see a marked decrease of competition between 2005 and 2007. Old EU members have a higher value of the Lerner Index (0.7602) than new EU members (0.6034). Taking into account the initial level of the Lerner Index in 2001 for all EU member states during the period analyzed, we observed a general reduction of market power across European banking systems, which means an improvement in competition.
Table 3 Mean values of Lerner Index for European countries over 2001-2009

<table>
<thead>
<tr>
<th>Country</th>
<th>Lerner Index</th>
<th>Country</th>
<th>Lerner Index</th>
<th>Country</th>
<th>Lerner Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>0.8373</td>
<td>Germany</td>
<td>0.9233</td>
<td>Netherlands</td>
<td>0.5751</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.6496</td>
<td>Greece</td>
<td>0.8906</td>
<td>Poland</td>
<td>0.6470</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.6000</td>
<td>Hungary</td>
<td>0.8571</td>
<td>Portugal</td>
<td>0.4255</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.9640</td>
<td>Ireland</td>
<td>0.1575</td>
<td>Romania</td>
<td>0.4793</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.4707</td>
<td>Italy</td>
<td>0.6578</td>
<td>Slovak Republic</td>
<td>0.4994</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.7858</td>
<td>Latvia</td>
<td>0.6991</td>
<td>Slovenia</td>
<td>0.4485</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.7585</td>
<td>Lithuania</td>
<td>0.3624</td>
<td>Spain</td>
<td>0.8367</td>
</tr>
<tr>
<td>Finland</td>
<td>0.8265</td>
<td>Luxembourg</td>
<td>0.6419</td>
<td>Sweden</td>
<td>0.6132</td>
</tr>
<tr>
<td>France</td>
<td>0.7154</td>
<td>Malta</td>
<td>0.7081</td>
<td>United Kingdom</td>
<td>0.8358</td>
</tr>
</tbody>
</table>

The results presented in Table 3 show the existence of important inequalities in the level of competition or market power among the banking sectors of the European Union. Cyprus (0.9640) and Germany (0.9233) have the highest values of market power, while Ireland (0.1575) and Lithuania (0.3624) have the lowest values, which suggest a monopolistic competition structure in most cases. These results can be explained by the increase of competition between 2001 and 2006, due to introduction of the euro and the process of EU accession of the present new member states (there were two accession waves: in 2004 and 2007).

Table 4 Mean values of H-statistics for European Union members over 2001-2009

<table>
<thead>
<tr>
<th>Period</th>
<th>Old EU members</th>
<th>New EU members</th>
<th>EU members</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0.5393</td>
<td>0.9968</td>
<td>0.6634</td>
</tr>
<tr>
<td>2002</td>
<td>0.5833</td>
<td>0.8433</td>
<td>0.5969</td>
</tr>
<tr>
<td>2003</td>
<td>0.6853</td>
<td>0.8754</td>
<td>0.7042</td>
</tr>
<tr>
<td>2004</td>
<td>0.9080</td>
<td>0.7492</td>
<td>0.8869</td>
</tr>
<tr>
<td>2005</td>
<td>0.6403</td>
<td>0.7293</td>
<td>0.6812</td>
</tr>
<tr>
<td>2006</td>
<td>0.7437</td>
<td>0.6246</td>
<td>0.7231</td>
</tr>
<tr>
<td>2007</td>
<td>0.5174</td>
<td>0.9063</td>
<td>0.6049</td>
</tr>
<tr>
<td>2008</td>
<td>0.5840</td>
<td>0.7122</td>
<td>0.6233</td>
</tr>
<tr>
<td>2009</td>
<td>0.6654</td>
<td>0.7573</td>
<td>0.6879</td>
</tr>
<tr>
<td>Average</td>
<td>0.6519</td>
<td>0.7994</td>
<td>0.6858</td>
</tr>
</tbody>
</table>

As we can see in Table 4, for new EU members the mean level of H-statistics (0.7994) is higher than for old EU members (0.6519) in the period 2001-2009. But perhaps the trend of competition at the level of these two groups of countries is more important: During the period analyzed we observed a significant decrease of competition in new EU members and an increase of competition in old EU members. The higher scores of H-statistics of new EU members in the first part of the period assessed (2001 - 2003) could be explained by reforms of the transition process of these banking systems from a centralized economy to a market-based economy, as well as by the process of EU accession. These reforms (2001-2003) implied higher changes in banking revenues due to changes in banking costs than after 2004. As a whole, the H-statistics for EU27 members do not have a coherent trend. Similar
to the findings of previous studies (see, e.g., Delis 2010), the H-statistic varies widely between countries, with Greece presenting the lowest score (0.1538) and Hungary the highest (0.9345). These values indicate, similar to the Lerner Index, a monopolistic competition in most of the countries.

4.2. Evaluating convergence of competition

In this section we provide information relating to convergence of competition scores (values of the Lerner Index) across the 27 countries that were member states of the European Union over the 2001-2009 period. In our analysis, we use two major indicators of convergence, namely σ- and β-convergence. The results provide evidence of β-convergence in terms of banking competition among the member states of the European Union, as the β-coefficient is negative and significant. That means the countries with the lowest level of competition in 2001 had experienced a higher increase of competition than countries with the highest level of competition during the period 2001-2009.

Table 5 Convergence of competition levels across European countries

<table>
<thead>
<tr>
<th>β-convergence</th>
<th>σ-convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>α</td>
<td>α</td>
</tr>
<tr>
<td>-0.0068</td>
<td>-0.0116</td>
</tr>
<tr>
<td>(0.0068)</td>
<td>(0.0068)</td>
</tr>
<tr>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td>-0.7890***</td>
<td>-0.8140***</td>
</tr>
<tr>
<td>(0.0278)</td>
<td>(0.0282)</td>
</tr>
<tr>
<td>γ</td>
<td>γ</td>
</tr>
<tr>
<td>0.1892***</td>
<td>0.1762***</td>
</tr>
<tr>
<td>(0.0221)</td>
<td>(0.0222)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are presented in parentheses.
*, **, *** indicates significance levels at 10%, 5% and 1%

A similar result is obtained in the case of σ-convergence, meaning that dispersion of mean competition scores between member states of the European Union was reduced during the 2001-2009 period. σ-convergence indicates how rapidly each country’s competition levels are converting to the sample mean.

The results of convergence tests for both groups, old EU members and new EU members, presented in Table 6, validate and reinforce our main conclusion concerning β-convergence and σ-convergence in banking competition across member states of the European Union, and show that β-convergence and σ-convergence was higher in new EU members from Central and Eastern Europe.
### Table 6: Tests of convergence of competition level across Old and New EU members

<table>
<thead>
<tr>
<th></th>
<th>Old EU members</th>
<th>New EU members</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )-convergence</td>
<td>( \beta )-convergence</td>
</tr>
<tr>
<td>( \alpha )</td>
<td>-0.0091***</td>
<td>-0.0004</td>
</tr>
<tr>
<td></td>
<td>(0.0080)</td>
<td>(0.0116)</td>
</tr>
<tr>
<td>( \beta )</td>
<td>-0.7651***</td>
<td>-0.9298***</td>
</tr>
<tr>
<td></td>
<td>(0.0316)</td>
<td>(0.0572)</td>
</tr>
<tr>
<td>( \gamma )</td>
<td>0.1874***</td>
<td>0.1887***</td>
</tr>
<tr>
<td></td>
<td>(0.0249)</td>
<td>(0.0482)</td>
</tr>
<tr>
<td>( \sigma )-convergence</td>
<td>0.0144*</td>
<td>0.0036***</td>
</tr>
<tr>
<td></td>
<td>(0.0080)</td>
<td>(0.0117)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are presented in parentheses. 
*, **, *** indicates significance levels at 10%, 5% and 1%

### Table 7: Granger-causality tests

**i) Dependent Variable: LERNER INDEX**

<table>
<thead>
<tr>
<th>Model</th>
<th>1-EU</th>
<th>2 – Old members</th>
<th>3 – New members</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.2278***</td>
<td>1.3009***</td>
<td>1.1940***</td>
</tr>
<tr>
<td></td>
<td>(0.1919)</td>
<td>(0.2171)</td>
<td>(0.4078)</td>
</tr>
<tr>
<td>LERNER(-1)</td>
<td>-0.0306</td>
<td>-0.1098***</td>
<td>0.0029</td>
</tr>
<tr>
<td></td>
<td>(0.0211)</td>
<td>(0.0313)</td>
<td>(0.0258)</td>
</tr>
<tr>
<td>LERNER(-2)</td>
<td>0.0613***</td>
<td>0.0910***</td>
<td>0.0253</td>
</tr>
<tr>
<td></td>
<td>(0.0173)</td>
<td>(0.0215)</td>
<td>(0.0250)</td>
</tr>
<tr>
<td>EFF(-1)</td>
<td>-0.5942***</td>
<td>-0.5469**</td>
<td>-0.7644**</td>
</tr>
<tr>
<td></td>
<td>(0.1742)</td>
<td>(0.1964)</td>
<td>(0.3942)</td>
</tr>
<tr>
<td>EFF(-2)</td>
<td>0.2473*</td>
<td>0.1725*</td>
<td>0.4446*</td>
</tr>
<tr>
<td></td>
<td>(0.1856)</td>
<td>(0.2102)</td>
<td>(0.4232)</td>
</tr>
<tr>
<td>SEFF</td>
<td>-0.3469</td>
<td>-0.3744</td>
<td>-0.3198</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6830</td>
<td>0.7003</td>
<td>0.5452</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.5575</td>
<td>0.5778</td>
<td>0.3663</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.6319</td>
<td>0.6768</td>
<td>0.4284</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>561.8443</td>
<td>492.0094</td>
<td>59.2911</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-1558.102</td>
<td>-1297.395</td>
<td>-182.4003</td>
</tr>
<tr>
<td>F-statistic</td>
<td>5.4435</td>
<td>5.7176</td>
<td>3.0488</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Method: Panel Least Squares
### ii) Dependent Variable: COST EFFICIENCY LEVEL

<table>
<thead>
<tr>
<th>Model</th>
<th>1 - EU</th>
<th>2 - Old members</th>
<th>3 - New members</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.8343***</td>
<td>0.8372***</td>
<td>0.7341***</td>
</tr>
<tr>
<td>(0.0283)</td>
<td>(0.0323)</td>
<td>(0.0559)</td>
<td></td>
</tr>
<tr>
<td>-0.0156</td>
<td>-0.0404</td>
<td>0.272170***</td>
<td></td>
</tr>
<tr>
<td>EFF(-1)</td>
<td>(0.0257)</td>
<td>(0.0292)</td>
<td>(0.0562)</td>
</tr>
<tr>
<td>-0.1591***</td>
<td>-0.1555***</td>
<td>-0.2614***</td>
<td></td>
</tr>
<tr>
<td>EFF(-2)</td>
<td>(0.0272)</td>
<td>(0.0312)</td>
<td>(0.0570)</td>
</tr>
<tr>
<td>0.0056*</td>
<td>0.0101**</td>
<td>-0.0014</td>
<td></td>
</tr>
<tr>
<td>LERNER(-1)</td>
<td>(0.0029)</td>
<td>(0.0041)</td>
<td>(0.0033)</td>
</tr>
<tr>
<td>0.0031</td>
<td>0.0033</td>
<td>-0.0013</td>
<td></td>
</tr>
<tr>
<td>LERNER(-2)</td>
<td>(0.0024)</td>
<td>(0.0032)</td>
<td>(0.0032)</td>
</tr>
<tr>
<td>0.087</td>
<td>0.0134</td>
<td>-0.0027</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.5660</td>
<td>0.0134</td>
<td>0.7152</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3948</td>
<td>0.3554</td>
<td>0.6106</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.0988</td>
<td>0.1071</td>
<td>0.0619</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>15.0527</td>
<td>13.5088</td>
<td>1.3585</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>2283.07</td>
<td>1645.317</td>
<td>737.1681</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.3059</td>
<td>2.8846</td>
<td>6.8384</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Method: Panel Least Squares

Note: Standard deviations are presented in parentheses.

*, **, *** indicates significance levels at 10%, 5% and 1%

Table 7 reports the results of Granger-causality tests. In the first set of estimations, competition, measured as the Lerner Index, is estimated as a function of lagged competition and lagged cost efficiency. The results show that efficiency negatively Granger-causes the Lerner Index – hence, efficiency positively Granger-causes competition – in all three models. Causality is stronger in the case of new member states where, in the equation explaining the Lerner Index, lags of efficiency are jointly different from zero and sum up to -0.31, significant at 5%. In these conditions, the evidence for all groups of countries rejects the efficient structure hypothesis.

The results from the second set of estimations show that the Lerner Index does not Granger-cause efficiency in all three models, lags of the Lerner Index are not jointly different from zero and their sum is not significant at 10%. Thus, we can conclude that the results of reverse causality running from competition to efficiency provide little or no evidence that increases/decreases in market power precede decreases/increases in efficiency. Taking into account this evidence, we can neither reject nor support the ‘quiet life’ hypothesis.

### 5. Conclusions

In our study, we investigate competition in banking systems in the EU27 as a whole, but also in both old EU member states and new EU member states, in the context of European Union
integration and enlargement. After that, we test for convergence on non-structural measures of bank competition. We also assess the relationship between competition and efficiency in EU banking systems using Granger-type causality tests in a comparative manner, old EU members versus new EU members.

Our results show that competition in the EU27 had higher scores in 2009 in comparison with 2001 but it does not have a coherent trend. The increase of competition in new members’ banking systems could be explained by deregulation and entry of foreign banks through acquisitions or “greenfield” investments. On the other hand, the decrease of competition in old member states between 2005-2007 could be explained by a decrease of interest in the internal market (much more mature) of European multinational banks and their orientations to markets from Central and Eastern European markets, with many more possibilities to increase their profits.

Further proof of this that can be observed in the fact that in 2009 competition decreased in new member markets and, after 2008, it increased in the old member market. This could be explained by the effects of the international financial crisis that made banks from old member states reduce their exposure to new member markets. This evidence makes us draw the conclusion that competition in the EU is due to internationalization of European banks, while deregulation is not sufficient to increase competition. Thus, we could consider that competition in new-member markets is dependent on interest by parental undertakings in these markets. Both non-structural indicators, the Lerner Index and the H-statistic, demonstrate that most countries have monopolistic competition and higher competition in new member states than in old member states.

The results of convergence tests provide evidence of β-convergence and σ-convergence in terms of banking competition among the member states of the European Union and show that convergence was higher in new EU members from Central and Eastern Europe. By investigating the relationship between competition and efficiency in EU banking systems using Granger-type causality tests, we rejected the efficient structure hypothesis, but our findings provide little or no evidence to support or reject the ‘quiet life’ hypothesis.

From a policy perspective, our findings suggest that country-specific factors, the low market share of local banks and the decreasing interest of foreign banks (from old members or outside the EU) in maintaining their exposure could be the reason for decreasing competition in new member markets. This means that deregulation is not sufficient for continuously increasing competition and EU27 banking-market forces do not behave as a “single European market”, even if there is progress. Taking into account the results of investigating the relationship between competition and efficiency in EU banking systems, we can also conclude that an increase in efficiency of banks fosters competition – causality is stronger in the case of new member states, but no evidence supports reverse causality. Under these conditions, policymakers should not count on fostering competition in order to improve banks’ efficiency, but their measures should create an environment for improving efficiency of banks in order to increase competition and to take advantage of this phenomenon.
References


Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009

Laivi Laidroo¹, Zana Grigaliuniene²

Abstract

This paper investigates asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009. The results show weak evidence that the reaction to negative earnings news is lower than to positive news. Earnings response coefficients tend to be the largest in recession and lowest in expansion, but in most cases the differences between them are not big enough to be statistically significant. The results indicate some support for overreaction to bad news in expansion and underreaction to good news in recession. However, due to limitations of this paper arising from the naïve earnings expectations models used and differences in results reported using different state of the economy measures, more powerful tests on more developed markets with better data availability are needed to verify reported tendencies.

JEL classification codes: G1
Key words: market reaction, asymmetry, market sentiment, the state of the economy

Acknowledgements

The authors are grateful for the financial support provided by the Estonian Ministry of Education and Research to projects SF0140059s12 “Economic Fluctuations in Central and Eastern Europe: Causes, Consequences and Challenges” and B617A “Economic Cycles in Central and Eastern European Transition Economies”. This paper represents work conducted in connection with these two projects. The authors are also grateful for the comments received from associate professors Dmitrij Celov, Nerijus Maciulis and participants of financial markets sessions at the 3rd International Conference “Economies of Central and Eastern Europe: Convergence Opportunities and Challenges”.

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1. Introduction

According to Fama (1970), on an efficient capital market security prices should fully reflect all available information. Therefore, since the 1970s an overwhelming amount of studies in finance and accounting literature have been testing the information content of news and capital market efficiency by focusing on market reactions to different company news announcements including dividends, stock splits, strategic alliances, bankruptcy, lay-offs, mergers, de-listings, and the like. Still, the most popular types of news investigated have been quarterly, semi-annual or annual earnings because, as supported by investor surveys, earnings are considered to be more valuable to investors than other types of news announcements (Pike et al., 1993; Vergoossen, 1993). A review study by Dumontier and Raffournier (2002) based on European evidence also supports significant stock price changes and volume increases surrounding financial disclosure dates. Considering their greater importance, the objective of this paper is to investigate asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges (TSE, RSE and VSE) during 2000-2009.

The reason why these markets are of interest relates to the fact that although investor reactions to earnings announcements have received considerable attention in empirical studies focusing on the US capital market (for example Cready and Mynatt, 1991; Cready and Hurtt, 2002; Henry, 2008; Kama, 2009), significantly less attention has been paid to European markets (for a review see Dumontier and Raffournier, 2002). To the knowledge of the authors, in the context of emerging Central and Eastern European markets only three papers have so far focused on market reactions to earnings announcements. Korczak and Tavakkol (2004) investigated the relation between institutional ownership and the information content of earnings surprises on the Polish stock market during 1999-2002. Kiete and Uloza (2005) focused on market reactions to earnings announcements on the Riga and Vilnius Stock Exchanges during 2001-2004. Laidroo (2008) concentrated on the economic significance of market reactions to different news items including earnings announcements on the Tallinn, Riga and Vilnius Stock Exchanges during 2001-2005. The periods covered in these studies were short and none of them focused on asymmetries in reactions. Considering that these three countries have gone through a significant economic downturn during recent years, these markets provide a good testing ground for capturing the impact of the whole business cycle on reactions to earnings news during the period 2000-2009.

Empirical research in finance supports the existence of under- and overreaction phenomena (Bernard and Thomas, 1989; Lakonishok et al., 1994). Previous empirical research focusing on asymmetries in reactions to company news can be roughly divided into three strands: asymmetry in reactions related to the tone of the news (Skinner, 1994; Skinner and Sloan, 2002; Alwathainani, 2010), asymmetry in reactions related to the state of the economy (Johnson, 1999) and asymmetry in reactions considering both the tone of the news and the state of the economy (Conrad et al., 2002; Docking and Koch, 2005; Livnat and Petrovits, 2009). Considering that previous research has generally focused only on one aspect of reaction asymmetry, this paper extends the literature by focusing on several aspects of reaction asymmetry simultaneously. Based on theoretical predictions provided in Tversky and Kahneman
Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009

(1974), Diamond (1982), Barberis et al. (1998) and Veronesi (1999) four hypotheses are tested in this paper. First, investors’ reaction to bad earnings news is expected to be greater than to good earnings news. Second, investors’ reaction to earnings news is expected to be greater during economic expansion (here also referred to as high state) than during economic recession (here also referred to as low state). Third, investors are expected to overreact to bad earnings announcements during economic expansion. Fourth, investors are expected to underreact to good earnings announcements during economic recession.

The results show weak evidence that the reaction to negative earnings news is lower than to positive news. Earnings response coefficients tend to be largest in recession and lowest in expansion, but in most cases the differences between them are not big enough to be statistically significant and in a few cases where different state of the economy measures do give significant results, these contradict each other i.e. results remain inconclusive. When the tone of the news and the state of the economy are considered simultaneously, the results remain dependent on the state of economy measure used. With the industrial production index the results indicate no statistically significant differences in reactions to bad news in different states of the economy and in the case of good news weak evidence exists to reject underreaction to good news in recession. However, when the unemployment rate or alternative industrial production index measure is used, there is support for overreaction to bad news in expansion and underreaction to good news in recession. Considering the limitations of this paper arising from the naïve earnings expectations models used and differences in results reported using different state of the economy measures, more powerful tests on more developed markets with better data availability are needed to verify the results.

This paper is divided as follows. The theoretical and empirical background is presented in section two. The third section introduces the sample and variables. The analysis and results are presented in section four. Finally, section five concludes.

2. Theoretical and empirical background

Previous research investigating asymmetries in reactions to news can be roughly divided into three strands. The first line of research focuses on the impact of the tone of the news. The theoretical basis for it originates from psychology literature which indicates that negative information should have a much greater impact on people’s judgement than positive information. This asymmetry occurs due to the cognitive weighting process in which attention-grabbing information is given greater weight than alternatives (Tversky and Kahneman, 1974). Therefore, the first hypothesis to be tested in this paper is:

H1: Investors’ reaction to bad earnings news is greater than to good earnings news.

Previous empirical studies on reaction asymmetry to the tone of the news generally support this expectation. Skinner (1994) finds that negative earnings news generate larger stock price reactions than good news. Skinner and Sloan (2002) show that for growth stocks the average realized negative return to negative earnings surprises is significantly larger in magnitude than the average realized positive return to positive earnings surprises. Conrad et al.

(2002) find weak asymmetry in reactions to good and bad news with bad news presenting
greater earnings response coefficients. Alwathainani (2010) shows that investors’ overreaction
to consistency of firms’ historical financial performance measures is more pronounced
and persistent for consistent poor performers relative to good performers. In the context of
macroeconomic news H1 has been supported in Adams et al. (2004) and Hautsch and Hess

The second line of research pays more attention to the state of the economy or market or
investor sentiment. In this paper sentiment is defined as a judgment error at the level of the
market which is significantly influenced by the phase of the business cycle. If this definition
is used, all three terms refer to the same influence as the state of the economy affects
investor sentiment which in turn affects the state of the market and the influences of all three
will eventually be reflected in reactions to news. Diamond’s (1982) model exhibits multiple
steady-state equilibria and local inefficiency of all non-corner solution equilibria. The source
of local inefficiency is a trading externality, while the source of multiple equilibria is the posi-
tive feedback working through this externality. This means that an increase in the number of
potential trading partners makes trade easier, which in turn increases the profitability of pro-
duction. This refers to the possibility that thick-market efficiencies encourage concentration
of firms’ investment activity during certain periods. As profitable investment possibilities are
reflected in earnings and these opportunities are easier to capitalize during expansions, earn-
ings should remain more persistent during expansions. This in turn indicates that responses to
earnings news should be greater, so the second hypothesis is stated as:
H2: Investors’ reaction to earnings news is greater during economic expansion than during
economic recession.

A previous empirical study by Johnson (1999) showed that earnings response coefficients
were larger in expansions than in recessions. In the context of macroeconomic news the state
dependence of reactions has been supported in McQueen and Roley (1993), Pearce and So-
and Andersen et al. (2007).

The third line of research focuses on the combined impact of the tone of the news and the
state of the economy. The behavioural model of Barberis et al. (1998) attempts to explain
over- and underreaction through formation of investors’ expectations taking into account two
psychological phenomena: representativeness and conservatism. This model assumes that
the earnings of the asset follow a random walk while the investor is unaware of that fact. The
investor believes that the behaviour of a given firm’s earnings moves between two states or
regimes described by a Markov process. In the first state, earnings are mean-reverting. In the
second state, they trend, i.e., are likely to rise further after an increase. The regime switch
is determined by the state of the economy so that the state of the world today is assumed to
depend only on the state of the world in the previous period. Each period, the investor ob-
serves earnings and uses this information to update his Bayesian beliefs about which state he
is in. Specifically, when a positive earnings surprise is followed by another positive surprise,
the investor raises the likelihood that he is in a trending regime, whereas when a positive
surprise is followed by a negative surprise, the investor raises the likelihood that he is in a mean-reverting regime. Considering investor optimism observed during expansions (Hahn and Reyes, 2004), in the context of the model developed by Barberis et al. (1998) this refers to the possibility that the business cycle impacts investors’ evaluation of transition probabilities of the state of the economy, which in turn affects transition probabilities between mean reverting and trending regimes. This means that during an economic downturn the investor is more likely to be in a mean-reverting regime and during an economic upswing in a trending regime i.e. during an economic downturn the investor is likely to underreact to good news and during an economic upswing to overreact to negative news. A similar idea has been investigated in the dynamic rational expectations equilibrium model developed in Veronesi (1999). This assumes that stock dividends are generated by realizations of a Gaussian diffusion process whose drift rate shifts between a high (expansion) and a low (recession) state at random times. Investors can infer the drift rate of the dividend process only from observation of past dividends. The past dividend influences investor uncertainty on the current state and investor willingness to “hedge” against changes in their level of uncertainty (discount new information at a higher rate) makes them overreact to bad news in good times and underreact to good news in bad times. This also indicates that volatility should be higher during recessions and lower during expansions. Although the model of Veronesi (1999) focuses on volatility impact, it also postulates a positive relationship between volatility and excess returns i.e. the model could be extended in the context of returns. Based on the expectations arising from the models of Barberis et al. (1998) and Veronesi (1999) this paper tests the following two hypotheses:

H3: Investors overreact to bad earnings announcements during economic expansion.
H4: Investors underreact to good earnings announcements during economic recession.

The combined impact of the tone of news and the state of the market has been investigated in several empirical papers. Conrad et al. (2002) find that the stock price response to negative earnings surprises increases as the market level rises and the stock price response to positive earnings surprises decreases as the market level rises (this result is less significant). Docking and Koch (2005) show that announcements to increase dividends tend to elicit greater positive abnormal returns when the market direction is normal or down and volatility is high and announcements to decrease dividends elicit significantly greater negative abnormal returns when market direction has been up and volatility is high i.e. support H3, but contradict H4. Livnat and Petrovits (2009) show that upward (downward) stock price drift following extreme positive (negative) earnings surprises is greater for low (high) investor sentiment periods than for high (low) investor sentiment periods. They also find support for announcement returns for extreme good news firms being significantly higher during periods of low sentiment than during periods of high sentiment (not supported in the context of bad news). In the context of macroeconomic news, Knif et al. (2008) support H3 and H4 while Laakkonen and Lanne (2008) support H3 and reject H4.

---

3 Conrad et al. (2002) define the level of the market as the difference between the current market P/E ratio and the average P/E during the preceding 12 months i.e. sentiment is viewed more on the level of stock not the market or the economy as a whole.
Most of the empirical papers listed above generally focus on one aspect of reaction asymmetry. The only exception is Conrad et al. (2002). However, their paper focuses on stock sentiment not on market sentiment. The main limitation of this narrow approach in previous empirical papers is that some important determinants of reaction asymmetries may be overlooked. Therefore, this paper extends all three lines of research by considering all three aspects simultaneously and by focusing on markets where no such study has been previously conducted.

Table 1. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variables for estimation window (-63; 3)</td>
<td>Abnormal return on event day (see formula 8).</td>
<td>0.0019</td>
<td>-0.0008</td>
<td>0.9832</td>
<td>-0.2170</td>
<td>0.0470</td>
</tr>
<tr>
<td>AR (0)</td>
<td>Abnormal return on event day (see formula 8).</td>
<td>0.0017</td>
<td>-0.0025</td>
<td>2.1326</td>
<td>-0.3778</td>
<td>0.0874</td>
</tr>
<tr>
<td>CAR (0; 1)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (-1;1), or (-2;2) or (-3;3).</td>
<td>0.0005</td>
<td>-0.0053</td>
<td>2.7329</td>
<td>-1.1940</td>
<td>0.1648</td>
</tr>
<tr>
<td>CAR (-1; 1)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0002</td>
<td>-0.0047</td>
<td>6.3362</td>
<td>-0.9186</td>
<td>0.2031</td>
</tr>
<tr>
<td>CAR (-1; 2)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0077</td>
<td>-0.0038</td>
<td>3.7032</td>
<td>-0.7250</td>
<td>0.2075</td>
</tr>
<tr>
<td>CAR (-2; 2)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0006</td>
<td>-0.0042</td>
<td>3.7065</td>
<td>-0.9815</td>
<td>0.2236</td>
</tr>
<tr>
<td>CAR (-3; 3)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0009</td>
<td>-0.0064</td>
<td>6.2134</td>
<td>-1.5452</td>
<td>0.2433</td>
</tr>
<tr>
<td>Dependent variables for estimation window (-103; 3)</td>
<td>Abnormal return on event day (see formula 8).</td>
<td>0.0038</td>
<td>0.0005</td>
<td>0.2337</td>
<td>-0.6328</td>
<td>0.0429</td>
</tr>
<tr>
<td>AR (0)</td>
<td>Abnormal return on event day (see formula 8).</td>
<td>0.0019</td>
<td>0.0000</td>
<td>0.3268</td>
<td>-1.4575</td>
<td>0.0713</td>
</tr>
<tr>
<td>CAR (0; 1)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), or (-2;2).</td>
<td>0.0063</td>
<td>-0.0006</td>
<td>7.3604</td>
<td>-1.2722</td>
<td>0.2289</td>
</tr>
<tr>
<td>CAR (-1; 1)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0028</td>
<td>0.0000</td>
<td>0.3937</td>
<td>-1.9267</td>
<td>0.0883</td>
</tr>
<tr>
<td>CAR (-1; 2)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0080</td>
<td>0.0003</td>
<td>7.3763</td>
<td>-1.7414</td>
<td>0.2345</td>
</tr>
<tr>
<td>CAR (-2; 2)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0019</td>
<td>0.0003</td>
<td>7.3631</td>
<td>-1.7283</td>
<td>0.2354</td>
</tr>
<tr>
<td>CAR (-3; 3)</td>
<td>Cumulative abnormal return (see formula 8) summed over event window (0;1), (0;2), (0;3), (-1;1), (-1;2), or (-2;2).</td>
<td>0.0059</td>
<td>-0.0032</td>
<td>6.4361</td>
<td>-1.9884</td>
<td>0.2187</td>
</tr>
<tr>
<td>Explanatory variables</td>
<td>Scaled unexpected earnings calculated on the basis of the random walk model.</td>
<td>-0.3558</td>
<td>0.0715</td>
<td>43.9744</td>
<td>-95.6955</td>
<td>5.0155</td>
</tr>
<tr>
<td>scUE_rvw</td>
<td>Scaled unexpected earnings calculated on the basis of the seasonal random walk model.</td>
<td>-0.3987</td>
<td>0.0728</td>
<td>39.5546</td>
<td>-54.6683</td>
<td>4.3046</td>
</tr>
<tr>
<td>ln size</td>
<td>Natural log of market capitalization.</td>
<td>7.4527</td>
<td>7.4449</td>
<td>9.0462</td>
<td>5.6979</td>
<td>0.6630</td>
</tr>
<tr>
<td>iVol</td>
<td>Idiosyncratic volatility calculated as in formula 12.</td>
<td>0.0038</td>
<td>0.0004</td>
<td>2.9985</td>
<td>-0.0036</td>
<td>0.0884</td>
</tr>
<tr>
<td>Volat</td>
<td>Standard deviation of stock returns during days (-63; 3).</td>
<td>0.0293</td>
<td>0.0231</td>
<td>1.7316</td>
<td>0.0000</td>
<td>0.0557</td>
</tr>
</tbody>
</table>

Source: Authors.
3. Sample and variables

Due to the limited number of listed companies on TSE, RSE and VSE, all companies that had been listed for the whole period of 2000-2009 were included in the sample. The final sample includes 40 companies: 7 from TSE, 9 from RSE, and 24 from VSE. The reason why pooling of data was chosen relates to the small number of stocks listed on TSE and RSE which would not enable to conduct reliable hypothesis tests on the basis of one market. Besides, the use of data of companies from three markets simultaneously should not bias the results considerably as the historical and economic background of the markets is similar. Although the number of Lithuanian companies in the sample is bigger, the Lithuanian economy is the largest of the three countries. Therefore, the selected sample enables to better capture tendencies in the whole region.

The number of observations varies as for some announcements it was not possible to determine either their date or the size of quarterly earnings. The description of variables used in empirical analysis along with summary statistics is presented in table 1. The following subsections summarize the selection and calculation principles for these measures. All earnings and trading data used here were gathered from the stock exchanges’ web-pages.

3.1. Measures of market reaction

Due to shortage of high frequency data at the beginning of the sample period, this paper employs traditional event study methodology for measuring market reaction to earnings announcements. The most popular measure used in previous event studies focusing on earnings is return (for example Cready and Mynatt 1991; Bamber and Cheon, 1995; Conrad et al., 2002; Korczak and Tavakkol, 2004; Kiete and Uloza, 2005 etc.), but several papers also consider different volume metrics (for example Bamber and Cheon, 1995; Cready and Hurtt, 2002; Korczak and Tavakkol, 2004). Although previous empirical papers (Bamber and Cheon, 1995; Laidroo, 2008) have reported differences in relative magnitude of volume and return reactions, the authors failed to create reasonably well-performing volume expectation measures considering data availability limitations. Therefore, this paper focuses only on price reactions and the return is calculated as follows:

\[
R_{i,n} = \frac{P_{i,n} + D_{i,n} - P_{i,n-1}}{P_{i,n-1}}
\]

(1)

Where

- \( R_{i,n} \) = stock return of firm \( i \) on day \( n \),
- \( P_{i,n} \) = stock price of firm \( i \) on day \( n \),
- \( P_{i,n-1} \) = stock price of firm \( i \) on day \( n-1 \),
- \( D_{i,n} \) = dividend of firm \( i \) on day \( n \).

Expected returns are usually determined by statistical methods (constant mean return or market model) as the economic models based on CAPM (capital asset pricing model) are based on assumptions that may not hold in reality and models based on APT (arbitrage pricing
theory) add relatively little explanatory power compared to the market model (for discussion see MacKinlay, 1997). In this paper expected returns were initially calculated for each stock using the constant mean return model (expected return set equal to preceding average return), the market adjusted return model (excess return defined as security return minus market return) and the market model using different estimation windows. As the market model was the best performing of the three, the final calculations are carried out only with that and by employing estimation windows of (-103;-3) and (-63;-3). The estimation windows were selected by considering the usual practice in previous empirical research. If windows are too long, the sample size may be reduced and prices are more influenced by previous earnings announcements. However, when the event windows are too short, the beta estimates become less accurate. As (-63;-3) estimates do not include the impact of previous earnings announcements, most results are presented for that event window. Still, (-103;-3) estimates were calculated to test the robustness of the results.

The market model used in this paper includes the Scholes-Williams correction (Scholes and Williams, 1977) to reduce bias introduced into the ordinary market model by infrequent trading. This approach is based on using three regression models for calculating beta.

$$R_{i,n} = \alpha_{1i} + \beta_{1i}R_{m,n} + \epsilon_{1,n}$$  \hspace{1cm} (2)

$$R_{i,n} = \alpha_{2i} + \beta_{2i}R_{m,n-1} + \epsilon_{2,n}$$  \hspace{1cm} (3)

$$R_{i,n} = \alpha_{3i} + \beta_{3i}R_{m,n+1} + \epsilon_{3,n}$$  \hspace{1cm} (4)

Where

$R_{i,n}$ = stock return of firm $i$ on day $n$,

$R_{m,n}, R_{m,n-1}$ and $R_{m,n+1}$ = market returns on day $n$, $n-1$ or $n+1$ calculated based on the respective stock exchange market index change,

$\epsilon_{1,n}, \epsilon_{2,n}$ and $\epsilon_{3,n}$ = error terms.

$$\beta'_{SWi,n} = \frac{(\beta'_{1i} + \beta'_{2i} + \beta'_{3i})}{(1 + 2\rho'_m)}$$  \hspace{1cm} (5)

Where

$\beta'_{SWi,n}$ = estimated Scholes-Williams beta of security $i$ on day $n$,

$\beta'_{1i}, \beta'_{2i}$ and $\beta'_{3i}$ = betas estimated according to formula 2, 3 and 4 during the estimation period,

$\rho'_m$ = estimated serial correlation of market returns of order one during the estimation period.

$$\alpha'_{SWi,n} = \bar{R}_i - \beta'_{SWi,n}\bar{R}_m$$  \hspace{1cm} (6)

Where

$\alpha'_{SWi,n}$ = estimated Scholes-Williams alpha of security $i$ on day $n$,

$\beta'_{SWi,n}$ = estimated Scholes-Williams beta of security $i$ on day $n$ calculated as in formula 5,
\( \bar{R}_i \) = average return of security \( i \) during estimation period,

\( \bar{R}_m \) = average market return during estimation period.

\[
E(R_{i,n}) = \alpha_{{SW,i,n}} + \beta_{{SW,i,n}} R_{m,n}
\]  \( (7) \)

Where

\( E(R_{i,n}) \) = expected return of firm \( i \) on day \( n \),

\( \alpha_{{SW,i,n}} \) = estimated Sholes-Williams alpha of security \( i \) on day \( n \) calculated as in formula 6,

\( \beta_{{SW,i,n}} \) = estimated Sholes-Williams beta of security \( i \) on day \( n \) calculated as in formula 5,

\( R_{m,n} \) = market return of day \( n \) calculated based on the respective stock exchange market index change.

Thereafter abnormal returns are calculated as follows:

\[
AR_{i,n} = R_{i,n} - E(R_{i,n})
\]  \( (8) \)

Where

\( AR_{i,n} \) = abnormal return of firm \( i \) on day \( n \),

\( R_{i,n} \) = actual return of firm \( i \) on day \( n \),

\( E(R_{i,n}) \) = expected return of firm \( i \) on day \( n \).

In the calculations below the abnormal returns are summed over event windows of \((0;1), (0;2), (0;3), (-1;1), (-1;+2), (-2;+2) \) and \((-3;+3) \) to create cumulative abnormal return \( (CAR) \).

### 3.2. Measures of the state of the economy

In this paper the state of the economy or market or sentiment are considered to refer to a similar impact that these may have on reaction to news. State of the economy measures employed in previous studies include industrial production (McQueen and Roley, 1993; Flannery and Protopapadakis, 2002; Adams et al., 2004; Pearce and Solakoglu, 2007), manufacturing capacity (Knif et al., 2008), capacity utilization (McQueen and Roley, 1993), unemployment rate (McQueen and Roley, 1993; Flannery and Protopapadakis, 2002; Andersen et al., 2007) and number of job openings (Flannery and Protopapadakis, 2002). Some studies (for example Johnson, 1999; Boyd et al., 2005) use NBER\(^4\) information about the US business cycle to determine expansions and contractions, but no similar chronology exists for the Baltic markets. Considering data availability, the industrial production index \( (IPI) \) is mainly used in this paper along with the unemployment rate \( (UR) \) used in some robustness checks.

Hypothesizing the interaction between market sentiment and the state of the economy, one direct sentiment measure, the Economic Sentiment Indicator (ESI), is used in this paper as in Flannery and Protopapadakis (2002) and Laakkonen and Lanne (2008). Its use is justified by the good predictive power that Business Survey variables have shown in explaining future production accounts series in previous studies covering the Scandinavian market (for review see Lemmens et al., 2005).

The most often cited approach for distinguishing the state of the economy or sentiment is the one applied by McQueen and Roley (1993), which enables one to distinguish between high, low and medium states of economic activity (represented by dummies) and which is also used in this paper. In the following discussion the observations occurring in the high state are also referred to as expansion and in the low state as recession. Another approach employed by Andersen et al. (2007) is to distinguish between recessions and expansions so that recession requires three consecutive declines in a selected variable and an expansion three consecutive monthly increases. In the case of IPI this approach is used as a robustness check (referred to as IPI2).

3.3. Measure of unexpected earnings

In empirical research earnings expectations are either based on analyst forecasts (see for example Bamber and Cheon 1995; Conrad et al., 2002; Korczak and Tavakkol, 2004) or naïve models (see for example Bernard and Thomas, 1989; van Huffel et al., 1996; Kiete and Uloza, 2005). As on TSE, RSE and VSE the availability of analyst forecasts is limited to the post-2006 period and covers only a few stocks, only naïve expectations models could be used. Considering easier calculation possibilities, in this paper four naïve models were initially considered for calculating expected quarterly earnings: random walk, random walk with a drift, seasonal random walk and seasonal random walk with a drift. As initial results indicated no significant differences in models including drift, the hypothesis tests are based on the simple random walk and seasonal random walk models. The models are set up as in Foster (1977) and Brown and Kennelly (1972). If \( E_t \) - is earnings in quarter \( t \), then expected earnings are calculated using simple random walk (RW) model as:

\[
E(E_t) = E_{t-1}
\]

The seasonal random walk model (SRW) assumes seasonality in quarterly data:

---

1 This is constructed by the European Commission and reflects developments of overall economic activity in Europe or in each member state separately. Economic agents are surveyed both on aspects directly related to their activity and on variables over which they have no control. Each component of the 15 is aggregated over the member states using specific country-weights. Then these 15 component series are aggregated by using survey weights (given according to the importance of the corresponding sector in the total economy and according to the co-movement of a certain sector with GDP: 40% for industrial confidence, 30% for services, 5% for the retail trade, 5% for construction and 20% for consumer confidence) to end up with one single indicator.

2 Industrial production is regressed on time trend and based on residuals, with observations categorized into high (25% highest), low (25% lowest) and medium (the remaining 50%).
Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009

\[ E(E_t) = E_{t-4} \]  

(10)

The information about actual quarterly earnings is taken either from the earnings announcement or from the quarterly report and no corrections following the first disclosure date are considered. In the hypothesis tests the earnings measure used is \( scUE \) which represents the scaled unexpected earnings and is calculated as:

\[ scUE_{i,t} = \frac{E_{i,t} - E(E_{i,t})}{|E_{i,t}|} \]  

(11)

Where

- \( E_{i,t} \) = actual earnings of company \( i \) in quarter \( t \),
- \( E(E_{i,t}) \) = expected earnings of company \( i \) in quarter \( t \) calculated based on the random walk or seasonal random walk model,
- \( |E_{i,t}| \) = absolute value of actual earnings of company \( i \) in quarter \( t \).

This representation differs from most previous studies, which employ differences in actual and expected EPS (earnings per share) scaled by the standard deviation of EPS figures or by the share price. For the markets viewed the EPS measures were not as easily obtainable and therefore the former approach was preferred. In the series of calculated unexpected earnings some significant outliers were identified. Therefore, the absolute \( scUE \) measures representing the top 1% percentile of all observations for each company are removed from the dataset.

In hypothesis tests dummy variables are created to mark the tone of the news. Good earnings news (\( dscUEp \)) is defined as news where actual earnings are greater than expected earnings. Bad earnings news (\( dscUEn \)) is defined as news where actual earnings are lower than expected earnings.

3.4. Other control variables

Some regression models include additional control variables. These include company size (log of market capitalization) which is used to control for the risk and size differences of listed companies as in Conrad et al. (2002). This variable is expected to have a negative association with \( CAR \).

Some previous studies have used volatility to reduce the noise level in regressions involving \( CARs \) (for example Schadewitz et al., 2002). As on the three markets the riskiness of a stock (level of information asymmetry) is expected to be more pronounced in the volatility of returns measure, two volatility measures are also used as control variables in some modifications. The first is ordinary volatility calculated as a standard deviation of stock returns during the estimation period of (-63;-3). As it is possible to divide stock return volatility into components measuring systematic and unsystematic risk and the latter component called the idiosyncratic volatility captures the firm-specific risk better (Xu and Malkiel, 2003), the following idiosyncratic volatility measure is used in some models:
\[ iVarR_{i,n} = VarR_i - VarR_m \]  

Where
\[ iVarR_{i,n} = \text{idiosyncratic variance of stock } i \text{ returns on day } n, \]
\[ VarR_i = \text{variance of stock } i \text{ returns during the estimation period (-63;-3)}, \]
\[ VarR_m = \text{variance of market returns during the estimation period (-63;-3) based on market index } m. \]

Although in the following analysis the volatility measures are calculated over an estimation period of (-63;-3), these measures are highly correlated (pair-wise correlation coefficients were above 0.79) with other volatility measures calculated for shorter pre-announcement periods (-33;-3) and (-23;-3) and also for periods covering both pre- and post-announcement periods (-30;30); (-20;20).

4. Analysis and results

Previous papers focusing on earnings announcements use either the portfolio approach (Livnat and Petrovits, 2009), regression models (Johnson, 1999) or both (Skinner and Sloan, 2002; Conrad et al., 2002). Considering this paper’s greater similarity with papers employing regression models and for enabling better possibilities to test the hypotheses, the regression approach is used in this paper. As the data is a panel, both individual and time fixed effects were included in all regression models. The analysis started with the simple regression model:

\[ CAR_{i,t} = \alpha + \gamma_i + \lambda_t + \beta_1 \text{scUE}_{i,t} + \epsilon_{i,t} \]  

Where
\[ CAR_{i,t} = \text{cumulative abnormal return of company } i \text{ in quarter } t \text{ in event window and calculated based on the market model}, \]
\[ \text{scUE}_{i,t} = \text{scaled unexpected earnings of company } i \text{ in quarter } t \text{ calculated as in formula 11}, \]
\[ \alpha = \text{constant}, \gamma_i = \text{individual effects}, \lambda_t = \text{time effects}, \epsilon_{i,t} = \text{error term}. \]

The results of formula 13 in table 2 show that the explanatory power and statistical significance of regressions using a shorter estimation period are higher. Considering also that 60-day estimation periods do not overlap, the following discussion puts less emphasis on the results obtained with a 100-day estimation period. The results indicate that inclusion of the pre-announcement period decreases the explanatory power of regression models. Regressions with \( AR(0) \), \( CAR(0;1) \) and \( CAR(0;2) \) are statistically significant and the adjusted R-squared is between 0.036 and 0.132. These seem to be slightly higher compared to 0.008 reported in Conrad et al. (2002) and 0.047 reported in Johnson (1999).

When the event window is extended to (0;3), the explanatory power of regression begins to decrease, indicating that use of longer event windows would not lead to more significant results. Some models do exhibit negative adjusted R-squared values, but this result is in line with Schadewitz et al. (2002) who also showed that adjusted R-squared measures may vary between positive and negative values when different event windows are used.
Table 2. Return responses to quarterly earnings news with different event windows

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AR (0)</td>
<td>0.0019</td>
<td>***</td>
<td>32.23</td>
<td>0.0000</td>
<td>0.10</td>
<td>0.036</td>
<td>1.56 ***</td>
<td>1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (0;1)</td>
<td>0.0019</td>
<td>***</td>
<td>20.34</td>
<td>0.0003</td>
<td>1.17</td>
<td>0.097</td>
<td>2.63 ***</td>
<td>1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (0;2)</td>
<td>0.0080</td>
<td>***</td>
<td>27.13</td>
<td>0.0007</td>
<td>0.81</td>
<td>0.132</td>
<td>3.31 ***</td>
<td>1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (0;3)</td>
<td>0.0015</td>
<td>***</td>
<td>5.56</td>
<td>0.0007</td>
<td>0.91</td>
<td>0.079</td>
<td>2.30 ***</td>
<td>1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (-1;1)</td>
<td>0.0023</td>
<td>***</td>
<td>14.13</td>
<td>0.0004</td>
<td>0.97</td>
<td>-0.005</td>
<td>0.93</td>
<td>1163</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (-1;2)</td>
<td>0.0072</td>
<td>***</td>
<td>23.83</td>
<td>0.0007</td>
<td>0.86</td>
<td>0.143</td>
<td>3.52 ***</td>
<td>1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (-2;2)</td>
<td>0.0033</td>
<td>***</td>
<td>11.26</td>
<td>0.0011</td>
<td>1.32</td>
<td>-0.001</td>
<td>0.99</td>
<td>1163</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR (-3;3)</td>
<td>-0.0009</td>
<td>***</td>
<td>-3.30</td>
<td>0.0011</td>
<td>1.44</td>
<td>-0.024</td>
<td>0.65</td>
<td>1163</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Estimation period (-103;-3)

| AR (0)             | 0.0038   | ***     | 53.76  | 0.0001   | 0.55  | 0.002   | 1.04     | 1163        |       |            |
| CAR (0;1)          | 0.0018   | ***     | 15.28  | 0.0003   | 0.84  | 0.000   | 1.00     | 1163        |       |            |
| CAR (0;2)          | 0.0063   | ***     | 37.25  | -0.0002  | -0.34 | -0.008  | 0.88     | 1163        |       |            |
| CAR (-1;1)         | 0.0027   | ***     | 22.25  | 0.0000   | -0.06 | -0.010  | 0.85     | 1158        |       |            |
| CAR (-1;2)         | 0.0079   | ***     | 46.31  | -0.0005  | -0.96 | -0.008  | 0.87     | 1163        |       |            |
| CAR (-2;2)         | 0.0091   | ***     | 57.17  | -0.0003  | -0.71 | -0.009  | 0.86     | 1158        |       |            |
| CAR (-3;3)         | 0.0062   | ***     | 29.59  | 0.0000   | 0.00  | -0.011  | 0.84     | 1158        |       |            |

Notes: For definitions of variables see table 1. Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Source: Authors.

The earnings response coefficient ($\beta_1$ in formula 13) calculated on the basis of the random walk model remains statistically insignificant with t-value below 1.17. This contradicts the statistically significant negative association reported in Conrad et al. (2002) and the statistically significant positive association supported in Johnson (1999). The statistical significance of $\beta_1$ can depend on the method chosen for $scUE$ calculation (analysts’ forecasts or naïve model). The test of analyst forecasts’ deviation from actual results for 3 VSE stocks did exhibit lower dispersion than in the case of time series forecasts, indicating that the possibilities to capture $scUE$ impact on CARs may have been reduced by the chosen calculation method. Schadewitz et al. (2002) also show that the statistical significance of earnings response coefficients ($\beta_1$) may depend on the disclosure level so that lower quality disclosures may lead to insignificant earnings response coefficients. Assuming that disclosure quality on the selected developing markets is lower, it could lead to insignificant earnings response. A previous study on disclosure quality of Baltic markets’ public announcements showed that it varies significantly across stocks (Laidroo, 2009); therefore, this assumption seems reasonable.
Table 3. Return responses to quarterly earnings news with $CAR(0;2)$

<table>
<thead>
<tr>
<th>Variable</th>
<th>$CAR(0;2)$ regressed on $CAR(0;2)$</th>
<th>$CAR(0;2)$ regressed on $CAR(0;2)$</th>
<th>$CAR(0;2)$ regressed on $CAR(0;2)$</th>
<th>$CAR(0;2)$ regressed on $CAR(0;2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0080</td>
<td>***</td>
<td>27.13</td>
<td>0.0093</td>
</tr>
<tr>
<td>$scUE_{Frov}$</td>
<td>0.0007</td>
<td>0.81</td>
<td>0.80</td>
<td>0.0007</td>
</tr>
<tr>
<td>$ln\ Size$</td>
<td>0.0007</td>
<td>0.84</td>
<td>0.84</td>
<td>0.0007</td>
</tr>
<tr>
<td>$iVol$</td>
<td>0.0023</td>
<td>0.22</td>
<td>0.22</td>
<td>0.0023</td>
</tr>
<tr>
<td>$Volat$</td>
<td>0.6368</td>
<td>***</td>
<td>17.13</td>
<td>0.6368</td>
</tr>
</tbody>
</table>

Notes: $CAR$ estimation period used is (-63;-3) and event window is (0;2). For definitions of variables see table 1. Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Source: Authors.

Table 3 shows that when additional control variables are added to formula 13, the $scUE$ variable remains statistically insignificant, but the explanatory power of regression increases significantly if idiosyncratic or ordinary volatility is added. Similar results to table 3 are achieved with $AR(0)$ and $CAR(0;1)$. This indicates that over shorter event windows higher return volatility prior to announcement is likely to be associated with higher cumulative abnormal return. The sign of the volatility measure changes when pre-announcement period (day -3, -2 and/or -1) is included in the event window. This indicates that the impact of volatility may depend on the event period selected. The change in the sign of volatility variable was also observed in Schadewitz et al. (2002). Still, it is uncommon that size has no statistical significance in regressions as Conrad et al. (2002) report a significant negative association between size and $CAR$. The lack of significance of the size measure could be related to the possibility that the $CAR$ measures on these three markets are more influenced by overall trading frequency which affects volatility and also firm specific risk which is more visible in the volatility measure. The inclusion of volatility and size measures simultaneously has no significant impact on the reported results as size remains statistically insignificant and the explanatory power of regressions compared to regressions including only volatility as a control does not improve significantly. Considering these findings, the following discussion focuses only on the impact of volatility measures on $CAR$s and does not consider controlling for size. The results presented in tables 2 and 3 calculated using seasonal random walk-based $scUE$s (results are available upon request from the authors) remained similar in terms of adjusted R-squared values, F-statistics as well as the statistical significance of explanatory variables.

To test whether the insignificance of the $scUE$ variable in the regression was due to different signs of its reported value (asymmetry in reactions to good and bad news), the following model is estimated:

$$CAR_{t,i} = \alpha + \gamma + \lambda + \beta_1 scUE_{t,i} + \beta_2 dscUE_{t,i} + \beta_3 scUE_{t,i} \times dscUE_{t,i} + \epsilon_{t,i} \quad (14)$$

Where $CAR_{t,i}$ = cumulative abnormal return of company $i$ in quarter $t$ in event window and calculated based on the market model,
Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009

\( scUE_{it} \) = scaled unexpected earnings of company \( i \) in quarter \( t \) calculated as in formula 11, 
\( dscUEn_{it} \) = dummy variable that equals 1, if the scaled unexpected earnings calculated as in formula 11 is negative, and 0 otherwise,
\( \alpha \) = constant, \( \gamma_i \) = individual effects, \( \lambda_t \) = time effects, \( \epsilon_{i,t} \) = error term.

Table 4. Return responses to good and bad earnings news with CAR (0;2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAR (0;2) regressed on</th>
<th>CAR (0;2) regressed on</th>
<th>CAR (0;2) regressed on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0024</td>
<td>0.38</td>
<td>0.0023</td>
</tr>
<tr>
<td>scUE</td>
<td>0.0014</td>
<td>0.65</td>
<td>0.0011</td>
</tr>
<tr>
<td>dscUEn</td>
<td>0.0114</td>
<td>0.96</td>
<td>0.0066</td>
</tr>
<tr>
<td>scUE * dscUEn</td>
<td>-0.0004</td>
<td>-0.26</td>
<td>-0.0003</td>
</tr>
<tr>
<td>iVol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.131</td>
<td></td>
<td>0.204</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.23</td>
<td>***</td>
<td>4.74</td>
</tr>
<tr>
<td>No of obs</td>
<td>1167</td>
<td></td>
<td>1167</td>
</tr>
</tbody>
</table>

Notes: The CAR estimation period used is (-63;-3) and the event window is (0;2). \( dscUEn \) – dummy variable that equals 1, if the scaled unexpected earnings \( (scUE) \) is negative, and 0 otherwise. For definitions of other variables see table 1. Statistical significance: *** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.10 \).

Source: Authors.

Table 4 presents the results of formula 14 for \( CAR (0;1) \) (this window has the highest explanatory power in terms of adjusted R-squared). According to H1 the reaction to bad news (negative \( scUE \)) is expected to be stronger than the reaction to good news (positive \( scUE \)). The coefficient \( \beta_3 \) of the interaction term in formula 14 explains the difference in the slope of negative news \( scUE \) compared to the slope of positive news \( scUE \) and if it is statistically significant and positive, H1 is supported. The results presented in table 4 indicate no statistically significant asymmetry in reaction to good and bad news and contrary to expectations the slope coefficient for negative news is lower than for positive news. When formula 14 is employed on the same estimation window’s \( AR (0) \), \( CAR (0;1) \) and \( CAR (0;3) \), the results resemble those reported in table 4. The only occasions when formula 14 coefficients \( \beta_1 \) and \( \beta_3 \) become statistically significant are \( CAR (-2;2) \) and \( CAR (-3;3) \). When idiosyncratic volatility is included as a control, the adjusted R-squared for \( CAR (-2;2) \) becomes 0.045, the regression is statistically significant at \( p<0.01 \), \( \beta_1 = 0.003 \) (\( p<0.10 \)) and \( \beta_3 = -0.003 \) (\( p<0.10 \)). Although quite similar results hold for \( CAR (-3;3) \) using either of the volatility measures as additional controls, the fact that \( \beta_3 \) is negative, indicates that the reaction to negative news is lower than to positive news and this weak result is contrary to H1. H1 tests done with \( scUE \) calculated on the basis of the seasonal random walk model (results are available upon request from the authors) remain inconclusive. From previous papers Conrad et al. (2002) reported weak asymmetry in reactions to good/bad news (negative reaction was higher than expected according to H1) and Skinner and Sloan (2002) provided stronger support to H1. One potential reason why the findings in this paper may differ relates to the models used to measure earnings expectations and to the period viewed, because a significant change occurred in economic conditions. In order to understand how the state of the economy affects reported results, the impact of the state of the economy on market responses to news is investigated using the following model:
\[ CAR_{i,t} = \alpha + \gamma_i + \lambda_i + \beta_{1i}scUE_{i,t} + \beta_{2i}stateh_{i,t} + \beta_{3i}scUE_{i,t} \times stateh_{i,t} + \beta_{4i}statel_{i,t} + \beta_{5i}scUE_{i,t} \times statel_{i,t} + \varepsilon_{i,t} \] (15)

Where

\( CAR_{i,t} \) = cumulative abnormal return of company \( i \) in quarter \( t \) in event window and calculated based on the market model,

\( scUE_{i,t} \) = scaled unexpected earnings of company \( i \) in quarter \( t \) calculated as in formula 11,

\( stateh_{i,t} \) = dummy variable that equals 1, if the economy is in a high state, and 0 otherwise,

\( statel_{i,t} \) = dummy variable that equals 1, if the economy is in a low state, and 0 otherwise,

\( \alpha = \) constant, \( \gamma_i = \) individual effects, \( \lambda_i = \) time effects, \( \varepsilon_{i,t} = \) error term.

Table 5. Return responses to quarterly earnings news in different states of the economy

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAR (0;2) regressed on</th>
<th>CAR (0;2) regressed on</th>
<th>CAR (0;2) regressed on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0448</td>
<td>1.22</td>
<td>0.0442</td>
</tr>
<tr>
<td>scUERW</td>
<td>0.0020</td>
<td>0.92</td>
<td>0.0020</td>
</tr>
<tr>
<td>stateh</td>
<td>-0.0985</td>
<td>-1.08</td>
<td>-0.1037</td>
</tr>
<tr>
<td>scUERW \times stateh</td>
<td>-0.0016</td>
<td>-0.75</td>
<td>-0.0016</td>
</tr>
<tr>
<td>statel</td>
<td>0.0922</td>
<td>0.99</td>
<td>0.0975</td>
</tr>
<tr>
<td>scUERW \times statel</td>
<td>0.0023</td>
<td>0.49</td>
<td>0.0024</td>
</tr>
<tr>
<td>iVol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. R²</td>
<td>0.163</td>
<td>***</td>
<td>0.240</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.80</td>
<td>***</td>
<td>5.48</td>
</tr>
<tr>
<td>No of obs.</td>
<td>1167</td>
<td></td>
<td>1167</td>
</tr>
<tr>
<td>Wald test ( \beta_3=\beta_5=0 )</td>
<td>0.51</td>
<td>0.47</td>
<td>0.42</td>
</tr>
<tr>
<td>F-statistic</td>
<td>1.03</td>
<td>0.94</td>
<td>0.84</td>
</tr>
<tr>
<td>Wald test ( \beta_3=\beta_5 )</td>
<td>-0.82</td>
<td>-0.82</td>
<td>-0.80</td>
</tr>
<tr>
<td>t-statistic</td>
<td>0.68</td>
<td>0.67</td>
<td>0.65</td>
</tr>
<tr>
<td>Chi-square</td>
<td>0.68</td>
<td>0.67</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Notes: The CAR estimation period used is (-63; -3) and the event window is (0;2). stateh – dummy variable that equals 1, if the economy is in a high state (IPI used as a measure of the state of the economy), 0 otherwise; statel – dummy variable that equals 1, if the economy is in a low state, and 0 otherwise. For definitions of other variables see table 1. Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Source: Authors.

The industrial production index (IPI) is used as the state of the economy variable when presenting formula 15 results in table 5. Formula 15 is based on the medium state i.e. the coefficients of interaction terms show the differences in slopes compared to the medium state. The first Wald test tests whether slope coefficients are jointly statistically different from zero i.e. different from the medium state. The second Wald test at the bottom of the table tests for slope differences between low and high state (asymmetry in price reaction). The results for CAR (0;2) show no statistically significant differences in reactions across the states of the economy. Still, the reaction in low state is higher than in medium state and the reaction
Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009

in high state is lower than in medium state. When other event windows are employed, the only one providing statistically significant differences is \( CAR (-3;3) \) for the estimation period (-63;-3). These regressions are statistically significant and the Wald test supports a statistically significant difference between reactions in low and high states of the economy and the coefficients are larger in low state at \( p<0.10 \) i.e. it contradicts H2 and Johnson (1999). Still, there is no difference in reactions in low and high state from medium state. When using the seasonal random walk model on formula 15 (results are available upon request from the authors), the results regarding H2 remain inconclusive.

In order to test H3, both the tone of the news and the state of the economy are viewed simultaneously using medium state negative news as a basis (for results see table 6):

\[
CAR_{i,t} = \alpha + \gamma_i + \hat{\lambda}_t + scUE_{i,t} + \beta_{i}stateh_{i,t} \times dscUEp_{i,t} + \beta_{2}scUE_{i,t} \times stateh_{i,t} \times dscUEp_{i,t} + \\
\beta_{3}stateh_{i,t} \times dscUEn_{i,t} \beta_{4}scUE_{i,t} \times stateh_{i,t} \times dscUEp_{i,t} + \\
\beta_{5}scUE_{i,t} \times statel_{i,t} \times dscUEp_{i,t} + \beta_{6}stateh_{i,t} \times dscUEp_{i,t} + \\
\beta_{7}scUE_{i,t} \times statel_{i,t} \times dscUEp_{i,t} + \beta_{8}scUE_{i,t} \times statel_{i,t} \times dscUEn_{i,t} + \\
\beta_{9}stateh_{i,t} \times statem_{i,t} \times dscUEp_{i,t} + \beta_{10}scUE_{i,t} \times statem_{i,t} \times dscUEp_{i,t} + \epsilon_{i,t} 
\]

Where,

- \( CAR_{i,t} \) = cumulative abnormal return of company \( i \) in quarter \( t \) in event window and calculated based on the market model,
- \( scUE_{i,t} \) = scaled unexpected earnings of company \( i \) in quarter \( t \) calculated as in formula 11,
- \( stateh_{i,t} \) = dummy variable that equals 1, if the economy is in a high state, and 0 otherwise,
- \( statel_{i,t} \) = dummy variable that equals 1, if the economy is in a low state, and 0 otherwise,
- \( statem_{i,t} \) = dummy variable that equals 1, if the economy is in a medium state, and 0 otherwise,
- \( dscUEp_{i,t} \) = dummy variable that equals 1, if the scaled unexpected earnings calculated as in formula 11 is positive, and 0 otherwise,
- \( dscUEn_{i,t} \) = dummy variable that equals 1, if the scaled unexpected earnings calculated as in formula 11 is negative, and 0 otherwise,
- \( \alpha \) = constant, \( \gamma_i \) = individual effects, \( \hat{\lambda}_t \) = time effects, \( \epsilon_{i,t} \) = error term.

The zinteraction terms with \( scUE \) in this regression represent the differences in slopes compared to the slope of medium state bad news. The results in table 6 focus on \( CAR (0;1) \) as this period gave the most significant results and similar results were also supported for \( CAR (-3;3) \) at a lower level of statistical significance. In addition to medium state negative news the interaction terms for high state positive and negative news appear statistically significant. High and low state negative news interaction terms are jointly statistically significantly different from medium state negative news interaction at \( p<0.10 \) or \( p<0.05 \). When using the random walk model, the earnings response coefficient for low state becomes 0.0011, for medium state 0.0043 and for high state 0.0003. This indicates that the greatest response occurs in the medium state compared to both high and low states. However, no support exists for statistically significant differences between negative news interaction terms for high and low state i.e. inconclusive results for H3. In previous papers Conrad et al. (2002) and Docking and Koch (2005) supported H3 and Mian and Sankaraguruswamy (2010) rejected it. If seasonal random walk-based \( scUE \) measures are used (results are available upon request from the authors),
the three-way interaction terms remain statistically insignificant and both Wald test results remain insignificant. This indicates that the results remain slightly vulnerable to the chosen earnings expectation model.

In order to test H4, both the tone of the news and the state of the economy are viewed simultaneously using medium state positive news as a basis (for results see table 7):

\[
CAR_{t,i} = \alpha + \gamma_i + \lambda_i + \beta_1 \text{scUE}_{i,t} + \beta_2 \text{stateh}_{i,t} \times \text{dscUEEp}_{i,t} + \beta_3 \text{scUE}_{i,t} \times \text{stateh}_{i,t} \times \text{dscUEEp}_{i,t} + \\
+ \beta_4 \text{stateh}_{i,t} \times \text{scUEEn}_{i,t} + \beta_5 \text{scUE}_{i,t} \times \text{stateh}_{i,t} \times \text{dscUEEn}_{i,t} + \beta_6 \text{dstatel}_{i,t} \times \text{dscUEEp}_{i,t} + \\
+ \beta_7 \text{scUE}_{i,t} \times \text{statel}_{i,t} \times \text{dscUEEp}_{i,t} + \beta_8 \text{dstatel}_{i,t} \times \text{dscUEEn}_{i,t} + \beta_9 \text{scUE}_{i,t} \times \text{statel}_{i,t} \times \text{dscUEEn}_{i,t} + \\
+ \beta_{10} \text{statement}_{i,t} \times \text{dscUEEn}_{i,t} + \beta_{11} \text{scUE}_{i,t} \times \text{statement}_{i,t} \times \text{dscUEEn}_{i,t} \epsilon_{i,t}. \tag{17}
\]

For notations see the previous formula 16.

The results in table 7 focus on the event window (0;1) as this period gave the most significant results. The medium state positive news scUE is statistically significant as are all interaction terms with scUE in the case of high state positive and negative news. Still, their significance disappears once volatility measures are added. The coefficients $\beta_3$ and $\beta_7$ are statistically significantly different from medium state in some of the regressions at $p<0.10$. Still, most models show inconclusive results regarding H4. The exception is $CAR\ (-1;1)$ models which exhibit a statistically significant difference in coefficients $\beta_3$ and $\beta_7$ and the earnings response coefficient is 0.0062 in low state, 0.0040 in medium state and 0.0000 in high state. This indicates that for $CAR\ (-1;+1)$ H4 is rejected. Conrad et al. (2002) found weak evidence to support H4 and rejection of H4 has also been previously supported by Docking and Koch (2005). Docking and Koch (2005) explain this contradiction with Veronesi (1999) model expectations through overall uncertainty on the market measured by volatility. Namely, the market tendency to overreact or underreact to good news could be ambiguous if announced in a down and volatile market. If good news is announced in a down market, the increased discount rate applied by investors to account for the greater uncertainty (according to Veronesi, 1999) diminishes the increase in value resulting from good news. On the other hand, if the market is more volatile this effect is counteracted by investors’ perception that good news is more informative in a volatile market. These two countervailing forces lead to an ambiguous result in which the market may over- or under-react, depending on which force outweighs the other in this situation. As in this paper inclusion of the volatility measure does not alter the result for H4 and it is not included as part of the interaction term, the explanation provided in the literature cannot be tested directly. In order to verify whether it could be the case of rejection of H4, some future study could consider this aspect in more detail. The regression replicated with seasonal random walk-based scUE measures (results are available upon request from the authors), the interaction terms remain statistically insignificant and the Wald tests also exhibit no statistical significance.

To summarize, the results reported earlier with IPI as the state measure show some differences depending on the selected event windows. H1 is rejected for $CAR\ (-2;2)$ and $CAR\ (-3;3)$. H2 is rejected for $CAR\ (-3;3)$ and H4 is rejected for $CAR\ (-1;1)$. For the rest of the
event windows the hypothesis tests’ results remain inconclusive. Differences do exist in reactions to bad news in different states of the economy for \( CAR(0;1) \) and \( CAR(0;3) \) and for good news for \( CAR(0;1) \). These results indicate that the \( CAR \) measures are not stable. This can be caused by low trading frequency and high volatility which create shifts in the signs of daily abnormal returns and thereby cause fluctuations in \( CAR \) values.

**Table 6.** Return responses to good and bad earnings news in different states of the economy using medium state bad news as a basis

<table>
<thead>
<tr>
<th>Variable</th>
<th>( CAR(0;1) ) regressed on</th>
<th>( CAR(0;1) ) regressed on</th>
<th>( CAR(0;1) ) regressed on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0219</td>
<td>*</td>
<td>1.80</td>
</tr>
<tr>
<td>scUE_{RW}</td>
<td>0.0043 **</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td>stateh x dscUEp_{RW}</td>
<td>-0.0348 **</td>
<td>-1.53</td>
<td></td>
</tr>
<tr>
<td>scUE_{RW} x stateh x dscUEp_{RW}</td>
<td>-0.0041 **</td>
<td>-2.01</td>
<td></td>
</tr>
<tr>
<td>stateh x dscUE_{RW}</td>
<td>-0.0282 *</td>
<td>-1.69</td>
<td></td>
</tr>
<tr>
<td>scUE_{RW} x stateh x dscUE_{RW}</td>
<td>-0.0040 **</td>
<td>-1.98</td>
<td></td>
</tr>
<tr>
<td>stateh x dscUEp_{RW}</td>
<td>-0.0049</td>
<td>-0.24</td>
<td></td>
</tr>
<tr>
<td>scUE_{RW} x stateh x dscUEp_{RW}</td>
<td>-0.0002</td>
<td>-0.04</td>
<td></td>
</tr>
<tr>
<td>stateh x dscUE_{RW}</td>
<td>0.0072</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>scUE_{RW} x stateh x dscUE_{RW}</td>
<td>-0.0032</td>
<td>-1.31</td>
<td></td>
</tr>
<tr>
<td>stateh x dscUE_{RW}</td>
<td>-0.0192</td>
<td>-1.56</td>
<td></td>
</tr>
<tr>
<td>scUE_{RW} x stateh x dscUE_{RW}</td>
<td>-0.0013</td>
<td>-0.51</td>
<td></td>
</tr>
<tr>
<td>iVol</td>
<td>0.6518 ***</td>
<td>21.64</td>
<td></td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.100</td>
<td>0.537</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>2.49 ***</td>
<td>16.37</td>
<td></td>
</tr>
<tr>
<td>No of obs.</td>
<td>1167</td>
<td>1167</td>
<td></td>
</tr>
<tr>
<td>Wald test ( \beta_5 = \beta_9 = 0 )</td>
<td>2.88 *</td>
<td>3.65</td>
<td></td>
</tr>
<tr>
<td>Chi-square</td>
<td>5.76 *</td>
<td>7.30</td>
<td></td>
</tr>
<tr>
<td>Wald test ( \beta_5 = \beta_9 )</td>
<td>-0.88</td>
<td>-1.06</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>0.77</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>Chi-square</td>
<td>0.77</td>
<td>1.12</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** The \( CAR \) estimation period used is \((-63;-3)\) and the event window is \((0;1)\). \( stateh \) – dummy variable that equals 1, if the economy is in a high state (IPI used as a measure of the state of the economy), and 0 otherwise; \( statel \) – dummy variable that equals 1, if the economy is in a low state, and 0 otherwise; \( statem \) – dummy variable that equals 1, if the economy is in a medium state, and 0 otherwise. \( dscUE_{En} \) – dummy variable that equals 1, if the scaled unexpected earnings \( (scUE) \) is negative, and 0 otherwise. \( dscUE_{Ep} \) – dummy variable that equals 1, if the scaled unexpected earnings \( (scUE) \) is positive, and 0 otherwise. For definitions of other variables see table 1. Statistical significance: *** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.10 \).

**Source:** Authors.
Table 7. Return responses to good and bad earnings news in different states of the economy using medium state good news as a basis

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAR (0;1) regressed on</th>
<th>CAR (0;1) regressed on</th>
<th>CAR (0;1) regressed on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0028</td>
<td>0.41</td>
<td>0.0016</td>
</tr>
<tr>
<td>(scUE_{BW})</td>
<td>0.0030</td>
<td>*</td>
<td>1.80</td>
</tr>
<tr>
<td>(stateh \times dscUEp_{BW})</td>
<td>-0.0157</td>
<td>-0.79</td>
<td>-0.0166</td>
</tr>
<tr>
<td>(scUE_{BW} \times stateh \times dscUEp_{BW})</td>
<td>-0.0028</td>
<td>*</td>
<td>-1.88</td>
</tr>
<tr>
<td>(stateh \times dscUEn_{BW})</td>
<td>-0.0090</td>
<td>-0.66</td>
<td>-0.0179</td>
</tr>
<tr>
<td>(scUE_{BW} \times stateh \times dscUEn_{BW})</td>
<td>-0.0027</td>
<td>*</td>
<td>-1.68</td>
</tr>
<tr>
<td>(statel \times dscUEp_{BW})</td>
<td>0.0014</td>
<td>0.87</td>
<td>0.0206</td>
</tr>
<tr>
<td>(scUE_{BW} \times statel \times dscUEp_{BW})</td>
<td>0.0012</td>
<td>0.37</td>
<td>0.0012</td>
</tr>
<tr>
<td>(statel \times dscUEn_{BW})</td>
<td>0.0263</td>
<td>1.24</td>
<td>0.0320</td>
</tr>
<tr>
<td>(scUE_{BW} \times statel \times dscUEn_{BW})</td>
<td>-0.0018</td>
<td>-0.95</td>
<td>-0.0014</td>
</tr>
<tr>
<td>(statem \times dscUEn_{BW})</td>
<td>0.0192</td>
<td>1.56</td>
<td>0.0216</td>
</tr>
<tr>
<td>(scUE_{BW} \times statem \times dscUEn_{BW})</td>
<td>0.0013</td>
<td>0.51</td>
<td>0.0023</td>
</tr>
<tr>
<td>iVol</td>
<td>0.6518</td>
<td>***</td>
<td>21.64</td>
</tr>
<tr>
<td>Volat</td>
<td>0.100</td>
<td>0.537</td>
<td>0.418</td>
</tr>
<tr>
<td>No of obs.</td>
<td>1167</td>
<td>1167</td>
<td>1167</td>
</tr>
<tr>
<td>Wald test (\beta_3 = \beta_7 = 0)</td>
<td>2.57</td>
<td>*</td>
<td>2.26</td>
</tr>
<tr>
<td>F-statistic</td>
<td>5.15</td>
<td>*</td>
<td>4.52</td>
</tr>
<tr>
<td>Wald test (\beta_j = \beta_7)</td>
<td>t-statistic</td>
<td>-1.38</td>
<td>-1.37</td>
</tr>
<tr>
<td>F-statistic</td>
<td>1.91</td>
<td>1.86</td>
<td>1.57</td>
</tr>
<tr>
<td>Chi-square</td>
<td>1.91</td>
<td>1.86</td>
<td>1.57</td>
</tr>
</tbody>
</table>

Notes: The CAR estimation period used is (-63;-3) and the event window is (0;1). \(stateh\) – dummy variable that equals 1, if the economy is in a high state (\(IPI\) used as a measure of the state of the economy), and 0 otherwise; \(statel\) – dummy variable that equals 1, if the economy is in a low state, and 0 otherwise; \(statem\) – dummy variable that equals 1, if the economy is in a medium state, and 0 otherwise. \(dscUEn\) – dummy variable that equals 1, if the scaled unexpected earnings (\(scUE\)) is negative, and 0 otherwise. \(dscUEp\) – dummy variable that equals 1, if the scaled unexpected earnings (\(scUE\)) is positive, and 0 otherwise. For definitions of other variables see table 1. Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Source: Authors.

The results also indicate that unlike in Conrad et al. (2002) there is no increasing trend in the differences of earnings response coefficients between bad and good news when moving from a low state towards a high state of the economy. Conrad et al. (2002) report the highest difference in the high state of the economy, but the results in this paper indicate that the greatest difference occurs either in the medium or low state (depending on the regression model and length of event window used). As most differences remain statistically insignificant, support for the existence of regime shift between the different states of the market is weak. Considering the shortage of papers dealing with this issue it is not possible to conclude whether it could be a market-specific phenomenon or caused by the naïve earnings expectations measure used. Therefore, some future study could try to investigate the impact of medium state on market reactions in a more developed market setting with better data availability.
As a robustness check H2, H3 and H4 were tested using alternative state of the economy determinants (results are available upon request from the authors). These include the economic sentiment index (ESI), the unemployment rate (UR), the industrial production index (IPI2 divided into states as in Andersen et al., 2007) and the combined state of economy measure (PC1)\(^7\).

Results for H2 with alternative state of the economy measures for estimation period (-63;-3) remain inconclusive and only for ESI with CAR (0;1) do statistically significant differences appear across states at p<0.05. For estimation window (-103;-3) a few statistically significant differences in reactions appear for different states for IPI2, UR and PC1 and support exists for H2 in the case of IPI2 with CAR (-2;2) and CAR (-3;3) and in the case of UR with AR(0). Still, the PC1 with CAR (0;2) and CAR (-1;2) rejects H2 at p=0.10. This indicates that although some evidence exists that reactions across different states may vary, the differences are not in most cases big enough to be statistically significant and the H2 tests result remains inconclusive.

Results for H3 with alternative state of economy measures for estimation period (-63;-3) remain inconclusive with the exceptions of UR with AR (0), CAR (0;1) and CAR (-3;3) that supports H3 at p<0.10 or p<0.5. However, for ESI with CAR (0;1) H3 is rejected at p<0.10. Only for IPI with CAR (0;1) and CAR (0;3); for ESI with CAR (0;2); for UR with AR (0), CAR (0;1) and CAR (-3;3) there appear statistically significant differences in reactions to bad news across different states. For estimation window (-103;-3) a few statistically significant differences appear in reactions for different states for IPI, IPI2 and PC1 and support exists for H3 in case of IPI2 with CAR (-1;1), CAR (-1;2), CAR (-2;2) and CAR (-3;3) at p<0.01, in the case of UR with CAR (-3;3) at p<0.10 and in the case of PC1 with AR (0) at p<0.05. This indicates that although some evidence exists to support H3, the result remains dependent on the state of economy measure used.

Results for H4 with alternative state of economy measures for estimation period (-63; -3) remain inconclusive with the exceptions of IPI2 and UR with both CAR (0;1) and CAR (-1;1) that supports H4 at p<0.10 or p<0.5. However, for IPI with CAR (-1;1) and ESI with CAR (0;1) H4 is rejected at p<0.10. Only for IPI with CAR (0;1); for IPI2 with AR(0); for ESI with CAR (0;1); for UR and PC1 with CAR (-1;1) statistically significant differences appear in reactions to good news across different states. For estimation window (-103;-3) a few statistically significant differences appear in reactions for different states for IPI2 and PC1 and support exists for H4 in case of IPI2 with AR (0), CAR (0;2), CAR (-1;2), CAR (-2;2) and (-3;3) at p<0.05 or p<0.10. This indicates that although some evidence supports H4, the result remains dependent on the state of economy measure used.

\(^7\) The combined state of economy measure was calculated as the first principal component of the economic sentiment index (ESI), industrial production index (IPI) and unemployment rate (UR) for each stock exchange. The weights were 0.40, 0.63 and -0.67 for TSE, 0.53, 0.54 and -0.65 for RSE and 0.19, 0.68 and -0.71 for VSE. The states were defined as in McQueen and Roley (1993).
Considering the possibility that ESI may be a leading indicator of IPI and UR a lagging indicator of IPI, the leading lagging relationships between these variables were investigated using correlograms. These indicated that the greatest correlations between these variables appeared when no leads or lags were used. Therefore, leading or lagging relationships are not expected to have a significant influence on the results.

5. Conclusions

The objective of this paper was to investigate asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009. Asymmetries were investigated by focusing on the tone of the news (good/bad), the state of the economy (high, low and medium) and by combining the impact of the tone of the news and the state of the economy.

There is weak evidence that the reaction to negative earnings news is lower than to positive news. This is contrary to H1 and previous empirical studies that have tended to support H1 (Skinner and Sloan, 2002; Conrad et al., 2002). The results could be influenced by the chosen naïve approach for creating expected earnings measures and by the shifts in economic conditions that occurred during the selected period.

Based on the model developed by Diamond (1982) one would expect reactions to earnings news to be greater during economic expansion than during economic recession (H2). Although this result has been supported in a previous empirical study by Johnson (1999), the results of this paper remain inconclusive. Earnings response coefficients tend to be the largest in low state and lowest in high state, but in most cases the differences between them are not big enough to be statistically significant and in a few cases where different state of the economy measures do give significant results, these contradict each other.

The models of Barberis et al. (1998) and Veronesi (1999) suggest that investors overreact to bad earnings announcements during economic expansion (H3) and underreact to good earnings announcements during economic recession (H4). Although with the industrial production index (IPI) results remain inconclusive, the unemployment rate (UR) and alternative industrial production index (IPI2) do provide statistically significant support for H3 as in previous studies by Conrad et al. (2002) and Docking and Koch (2005). Although with IPI weak evidence exists to reject H4 (as in Docking and Koch, 2005), UR and IPI2 do provide stronger evidence in support of H4. Difficulties in capturing these associations could be influenced by volatility as explained in Docking and Koch (2005).

Despite its unique focus, this paper has several limitations. First, this paper employed naïve models for creating earnings expectations, but their use may decrease possibilities to capture the impact of earnings on prices. Therefore, a future study could try to find possibilities to verify the results of this paper using analyst forecast-based measures of expected earnings on the same or other markets. Second, although this paper did include volatility as a control, some better ways for controlling for its impact in H3 and H4 tests could be considered. Third,
the robustness tests of this paper indicated that the impact of the state of the economy could be dependent on the chosen state of economy measure and therefore the current results should be interpreted with caution.

Overall, this paper provides some interesting insights into how the tone of the news and state of the economy could impact earnings responses and emphasizes the need to pay more attention to the medium state in future theoretical and empirical research. Still, considering the limitations of the dataset used, more powerful tests on a more developed market with better data availability are needed to verify reported tendencies.
References


Testing for asymmetries in price reactions to quarterly earnings announcements on Tallinn, Riga and Vilnius Stock Exchanges during 2000-2009


Review of the Latvian Competitiveness Report

Maya Jollès

In February 2011, the Latvian State Chancellery ordered a report on the country’s competitiveness. The Latvian Competitiveness Report (LCR), delivered in April 2012, aims to “provide an overall assessment of competitiveness” in Latvia and “to develop a methodological framework”. One obvious outcome is its direct use for policy making decisions. It was a timely initiative to request the report in order to reflect on longer term sources of growth. After recent internal devaluation adjustments, a broad look at GDP growth sources offers a range of long term policy options.

Policymakers, economists or anyone interested in the recent but also structural economic changes in Latvia will find reading it worthwhile. Although commissioned by the Latvian government, its potential readership is in reality quite large. Not only can it be used in Latvia, but also outside, in neighbouring countries, in transition economies or in the context of international organisations. The LCR synthesises in one report in Latvian or English a perspective on the country’s competitiveness performance. It also offers an analytical framework that can serve as a reference for other countries.

The framework developed by the authors allows for a comprehensive overview of Latvia’s competitiveness, supported by a selection of in-depth studies. The LCR is a balanced mix of new analysis, of references to recent academic research and to recent international reports. The authors offer a deep knowledge of the region, but not only. The Baltic International Centre for Economic Policy Studies (BICEPS), the Stockholm School of Economics in Riga and other economic experts collaborated with Dr Ketels from the Institute for Strategy and Competitiveness at Harvard.

This review examines first the original angle of the LCR. Second, it highlights the report’s most striking features and findings. Third, it reflects on how to make use of the current LCR for policymaking and what could be expected from a potential future edition.

1. Scope of the LCR

A consensus exists on the importance of ‘competitiveness’ but no general understanding of the term. Since the LCR is not only a “country report” but a competitiveness report, what exactly is meant by competitiveness? What does it entail? The authors recognize the polysemy of the term “competitiveness”. They intentionally choose the productivity-based approach to competitiveness. This is in fact a perspective taken by many other reports on competitiveness,
such as the European Competitiveness reports (European Commission 2011). If productivity, measured broadly as GDP per capita, is considered the main source of competitiveness, the implication is that improved competitiveness, i.e. increase in GDP per capita, is synonymous with amelioration in standards of living. Since growth theory points to convergence in productivity levels from countries with the lowest GDP per capita, it is all the more relevant to look at how this convergence can be facilitated in Latvia. And as there is no one-size-fits-all answer to how a country can grow, the exhaustiveness of the report is very welcome.

But an increase in GDP per capita does not necessarily translate into social progress. Therefore the authors purposely complement the economic angle by social indicators. This broad vision of development reflects a general awareness that was propelled by Amartya Sen (Sen 1999) and translated into human development indicators by the UN. This approach has gained ground. Indeed, the Europe 2020 headline targets include socio-economic and environmental targets (European Commission). At EU level again, “Beyond GDP” (European Commission) offers not only economic indicators, but also social, environmental and well-being ones. The authors take as a reference the Stiglitz-Sen-Fitoussi report (Stiglitz, Sen and Fitoussi 2009), a French initiative used internationally.

2. Original findings and features of the LCR

Once the objectives and definitions of the key concepts of the report are set, the report is structured with an analytical part, a competitiveness diagnostics, an assessment and a prioritisation.

The analysis

The analytical second part of the LCR is based on three pillars - prosperity outcomes, intermediate indicators and competitiveness fundamentals - that can feed into each other. This rather simple structure makes the report clear and exhaustive. The report “scans” the Latvian economy from all levels: micro-, meso- (intermediate indicators on sectoral composition) and macroeconomic. The scope and variety of experts provides insight into all topics ranging from the labour market to fiscal policy and many more areas.

A considerable amount of data is processed. More than 100 indicators are selected. All data are from secondary sources. But this is not a shortcoming. On the contrary, it offers the reader a synthesis. Since this considerable collecting effort has been done once, it would be highly appropriate to capitalise on it and pursue it. The idea of renewing the report is discussed later in the review.

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3 http://hdr.undp.org
4 http://ec.europa.eu/europe2020/targets/eu-targets/index_en.htm
5 http://www.beyond-gdp.eu
The LCR is the strongest in its country-specific perspective. While many facts and data are often available in other publications, the background explanations are unique. The mix of international academic knowledge and Latvian knowledge offers insightful comparisons, especially with other countries. The most insightful parts for the reader not knowledgeable about the Latvian economy are certainly the precise analysis of the institutional specificities. This reader will learn about the Latvian wage bargaining system and about the system of “envelope wages”. The part on the under-development of the Latvian financial markets is also very substantial and insightful for a better understanding of its impact on the macro-economic situation. The explanations about legal aspects of innovation in Latvia clarify why the legal framework limits incentives for commercialisation of innovation.

Interestingly, the macro-economic imbalances section of the so-called “intermediate indicators” is very much in line with recently enacted monitoring mechanisms at EU level that intend to prevent the build-up of imbalances at an early stage. The Alert Mechanism Report in 2012 did not identify that Latvia needed an in-depth review as part of the Macroeconomic Imbalance Procedure. A repetition of the LCR, as discussed later in this review, would offer an additional useful source to determine the signals of potential future crises.

The diagnostics

Diagnostics is performed by isolating the areas that constrain growth most. What is meant by “diagnostics” is taken from the literature (Hausmann Rodrik and Velasco 2005). A methodology, such as a decision tree, can be used to identify issues more cumbersome than others. The areas selected have the largest knock-on effect on the rest of the economy. Three issues are selected to perform diagnostics: the large size of the shadow economy in Latvia, the low share of manufacturing, and the high level of income inequality.

The main problem with the informal economy is that its negative effects are pervasive and affect all sectors, not only areas traditionally dominated by informality in Latvia. What is more, informality tends to inhibit productivity growth and discourage foreign direct investment (FDI). The second issue, the low share of manufacturing in Latvia, is partly explained by low FDI. In comparison to Estonia, Latvia has not attracted as much FDI geared towards export sectors. The National Reform Programme of 2011 also mentions this shortcoming of a limited manufacturing sector. But this phenomenon is rather recent historically. The paradox is that Latvia had a large manufacturing sector in the Soviet era. The authors regret that Latvia has not been able to transform itself into a competitive economy and has therefore shrunk.

The monopolistic character of certain sectors can sometimes explain lack of incentives for modernisation and innovation. The choice of inequality as the third area has to do with the economic structure of Latvia. Latvia has the highest gini coefficient of all EU member states, signalling a worrying inequality in distribution of incomes. The report reflects on why and

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7 http://ec.europa.eu/economy_finance/economic_governance/macroeconomic_imbalance_procedure/index_en.htm
how inequality affects competitiveness. The distribution of skill levels across the population, the heterogeneity in capital and technological intensity across sectors and industrial composition itself (very low versus very high productivity sectors) contribute to fuelling inequalities. Indeed, the LCR identifies access to education across regions, migration and informality as key explaining factors of inequalities.

The prioritisation

As the authors note, the same structural problems persist over time. Latvian institutional specificities are largely responsible for the inertia. The authors call for urgent institutional changes to break the harmful effect of short-termism. The recent fiscal discipline law as well as electoral reform or use of a more diversified pool of talent in public administration are among the suggestions.

In the prioritization effort, the LCR is in line with the EU approach which favours focus on a few outstanding issues rather than on a laundry list of measures. Six problematic areas and two areas of strength are identified as standing out. Priority weaknesses include inequality, innovation, the low share of manufacturing, education, under-development of financial markets and informality. Priority strength areas are export diversification and transport and logistics infrastructure. Among those, three are singled out as the most crucial priorities: informality, education, and transport infrastructure.

Even if it is subject to discussion, the prioritisation exercise is highly valuable. It helps focus attention on only a few high impact areas. Nonetheless, the technique for prioritizing could be explained further, especially if the report is to be reproduced in the future for Latvia or for another country. This would ensure consistency across time and regions. It would also make the final choices even more credible. Some might debate selection of informality and education as priorities. Informality is very difficult to estimate and education could be seen from a wider angle, i.e. skills. Workforce training together with education would have been a relevant proposal. The third priority, transport infrastructure, has a strong EU component. This is also why the report should be read outside Latvia. Large scale infrastructure and transport projects are a typical area of cross-border industrial policy.

3. The report’s input for policymaking

Are the recommendations of the LCR detailed enough?

Since policymakers in Latvia receive recommendations from different sources, what is the specificity of the LCR with regard to other reports? Comparing with country-specific recommendations at EU level helps understand the specificity of the LCR recommendations. Among the three priorities identified in the LCR, education is the only one that coincides with one of the European Semester Country-specific Recommendations 2012-2013. The

objectives of the LCR and the European Semester overlap, but are intrinsically different. The European Semester is developed with a three-pronged objective in mind while the LCR is centred on competitiveness. The three objectives of the European Semester are 1/ monitoring budgetary discipline in the EU 2/ monitoring Europe 2020 progress 3/ preventing emerging macro-economic imbalances. In practice, the European Semester leads to identification of country-specific recommendations on a yearly basis in line with priorities laid out in the annual growth survey. The LCR mentions immediate possible changes but focuses its prioritisation on a longer term approach. Changes in the areas selected (e.g. education or transport infrastructure) are to be tackled immediately but will not bring immediate results. Therefore, monitoring them on a one year cycle is more difficult.

Since the report builds on the academic field of applied economics, should the authors go at length into practical implementation of the recommendations? In fact, the level of detail of the recommendations of this edition is optimal, as they can be used as a starting point. The added value of the report stems from its thorough analysis and prioritisation, not from highly detailed prescriptions. In practice, policy decisions stem from a careful interdisciplinary approach, in consultation with stakeholders. The economist alone may not be able to find the cure. Depending on the issue, an economist would need for instance to collaborate with a public-private partnership specialist or an education specialist to offer very specific advice. Concrete policymaking solutions are based on experiments over time. The risk also arises, if the LCR is repeated over time, of the authors becoming both the judges and the judged.

Is the scope of the report broad enough?

The Stiglitz-Sen-Fitoussi report (2009) recommends setting aside issues related to sustainable development and environment as those deserve their own indicators and perspectives. The authors follow this approach so that sustainability/environment issues are almost absent (and analyses of these issues scarce) in the LCR.

An additional report would therefore be desirable. Especially so as the energy sector has been pinpointed as a recommendation in the European Semester exercise. If social indicators are included, why not also take into account sustainability indicators? GDP measures and welfare measures do not indicate whether the environment or natural resources are preserved in the long term. As environmental issues are as important as social issues for both intra-temporal and inter-temporal equity, it would be worth having at least one additional in-depth report.

Is the LCR the first report of a long series?

In the long run, the report offers a basis for independent and long term thinking about the Latvian economy. The report should be repeated in order to take stock of what has been achieved and what reform measures are still pending. Incidentally, the framework is broad enough to open later editions to newly emerging topics.

Every year, various organizations and stakeholders also analyse the Latvian economy from a ‘competitiveness angle’. One can mention the national reform programme, a yearly exercise by the national authorities and coordinated by the European Commission that touches upon competitiveness issues. The “Member States competitiveness performance and policies 2011” report\textsuperscript{13} is a case in point as it is a yearly monitoring exercise from the European Commission. The World Bank’s ‘Doing Business’ (World Bank 2012)\textsuperscript{14} or the ‘IMD World Competitiveness Yearbook’ (IMD 2012)\textsuperscript{15} are also reports that look at member state economies from a competitiveness stance. All shed some light on the underlying strengths and shortcomings of the Latvian economy. While the national reform programme provides an exhaustive overview, it is not an independent exercise. The international rankings, on the other hand, provide some comparability across countries but only help identify some outstanding issues, not their source or how to resolve them. The added value of ranking is mainly to raise awareness. The ‘Member States competitiveness performance and policies 2011’ mixes in-depth thematic analyses and country-specific knowledge. But it is centred on benchmarking and does not aim to reach the same level of detail as the LCR. The LCR therefore has no equivalent.

Considering that the positioning of the LCR is unique, clearly the exercise should be repeated. But at what frequency and with what content? The framework offers a base that could be followed yearly or biennially. The OECD typically conducts country reports with a thematic approach on a biennial basis (OECD)\textsuperscript{16}. But Latvia is currently not part of the OECD. Moreover, OECD topics change according to a set of chosen policy priorities. They are not called ‘competitiveness reports’ even though the content is very much related to competitiveness issues. The optimal option could be a mixed approach, with a skeleton structure that does not change and a few in-depth issues that vary. This formula would benefit from comparability across time and from thorough insights into specific areas.

Maya Jollès, European Commission

*Views expressed in this review represent the position of the author and do not necessarily reflect those of the European Commission.*

\textsuperscript{13} http://ec.europa.eu/enterprise/policies/industrial-competitiveness/monitoring-member-states/index_en.htm
\textsuperscript{14} www.doingbusiness.org
\textsuperscript{15} http://www.imd.org/research/publications/wcy/index.cfm
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An Econometric Evaluation of the Latvian Labour Market and How it Functions

Anna Zasova

Defended on 10 April 2012 at the University of Latvia. The thesis is available at the library of the University of Latvia, Kalpaka blvd. 4, Riga.

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Like other countries that joined the EU on 1 May 2004, Latvia is supposed to join the Eurozone at some point. In circumstances where the government’s ability to use fiscal stimulus is restricted by EU fiscal discipline, the only shock absorption mechanism available to a Eurozone member state is a flexible labour market. The goal of the thesis was to evaluate the degree of Latvian labour flexibility and the role of labour market institutions in its formation. First, the thesis analyses Latvian labour market institutions relative to other European countries and the institutional changes that took place after the beginning of the recession in 2008. It was shown that in general labour market institutions in Latvia tend to be rather restrictive – the tax burden on labour is relatively high, employment protection legislation norms are strict, and the ratio of minimum wage to average earnings is high. Yet the thesis identifies several signals suggesting that law enforcement in Latvia is weak as compared to other EU countries, which allows for a flexible reaction of labour market participants to changing market circumstances.

Second, the thesis analyses adjustment of the Latvian economy to adverse shocks in the past and estimates real wage flexibility, using a structural VAR model. It was shown that real wages in Latvia are relatively flexible, which enabled recovery of the Latvian economy from the recession in the aftermath of the 2008 crisis without resorting to realignment of the nominal exchange rate.

Third, it was shown that the equilibrium unemployment rate (NAIRU) declined between 1996 and 2008, suggesting increased efficiency of the labour market. The equilibrium unemployment rate increased during the latest recession but the increase was minor. Factors that significantly affected the dynamics of NAIRU were labour emigration (downward impact) and the ratio of the minimum wage to average remuneration of employees (upward impact).

Finally, using a macroeconometric model of the Latvian economy and a unique dataset of EU fund expenditures derived from project-level data, it was shown that fund-financed activities aimed at raising the qualifications of the labour force had contributed to higher shock absorption capacity of the Latvian labour market.

To conclude, the results suggest that the Latvian labour market is flexible and that EU funds have contributed to increased efficiency. At the same time, there is evidence suggesting that
the flexible reaction of the labour market is to a large extent achieved by employers circumventing the formal rules. This in itself creates distortions in the market - the efficiency of the economy could be increased if resources spent on getting around the regulations were spent more productively. Moreover, deviations from the formal rules, being provoked by the strictness of the rules, undermine the merit of labour market institutions, which are there in the first place to protect workers and increase their welfare.
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