Labour Markets Dynamics and Characteristics in Bulgaria and Romania – Challenges for a Successful Integration in the European Union

by

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1. Introduction

Eastern Enlargement of European Union has generated unprecedented challenges for both the old member countries and new member states (NMS). The main concerns of the old EU-15 countries refer to the undesirable effects that the process may have on their labour markets and income distribution. In particular the potential large inflow of low-cost labour and de-localisation of enterprises from the West to the East were expected to result in deterioration of job chances and living standards of low skilled workers. On the other side, the NMS and the accession countries are facing the challenge of continuing restructuring of their economies combined with the striving for adopting EU regulations and rules of a single market.

In the last five years mounting evidence on the implications of Eastern Enlargement on old member countries have appeared. The literature focuses mainly on the effects triggered by channels of immigration, trade and foreign direct investment (Boeri and Brucker (2001); Burda (1998), Bauer and Zimmerman (1995); Schneider (2001)). At the same time the implications of EU integration for the labour markets in the NMS and accession countries have not been studied closely yet. The existing studies confine to descriptive reviews of the pre-accession situation and deriving challenges for the policy designs and interventions (Burda (1998), Burger and Schneider (2004)). Several papers have focused on the labour market flexibility as a pre-condition for successful labour market adjustment to the potential shocks that transition countries may experience after joining EU. Gruber (2004) analyses the labour market developments and labour market flexibility in five Central European countries and finds a higher labour-cost flexibility in them than in the EU in general, but small and even insignificant supply side flexibility, notably occupational and regional mobility. Thus, the paper suggest that the NMS have to make further efforts to enhance labour market flexibility otherwise the early participation in the euro area may not be an optimal option for some of the countries. Huber (2004) investigates the capability of regional labour markets in the candidate countries (as they were defined in late 1990s) to adjust to the potential asymmetric shocks and concludes that regional wage flexibility is more effective labour market adjustment mechanism than internal migration.

Labour market flexibility is becoming a central topic in the literature on the impact of EU enlargement on the NMS and candidate countries due to its growing importance with the decrease of degrees of freedom for national monetary policies imposed by Economic and Monetary Union (EMU). After joining the EU, the NMS are required to observe a number of obligations embodied in the EMU architecture, to participate in the exchange rate mechanism governed by common EU rules and to adopt euro as the final step of monetary integration. In this process, as the optimum currency area theory suggests (Mundel, 1961), the flexible labour markets become crucial for adjusting to the idiosyncratic shocks that the integration may trigger. Several studies have provided evidence on substantial asymmetric macro shocks between old and would-be member states (Horvath, 2001; Egert et.al., 2003). Labour market flexibility plays also a decisive role for the successful

continuation of the process of economic restructuring and reallocation of labour in line with common EU structure (Paas et.al, 2003).

This paper aims to contribute to the existing studies on the impact of EU integration on Central and Eastern European Countries by analysing challenges and implications for the labour markets of two candidate countries - Bulgaria and Romania that are supposed to join the EU on 1st of January, 2007. In particular it analyses the responsiveness of the labour markets in Bulgaria and Romania to macroeconomic shocks using a co-integrated structural VAR model[2]. The main objective is to identify shocks that might affect labour market equilibrium in general and especially those of them that may exert impact on unemployment using quarterly data on five key labour market indicators (employment, unemployment, wages, prices, labour productivity) for the period 1996-2005. The analysis draws on data from national official statistics in the two countries and from international organisations (ILO, Eurostat, World Bank). The study covers the period 1998 – 2005 for Bulgaria and 1996-2004 for Romania. The main reason behind selection of the periods is data limitations[3].

Empirical analysis is based on a small macro economic model introduced by Dolado and Jimeno (1997) for studying causes of Spanish unemployment. The model was also applied for explaining the historical record of German unemployment rate by Linzert (2001). Similar attempts of analysing labour market dynamics using structural VAR models have been provided by Carstensen and Hansen (2000) for West Germany, Hansen and Warne (2001) for Denmark and Jacobson et.al.(1998) for the Scandinavian countries. Dynamic effects of various macroeconomic shocks on labour markets in the transition countries have not been studied closely yet. To our knowledge this is the first attempt to apply co-integrated structural VAR approach to the labour market experience in Bulgaria and Romania and to use it for forecasting of potential implications of EU accession on the labour market equilibrium[4].

The structure of the paper is as follows. Next section presents in brief some stylised facts about labour market developments in Romania and Bulgaria since the beginning of the transition that generates some ideas about the importance of macroeconomic shocks for the labour markets. This section reviews also the current state of the labour markets in the two countries in the view of Lisbon Agenda and discusses the main challenges that the fulfilment of its goals will trigger. Section 3 presents the small macro-economic model suggested by Dolado and

[2] Unlike the traditional VAR approach the corresponding structural VAR model uses economic theory to sort out the contemporaneous links among the variables and require identifying restrictions from the macroeconomic model, thus allowing for the interpretation of the system dynamics.

[3] For example quarterly on from LFS are available since 1996 for Romania. In Bulgaria the introduction of the Currency Board in 1997 changed substantially the policy mix and macro-economic situation in the country. Most of the macro economic time series has not been directly comparable with those before the 1997. Therefore, the macroeconomic analysis for Bulgaria uses data since 1998 onwards.

[4] World Bank Report (2005) uses two different VAR models (unrestricted and restricted) to test wage flexibility through the observation of real wage and unemployment dynamics. The study however focuses on the responsiveness of wages to the unemployment. Empirical analysis based on quarterly data from the third quarter of 1997 to the last quarter of 2004 suggests that the wage flexibility is not statistically significant.

Jimeno (1997) and the corresponding structural VAR model. Section 4 reports empirical results. It analyzes the long-term relationships revealed by the co-integration tests and shows dynamics of the labour markets by means of impulse response functions and the forecast error decompositions. In this way, the paper identifies macro shocks that have affected labour markets in Bulgaria and Romania. The results from the VAR model are used to derive conclusions how sensitive the labour markets in the two countries would be to the shocks that the EU accession may trigger and to summarise the implications for the future policies aimed at increasing labour market flexibility.

Section 2: Labour markets in Bulgaria and Romania: facts and challenges in the view of Lisbon Agenda:

Employment

As candidate countries both Romania and Bulgaria incorporate Lisbon Agenda objectives and policies as central to their employment strategies[5]. The two countries however differ substantially in the levels and dynamics of their employment. Romania was one of the few countries in CEE where the initial adjustments occurred more in real wages, while the employment decline was limited. In contrary in Bulgaria economic restructuring led to sharp downwards adjustments in employment and a painfully high level of unemployment in the initial years of transition. When the Lisbon Agenda was launched in 2000, the employment rate in Romania was at around the EU average level (see table 1) and higher than in the new member states of the EU and Bulgaria. Bulgaria, on the other hand, had one of the lowest employment rates among the group of NMS and candidate countries - around 50% in 2000. Starting at different positions in 2000, by 2004, however, Bulgaria gained around 4% in employment and Romania lost 5%. The year 2004 was the first one of net employment expansion. The increase was marginal, but yet a good sign that enterprise restructuring as well as structural reforms in the public sector were yielding results. Some of the reverse in the employment trend in 2004 was attributable to the cycle of economic growth that Romania has experienced since 2001, of four years of robust economic growth of around 4-5% per annum. The recent fiscal relaxation introduced in 2005 through the adoption of the 16% flat income and profit tax rate led to a further expansion of employment, as the preliminary official statistical data suggest.

Unlike Romania, in Bulgaria the process of labour shedding of the surplus workforce by newly privatized firms and restructured ones took place in the period 1998-2001. During that period, both participation and employment declined. Since 2001, due in large part to sound macroeconomic policies and deep structural

[5] In March 2000 the European Council in Lisbon set an overall objective for the European economy to become the most competitive and dynamic knowledge-based economy in the world. To fulfil this strategic objective, the Lisbon agenda set quantitative targets - to increase the European employment rate to 70% overall, 60% for women, and 50% for older workers (aged 55 to 64) by 2010. The mid-term evaluation of the progress towards achieving the employment targets indicated however that the targets set were over-ambitious and the member states were not making sufficient progress toward achieving the Lisbon goals. Despite efforts made by the member states, the European employment rate increased only by 1%, from 61.9% in 1999 to 62.9% in 2003. Consequently, in March 2005, the Lisbon Agenda was revised and the focus was reoriented towards "delivering strong and lasting growth and more and better jobs".

reforms, Bulgaria has experienced sustained annual economic growth of around 4%. Employment has been steadily increasing by an average annual growth of 3% and this is reflected in both participation and employment rates (see table 1). Despite the positive economic developments in recent years, the labour market continues to face difficulties in creating employment opportunities. The number of jobs opened in the formal sector has hardly responded to macroeconomic growth. In order to meet Lisbon targets by 2010, Bulgaria needs to increase employment by 8% per year in the period 2005-2010, while labour market participation would have to increase by about 2% per year during the same period.

Table 1: Employment rate of population aged 15-64 in the EU, NMS and candidate countries

Employment rates	**2000**	**2001**	**2002**	**2003**	**2004**
EU (25 countries)	62.4	62.8	62.8	62.9	63.3
EU (15 countries)	63.4	64	64.2	64.3	64.7
Euro-zone	61.7	:	62.4	62.6	63
Euro-zone (12 countries)	:	62.2	62.4	62.6	63
Czech Republic	65	65	65.4	64.7	64.2
Estonia	60.4	61	62	62.9	63
Latvia	57.5	58.6	60.4	61.8	62.3
Lithuania	59.1	57.5	59.9	61.1	61.2
Hungary	56.3	56.2	56.2	57	56.8
Poland	55	53.4	51.5	51.2	51.7
Slovenia	62.8	63.8	63.4	62.6	65.3
Slovakia	56.8	56.8	56.8	57.7	57
Bulgaria	**50.4**	**49.7**	**50.6**	**52.5**	**54.2**
Croatia	:	:	:	53.4	54.7
Romania	**63**	**62.4**	**57.6**	**57.6**	**57.7**

Source: Eurostat.

As regards to Lisbon target of female employment both countries are in better position than with respect to overall employment. The female employment rates in Romania and Bulgaria are lower but very close to EU-average in 2004, being 53% and 51% (table 2). Romania started with a rate very close to the Lisbon target in 2000, but similarly to the overall employment rate, it decreased by a further 5% from 2001 to 2003 before starting to pick up in 2004. Unlike Romania, though, Bulgaria has experienced a growing female employment rate from 2000.

Table 2: Female employment rates for NMS and candidate countries

Female employment rates	**2000**	**2001**	**2002**	**2003**	**2004**
EU (25 countries)	53.6	54.3	54.7	55	55.7
EU (15 countries)	54.1	55	55.6	56	56.8
Euro-zone	51.7	:	53.1	53.6	54.5
Euro-zone (12 countries)	:	52.4	53.1	53.6	54.5
Czech Republic	56.9	56.9	57	56.3	56
Estonia	56.9	57.4	57.9	59	60
Latvia	53.8	55.7	56.8	57.9	58.5
Lithuania	57.7	56.2	57.2	58.4	57.8
Hungary	49.7	49.8	49.8	50.9	50.7
Poland	48.9	47.7	46.2	46	46.2
Slovenia	58.4	58.8	58.6	57.6	60.5
Slovakia	51.5	51.8	51.4	52.2	50.9
Bulgaria	**46.3**	**46.8**	**47.5**	**49**	**50.6**
Croatia	:	:	:	46.7	47.8
Romania	**57.5**	**57.1**	**51.8**	**51.5**	**52.1**

Source: Eurostat.

As regards to employment participation of older workers in both Bulgaria and Romania it is far away from the Lisbon targets. This is true for the majority of NMS, as well. As table 3 below shows, countries like Hungary, Slovakia, Poland and Slovenia are in the same situation as Bulgaria and Romania. In the case of Romania, one can conclude that the employment policies pursued were not effective in increasing older worker employment rate, since the rates have most of the time been decreasing, while Bulgaria has been more successful in achieving the old age employment goal. One has to further notice that Bulgaria started with an employment rate two times and a half smaller than Romania. In 2004 the difference was narrowed to only 4%, with Bulgaria gaining 12% in elderly employment and Romania losing 13%[6].

Increasing overall employment and employment of women and old persons in accordance with the Lisbon Agenda appears to be a main challenge for the labour markets in the two countries. Moreover, the current state

[6] One needs to be cautious in interpreting the recent dynamics of the employment rates of women and older workers. The lower female and older workers activity rates reflect the higher participation of those groups in the subsistence agricultural sector. Decline in the female activity has been largely involuntary, attributable to the discouragement from the lack of employment opportunities long-term unemployment during transition. Therefore a large percentage of inactive women are expected to return to work when labour market conditions start improving. Recently estimated labour market transition probabilities[6] from out of the labour force into employment show an important female added worker effect, where women enter the labour market to compensate for the withdrawal of men (World Bank, 2004).

shows that there is still a long way to go and the quantitative targets will not be easy taken. The increase in employment will narrow the income gap and will facilitate the convergence with the EU of the two countries.

Table 3 Employment rates for older workers

Older worker	**2000**	**2001**	**2002**	**2003**	**2004**
Czech Republic	35.6	37.1	40.7		42.6
Estonia	44.6	46.4	51.6	52.1	51.4
Latvia	36.8	37.4	42.1	44.1	47.9
Lithuania			41.8	44.6	46.8
Hungary	22.2	24.1	25.6	29	31
Poland	28.5	29	27.9	28.6	28
Slovenia		24.7	26.5	23.9	31.1
Slovakia	21.3	22.9	23.6	25.5	26.7
Bulgaria	**20.3**	**23.9**	**27.7**	**30.1**	**32.5**
Romania	**49.5**	**48.2**	**37.7**	**38**	**36.8**

Source: ILO

Efforts toward achieving the Lisbon objectives will contribute also towards meeting the demographic challenges that both Bulgaria and Romania are currently facing. Both countries have been experiencing negative population growth since the late 90s. The combination of low fertility rates and increased mortality, coupled with negative net migration flows, is expected to result in further population decline in the next years. If the basic demographic trends do not reverse, and there are no signs of that, the two countries will continue to be affected by accelerated population ageing. Bulgaria is the country with the highest proportion of the population aged 65 and over among all new member states and candidate countries – 17% in 2002 compared to 16% in the EU-15 in 2000. The share of the elderly population is expected to grow further to 25% by 2020. At the same time, while the number and share of older people will increase, the number and share of young people (0-14 years) will decline in Bulgaria. The low fertility rates below the replacement levels, has lead to a process of dejuvenation. The combination of dejuvenation in younger age groups, the expected further decline in the working age population and the ongoing trend of ageing is obscured in the total (demographic) dependency ratio (number of aged 0-14 and 65 and over compared to the population between 15 and 64). In Bulgaria this ratio is forecasted to raise from 45% in 2004 to about 50,4% in 2020. In Romania the ratio of beneficiaries to contributors to the PAYG pension system is one of the highest in Europe. As an effect, despite relatively low pensions, the pension system in the country runs a large deficit of around 1% of GDP, which has the potential to increase further. To mitigate the most damaging effects of demographic trends and, in particular, to compensate for the predicted drop in the working age population, the two countries need to increase substantially participation and

employment, to encourage investment in human resources and higher productivity through reforms, research and innovation.

Unemployment

High and persistent unemployment is another important characteristic of the labour markets in Bulgaria and Romania that is common also for some EU countries and NMS. Similar to other transition countries in Bulgaria and Romania unemployment emerged inevitably as a result of enterprise restructuring and output contraction. Romania was among the few former socialist economies (together with Czech Republic and Russia) that have experienced relatively low unemployment. Even after the rise due to the rapid and sustained GDP expansion in recent years, LFS unemployment rate has stabilized at around 7-8%. Bulgaria, on the other hand, has experienced severe unemployment, that reached a peak of 19% in 2000, concomitant with high output growth rates. Since then, the unemployment rate has steadily declined. By 2004 it reached 11.8%, of which 60% were long-term unemployed. The unemployment rate continued to decline further in 2005 to 10.7%.

The low unemployment/high employment figures in Romania are indication of the limited restructuring of the economy. At the same time decrease in employment has not been matched by a proportional increase in unemployment. Limited employment opportunities have push people out of the labour force, or into subsistence agriculture and the urban informal sector. Estimates of the informal economic sector in Romania range between 20% and 30% of GDP. Surveys suggest that the informal economic activities provide a large number of low paid jobs to unskilled individuals who cannot find formal employment. Another important factor that explains the low unemployment is the large external migration. Romania has experienced in the last four years high net outflows of workers, who were attracted by higher wages and better job prospects in the EU. Estimates suggest that more than 1.5 million Romanians currently work abroad. They send around Euro 4.3 bn per annum back to their country, which represents around 5% of GDP.

Unemployment in Bulgaria and Romania is characterized by low outflows and a prolonged average duration. Various studies[7] have showed that more than 50% of the unemployed in both Romania and Bulgaria are long term. This indicates a significant mismatch between skills and jobs, and between the location of unemployed and the location of jobs. At the same time, long-term unemployment affects the population asymmetrically. The most affected categories are newly graduates, lower educated and older age workers.

The current economic situation is favourable to addressing structural weaknesses in both countries, since they have been growing robustly for several years. Under such circumstances, encouraging job creation and reducing mismatch should be easier and more affordable.

[7] for example World Bank (2004), Country Economic Memorandum for Romania.

Labour Market Flexibility

Despite the progress made, both countries have been consistently criticised for labour market rigidities which contribute towards increasing the labour costs. High labour taxes are serious impediments to labour adjustment and job creation in both Bulgaria and Romania. In recent years both countries have made some progress towards reducing the non-wage component of the labour cost. In 2003, the total social security contributions have been decreased by 5% in Romania and, in 2005, by 6% in Bulgaria. These cuts are welcomed and further reductions are announced[8], but both countries still have large non-wage components of the labour costs, as payroll taxes amounted in 2005 to 49% of the gross wage in Romania and to 44% in Bulgaria.

Table 4: Non wage components of the labour costs –comparative figures

	Social security contribution			**Health care contribution**			**Contribution to the unemployment fund**			**Total**
	Employer's	**Worker**	**Total**	**Employer's**	**Worker**	**Total**	**Employer's**	**Worker**	**Total**	
Bulgaria	**0.37**	**0.02**	**0.39**	**0**	**0**	**0**	**0.04**	**0.01**	**0.05**	**0.44**
Czech Rep.	0.2	0.07	0.26	0.09	0.05	0.14	0.03	0	0.03	0.43
Hungary	0.22	0.05	0.27	0.11	0.03	0.14	0	0	0	0.41
Poland	0.1	0.1	0.2	0.07	0.09	0.16	0.04	0	0.04	0.4
Romania	**0.22**	**0.095**	**0.315**	**0.07**	**0.065**	**0.135**	**0.03**	**0.01**	**0.04**	**0.49**
EU			0.24						0.13	0.37

Source: World Bank.

With respect to employment legislation, both Romania and Bulgaria have enacted significant amendments to laws and changes to the regulations that are broadly in line with the EU standards. New labour codes were adopted in 1992 in Bulgaria[9] and in 2003 in Romania. Nowadays the main challenges refer to the legal restrictions imposed on the part time and temporary work, as well as on pursuing collective redundancies in Romania. The only valid reason that the labour code accepts for dismissals is economic hardship, although firms might need to fire workers just to improve their competitiveness. Employers need to adjust to adverse economic conditions and the reduction in the number of workers is one possible policy to do it. Economic reasons should therefore be included as valid arguments for dismissals. The main legal challenges for Bulgaria are folding the wage premium for seniority into the base wage (and thus eliminating it); more elastic use of temporary contracts

[8] In 2006 a further cut of 2% in the social security contribution of the employers is planned in Romania.
[9] Since then more modest changes to the Bulgarian labour code have been undertaken, the most significant of them in 2001. In the case of Romania, revisions were done in 2005.

and working schedules; allowing more flexible terms for hiring and firing in response to changes in production levels, performance and absenteeism.

Sectoral employment structures and reallocation

Integration into the EU economic system means that the formerly socialist countries need to compete in a new economic environment. From a labour market point of view this means a further significant labour adjustment, which will, likely, ultimately result in convergence towards the EU employment structures. In this context, we attempt to measure how far Romania and Bulgaria are from the EU in terms of labour market composition and how differences have evolved in time. For this purpose, we compare sectoral employment distributions in the EU and the two countries at different points in time: 1989, 1995, 1999 and 2003, which is the last year for which comparable information is available for all countries. We introduce measures of restructuring in order to assess how much restructuring has taken place in between the cross-sections, and whether restructuring has led to reducing the distance from the EU sectoral employment structures.

Table 5 presents the 1989 employment structure in Bulgaria, Romania and selected EU members. The table shows that the former communist countries started the transition with a substantially different employment breakdown than the EU members, and in particular with much higher agricultural employment.

Table 5: Sectoral employment in 1989 in Romania, Bulgaria and selected EU countries (%)

	Bulgaria	**Romania**	**Poland**	**Italy**	**Spain**	**UK**
Agriculture	18.7	27.9	25.3	9.2	13.0	2.1
Mining	2.6	2.8	3.4	1.1	0.6	0.8
Manufacturing	34.3	34.7	25.7	22.4	22.3	20.4
Electricity, gas, water	0.8	0.5	1.1	0.0	0.7	1.1
Construction	7.6	7.0	7.9	8.5	9.3	6.8
Trade	9.6	5.9	9.8	21.1	20.1	20.1
Transportation	6.6	6.9	7.2	5.5	5.8	5.7
Finance	1.4	0.3	2.2	4.1	5.2	11.2
Community services	18.4	13.8	16.8	28.2	23.0	30.6
Other	0.0	0.0	0.8	0.0	0.0	1.2

Source: ILO and author's computations

Romania had the largest share of agricultural employment among Central Eastern European countries (CEEs), although marginally larger than Poland. The manufacturing sector was the largest employer by far in both

Bulgaria and Romania. Services in general, and trade in particular, is sector where employment in the CEEs was much lower, especially in Romania. Under central planning the accent was on increasing material output, while services were largely neglected. As the tendency was to increase industrial production, in a low labour productivity environment, the eventual expansion of output was achieved by pursuing expansionary employment policies.

Following methodology of Jackman (1997) we compute a measure of the potential restructuring that is reported in the last rows of table 6, table 7 and table 8. The underlying assumption is that Bulgaria and Romania will reach, in the long term, a structure of employment similar to the average employment structure in the EU. In addition, we compute the potential restructuring needed for the average employment structure of the NMS, in order to assess their eventual advances in employment convergence with the EU, and compare the speed of convergence with Bulgaria's and Romania's. The restructuring index is defined as the proportion of the workforce that would need to change sectors in order to attain a structure of employment similar to the EU.

Table 6. Sectoral employment in 1995 in Romania, Bulgaria, Poland, EU-15, and NMS

1995	EU-15	NMS	Poland	Romania	Bulgaria[1]
Agriculture, sylviculture and fishing	5.18	16.47	22.62	40.33	*24.35*
Mining and quarrying	0.47	2.12	3.02	2.52	*1.98*
Manufacturing	21.43	23.28	21.09	22.40	*23.81*
Electricity, gas and water supply	0.91	2.01	1.80	1.83	*1.74*
Construction	8.01	6.73	6.07	4.20	*5.05*
Wholesale and retail trade	15.20	12.27	12.24	6.43	*9.78*
Hotels and restaurants	3.88	2.06	1.31	1.24	*2.33*
Transport, storage and communication	5.87	6.81	5.79	4.99	*7.67*
Financial intermediation	3.45	1.89	2.00	0.78	*1.30*
Real estate	6.73	3.26	2.28	1.38	*3.10*
Public administration, defence	7.76	5.51	4.63	5.05	*2.23*
Education	6.34	7.23	6.75	3.91	*7.79*
Health	8.93	6.32	6.59	3.10	*5.70*
Other community, Social and Personal Service Activities	4.56	3.93	3.66	1.85	*3.16*
Restructuring index (base=EU 15)		**17.71**	**21.29**	**39.10**	***27.14***
Restructuring index NMS (base=NMS)			**7.44**	**24.27**	***10.1***
Restructuring index Poland (base=Poland)				**19.48**	

Source: ILO and author's computations

Owing to their gradual approach to reforms, both Bulgaria and Romania had difficulties to enhance the creation of new jobs in the sectors that, by comparison to the EU, appeared to be in deficit of workforce. While job destruction in the declining sectors advanced substantially, new jobs were not created at sufficient speed to compensate loses, leading to large inflows into unemployment, in general long term, out of the labour force or into agriculture, which became the employer of last resort. Consequently, and contrary to expectations, in the early years of transition employment in agriculture increased instead of decreasing. This increase was in the opposite direction to the expected reallocation of workers needed in order to converge towards the EU sectoral employment composition. The restructuring index confirms that, in terms of sectoral allocation and dynamics, the employment situation in 1995 was not improving, especially in Romania (see table 6). In 1995, almost 40% of the workforce needed to change sectors in order to reach an employment structure similar to the one the average EU member had in 1995. In Bulgaria's case, the percentage was smaller, at below 30%. Even in the case of the NMS, the restructuring index shows that at that time around 20% of the workforce needed to change sectors.

Table 7. Sectoral employment in 1999 in Romania, Bulgaria, Poland, EU-15, and NMS

1999	EU-15	NMS	Poland	Romania	Bulgaria
Agriculture, sylviculture and fishing	4.52	13.22	18.07	41.75	25.76
Mining and quarrying	0.36	1.57	2.13	1.73	1.57
Manufacturing	20.45	22.65	20.66	20.09	21.11
Electircity, gas and water supply	0.76	1.88	1.67	2.07	1.89
Construction	8.04	7.28	6.86	3.68	4.28
Wholesale and retail trade	15.14	13.86	14.20	8.60	11.48
Hotels and restaurants	4.07	2.37	1.50	1.15	2.59
Transport, storage and communication	5.88	6.90	6.06	4.64	7.55
Financial intermediation	3.38	2.28	2.62	0.81	1.12
Real estate	8.15	4.10	3.43	1.31	3.70
Public administration, defence, education, health	7.42	6.13	5.23	4.94	2.91
Education	6.49	7.27	6.97	3.93	7.48
Health	9.40	6.54	6.97	3.16	5.31
Other community, Social and Personal Service Activities	4.64	3.81	3.57	2.14	3.23
Restucturing index (base=EU 15)		**15.03**	**17.11**	**39.92**	**26.9**
Restructuring index EU 15 - 1995		**13.29**	**15.37**	**39.00**	**25.48**
Restructuring index NMS(base=NMS)			**6.53**	**28.89**	**13.63**
Restructuring index Poland (base=Poland)				**24.09**	

Source: ILO and author's computations

By 1999, the situation had deteriorated further both in Bulgaria and Romania, and convergence towards the EU structures was clearly off track (see table 7). While economic restructuring was advancing, job creation in the expanding sectors was slow. Consequently, the increase in agricultural employment continued in both countries. During this period, by comparison, Poland lost another almost 4% of its agricultural workforce. The decline in employment in manufacturing continued, paradoxically leaving Romania with a share of industrial employment lower than the EU average. On the positive side, employment in wholesale trade started to grow in both countries, by around 2%, though other services did not show signs of net positive job creation. Other sectors, such as construction, continued to decline in terms of employment share.

The overall dynamics of economic restructuring is captured by the changes in the values of the restructuring indexes. In Romania, the restructuring index when computed against the employment structure of the EU in 1999 registered a further, though small, deterioration. If the index is computed relative to the 1995 own country employment structure a mild improvement is observed, indicating that progress occurred, though a timid one. Furthermore vis-à-vis the NMS, Romania exhibited a significant increase in the restructuring index, indicating a higher speed of adjustment of these countries towards EU structures. Bulgaria's performance is slightly better than Romania's but not impressive either. The restructuring index showed a small improvement of 0.2%, although, similar to Romania, the speed of adjustment relative to the NMS is considerably lower.

Table 8 repeats the analysis for 2003, which is the last year for which comparable data for all countries are available. Dynamics of the restructuring indexes shows improvements, although there is still significant caching up that both Romania and Bulgaria need to do. The figures capture the momentum that the reform process gained in both countries, after years of delayed reforms. Supported by favourable macroeconomic conditions, which made the reforms less painful, convergence started to gather speed after 2000. The first positive sign is the size of Romania's agricultural employment, which after many years of expansion, began to decrease, declining to around 35% of the workforce. For the first time, job creation is larger than job destruction, and people began to leave agricultural employment. The newly created jobs are primarily in the service sector, which suffered from a chronic deficit of workforce. Even the increase in employment in manufacture is a good sign, indicating that the sector has begun to correct its inherited distortions.

The positive signs are summarized in the decrease of the restructuring indices for both countries. In Romania's case, the decrease was from 40% to 33%, while in Bulgaria's the decrease was from 27% to 22%. In addition, Romania experienced an improvement in its employment structure vis-à-vis the NMS, from 28% to 24%. This indicates a higher speed of adjustment. Bulgaria has had a similar pace of labour reallocation to the NMS. The figures suggest that convergence of employment towards the EU structure is under way in both Bulgaria and Romania. It is of course difficult to assess how long it will take for convergence to be achieved, but there is evidence that the process is gathering speed.

Table 8: Sectoral employment in 2003 in Romania, Bulgaria, Poland, EU-15, and NMS

2003	EU-15	NMS	Poland	Romania	Bulgaria
Agriculture, sylviculture and fishing	4.78	12.49	18.42	35.70	25.47
Mining and quarrying	0.34	1.22	1.81	1.50	1.05
Manufacturing	22.04	21.79	19.04	21.68	20.09
Electircity, gas and water supply	0.87	1.79	1.84	2.03	1.87
Construction	9.43	7.13	5.90	4.62	4.23
Wholesale and retail trade	17.43	14.07	14.41	9.34	13.03
Hotels and restaurants	4.95	2.63	1.68	1.29	3.11
Transport, storage and communication	7.17	6.81	6.04	5.00	6.73
Financial intermediation	3.88	1.99	2.06	0.90	1.11
Real estate	10.96	5.47	5.10	1.63	4.76
Public administration, defence	9.06	6.59	6.26	5.75	3.59
Education	7.97	7.69	7.92	4.40	6.22
Health	11.71	6.34	6.15	3.80	4.79
Other community, Social and Personal Service Activities	5.56	3.76	3.30	2.37	3.93
Restucturing index EU 15		**9.51**	**16.08**	**33.23**	**22.4**
Restructuring index EU 15 1999		**13.33**	**17.85**	**34.81**	**23.6**
Restructuring index NMS			**7.20**	**23.72**	**13.7**

Source: ILO and author's computations

Section 3: Methodology

3.1. A Simple Macroeconomic Model

Empirical analysis of sensitivity of labour markets in the two countries to various macroeconomic shocks is based on a small macro economic model introduced by Dolado and Jimeno (1997) for studying causes of Spanish unemployment. The model is conventional one and consists of five basic relations that allow identifying the main shocks that may affect the labour market equilibrium: aggregate demand shocks, labour supply shocks, pushes to wages or prices and technology shocks. The first three equations in the model correspond to aggregate demand function, production function assuming constant returns to scale and price-setting equation allowing for a non-zero mark-up on unit labour costs:

$$y = \phi(d - p) \tag{1}$$
$$y = n + \theta$$
$$p = w - \theta + \mu$$

where y, p, n, w and $(d-p)$ denote the logs of output, price level, employment, nominal wages and real aggregate demand (reflecting fiscal and monetary policies); in turn , θ and μ represent shift factors in productivity and price-settings rule.

Dolado and Jimeno (1997) further characterise the supply side of the labour market adding the following three equations to the model:

$$l = c(w-p) - bu + \tau \tag{4}$$

$$w = w^* + \varepsilon_w + \gamma_1 \varepsilon_d + \gamma_2 \varepsilon_p \tag{5}$$

$$w^* = \arg\left\{n^e = (1-\lambda)n_{-1} + \lambda l_{-1}\right\} \tag{5'}$$

where l is the log of labour force, n^e is the expected value of log (employment), u is the unemployment rate, τ is a labour supply shift factor and ε_w, ε_d and ε_p are i.i.d shocks to wages, demand and prices, respectively.

Labour supply l depends on the real wages, the unemployment rate u - capturing the discouragement effect and other supply shift factors. Coefficients c and b are expected to be positive where the positive sign of b reflects discouragement of the unemployed. Equation (5) describes the wage-setting behaviour in the way similar to the Blanchard and Summers (1986). The targeted nominal wages are chosen one period in advance and are set to be equal to the weighted average of the lagged labour supply and employment. The possible presence of hysteresis effect is also incorporated in the model through the value of the coefficient λ. When $\lambda=0$ we observe full hysteresis and if $0<\lambda<1$ a partial hysteresis is observed. The stochastic parts of the equations are modelled as random walks. In particular:

$$\Delta d = \varepsilon_d \tag{6}$$

$$\Delta \theta = \varepsilon_s \tag{7}$$

$$\Delta \mu = \varepsilon_p \tag{8}$$

$$\Delta \tau = \varepsilon_l \tag{9}$$

where ε_w, ε_d and ε_p are i.i.d shocks to wages, demand and prices.

The model can be solved under two different assumptions: in partial hysteresis framework and under full hysteresis hypothesis. The latter case is equivalent to the unemployment rate being integrated of order 1. As regards to Bulgarian and Romanian data set used in the current study, the Augmented Dickey-Fuller tests do not reject the unit root restriction about unemployment (see table 9). Therefore in the present paper we believe that

the assumption that unemployment is I(1) and λ=0 is reasonable, at least for the period under consideration for both countries, All five macro-economic variables - productivity, employment, prices, real wages, unemployment in the model are treated as endogeneous and their dynamics is analysed in the econometric framework of VAR models. In particular the model is solved as to express the five variables solely in terms of structural shocks to technology, wages, prices, aggregate demand and labour supply (for technical details see Linzert (2001).).

According to the model aggregate demand shocks (ε_d) increase output and consequently employment while decreasing unemployment. Price shocks (ε_p) enter the production function with a negative sign and consequently decrease output and employment but have a positive effect on prices and wages. Wage shocks (ε_w) increase prices, wages and unemployment but they decrease output and employment. The impact of technological shocks (ε_s) depends on the size of the parameter ϕ in the demand equation in the model. If ϕ>1 then output and employment rise while unemployment will rise if ϕ<1. Theoretical model was used to obtain the restrictions on equations necessary to estimate the structural VAR model.

Section 4: Empirical results

4.1. Co-integration

All five macro-economic variables - productivity, employment, prices, real wages, unemployment in the model are treated as endogeneous and their dynamics is analysed in the econometric framework of VAR models. Empirical analysis makes use of quarterly data for the period 1998 – 2005 for Bulgaria and 1996-2004 for Romania on the following macro-economic indicators; GDP in national currencies (Yt); consumer prices index with a base year 1995-(Pt); average real wage (Wt); employment, measured in millions of persons (Et); unemployment rate, measured as percentage of the unemployed of the total labour force (Ut). In Romanian data set GDP is provided in constant 1995 prices while for Bulgaria real GDP was calculated deflating nominal GDP by consumer price index. In Romanian set data on unemployment and employment come from LFS while in Bulgarian case the unemployment refers to the registered unemployment. All series are in natural logarithms except for unemployment rate. Labour productivity is calculated as log (GDP_t/E_t). At the beginning all the time series were seasonally adjusted.

In order to decide on the type of VAR to be applied the empirical analysis starts with testing the non-stationarity of time series variables in the model by means of Augmented Dicky Fuller Tests (ADF tests). The ADF regressions have been augmented by a number of lags until coming up with a white noise residuals (as indicated by the Durbin Watson statistics (DW) in table 9). The regressions include a constant and a liner trend for the

levels tests and only a constant in the first differences tests. As the results from table 9 indicate, all the variables are integrated I(1) and are difference stationary except for the CPI index that's is border case[10].

Table 9: Results from ADF tests for integration

Statistics	Unemployment	Real wages	Employment	Productivity	Prices
Romania					
ADF – levels	-1.33	-2.13	-1.59	-0.58	-2.16
DW – levels	2.01	1.98	1.98	2.10	1.98
ADF - differences	-3.87	-6.01	-5.79	-4.55	-3.50
DW –differences	1.97	2.02	1.96	1.95	1.95
Bulgaria					
ADF – levels	-2.04	-3.59	-1.43	-2.45	-1.78
DW – levels	2.02	2.01	1.97	1.99	1.97
ADF - differences	-3.76	-4.18	-4.58	-3.80	-5.18
DW –differences	2.03	2.07	2.00	2.01	2.07

Note: Critical values for 5% significance level are -3.49 for the levels tests and -2.92 for the differences.

The non-stationarity of time series requires either using VAR in first differences or to apply VECM in case of co-integration among the variables. The vector error correction (VEC) specification restricts the long-term behaviour of the endogenous variables in the model to converge to their co-integrating relationship while allowing for a wide range of short-run dynamics. We implement the full information likelihood approach introduced by Johansen (1985) to test whether series are co-integrated. The test maybe performed subject to some assumptions about the trends in the series and about the constant and trend the co-integration equation. First we choose the lag order of the VAR model on the basis of Likelihood ratio (LR) test. To carry out LR test we estimate unrestricted VAR for each country four times each with different lags (starting from 4 to 1). The Akaike and Schwartz information criteria also select VAR(2) as the most appropriate specification. The tests indicate that the lag of 2 is the most appropriate for both Romania and Bulgaria[11].

For testing co-integration the trace test of Johansen was used where the null hypothesis is that there are at most r co-integration relationships. We begin with testing whether there is no co-integration (r=0) versus at most one such relationship. If this is rejected we test whether there are at most two co-integration relationships and continue in the same way up to four co-integration relationships (maximum possible number of co-integrations

[10] Many empirical studies on the behavior of macroeconomic indicators have found that inflation is integrated of different order depending on the sample period (Hassler, U. and J.Wolters, 1995).
[11] It is worth noting that given the small sample sizes the lag length larger than 3 would result in imprecise estimates of VAR models.

in our VARs consisting of 5 endogenous variables). Asymptotic distributions of the critical values of trace test depend on the assumptions about trends in the data and in the co-integration relationships. Looking at the graphs 1 and 2 displaying dynamics of individual macro series in Bulgaria and Romania respectively it seems most appropriate to apply test allowing for quadratic trend in data for Bulgaria and linear deterministic trend for Romania. As regards to the co-integration relationships it is assumed that they contain intercepts only. Results from Johansen procedure are reported in table 10.

Table 10: Johansen Trace tests for the co- integration rank of variables

Bulgaria

H0: rank= r	Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value
r=0	0.814	119.35**	77.74	85.78
r≤1	0.660	68.84**	54.64	61.24
r≤2	0.466	36.52*	34.55	40.49
r≤3	0.310	17.68	18.17	23.46
r≤4	0.196	6.33	3.74	6.40

Romania

H0: rank= r	Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value
r=0	0.671**	88.64	68.52	76.07
r≤1	0.487*	51.86	47.21	54.46
r≤2	0.377	29.80	29.68	35.65
r≤3	0.320	14.18	15.41	20.04
r≤4	0.042	1.44	3.76	6.65

Note: **/* -denotes rejection of Ho at 1%/5% significance level. Critical values for the trace statistics are those reported by Osterwald-Lenum (1992).

The results from L.R. tests are not robust. As table 10 shows, there are three co-integrating equations for Bulgaria and two for Romania at 5% significance level and two and one co-integrating relationships respectively at 1% significance level. Having in mind that in finite samples the conventional statistics tends to over-reject true nulls we decide to accept the hypothesis of two co-integrating relationships for Bulgaria and one co-integrating relationship for Romania. The co-integrating equations maybe interpreted as long-run equilibrium relationships between the variables. The additional information on the long-run structure of labour market relations was incorporated in the estimation of the VAR model. Clearly it is inappropriate to estimate a VAR of

co-integrated variables using only first differences. Without the error correction part that measures the deviation from the long-term equilibrium relationship, the VAR model will results in misspecification. Therefore, the rest of the analysis is based on the VEC model based on the theoretical model presented in the previous section. at 1% significance level the tests show.

4.2. Variance error decomposition and impulse response functions

Since the primary goal of the analysis is to measure the response of the labour markets systems in each country to a series of macroeconomic shocks in the rest of the paper we focus on the impulse response functions and various decompositions of the multivariate model. It is well known that innovation accounting[12] depends on the ordering of variables in the VAR model. In the present study the order of variables has its theoretical foundations in the macro-model of Dolado and Jimeno (1997) described in the previous section. Plotting the impulse response functions is a practical way to visually represent the behaviour of each of the endogenous variables in response to the various shocks. However, in order to identify the impulse response functions one needs to impose additional restrictions on the VAR system. In the current study the errors are ortogonalized by a Choleski decomposition with the ordering productivity $\rightarrow$ real wages $\rightarrow$ price level $\rightarrow$ employment $\rightarrow$ unemployment so that the covariance matrix of the resulting innovations is diagonal[13].

While impulse response functions trace the effects of a shock to an endogenous variable on the other variables in the system, variance decomposition provides a different method of depicting the system dynamics. It partitions the variance of the forecast error into proportions attributable to each random innovation to the variables in VAR. In our case the theoretical model allows for isolating effects of five structural shocks - technology (productivity) shocks, pushes to wages and prices, aggregate demand shock and labour supply shock. Having in mind the quarterly frequency of the data and the small sample size we decided to trace the response functions and to decompose the variance of the forecast error for twenty quarters (five years).

Tables 11a and 11b contain results from the forecast error decomposition for Bulgaria and Romania respectively. Each table shows the percentage of the variance of the error made in forecasting a variable (say labour productivity) due to a specific shock (say, the error term in the unemployment equation) at a given horizon. The results from the variance decomposition suggest a number of interesting conclusions about the sensitivity of the labour markets to different macro-economic shocks in the two countries. *A quick look at tables 11a and 11b shows that a more substantial interaction among macro variables is present in Bulgaria. In Romania even after a long period of time the major source of errors in the forecasts of variables is their own*

[12] term introduced by Sims (1980) to denote together the impulse response functions and variance decompositions.
[13] Ortogonalization is one of the most often used methods of identifying the model by placing restrictions on the covariance matrix instead of restricting lag lengths. By diagonalising the residual matrix the Choleski decomposition removes the contemporaneous correlation of the residuals between equations.

shocks. For example at the 12-quarter horizon 87.9% of the forecast error of unemployment is attributable to the labour supply shock, 80.9% of employment error – to the demand shock and 69.3% of wages error to pushes to wages[14].

Bulgarian labour market is more sensitive to various macro-economic shocks. This is well expressed in the dynamics of the most often analysed labour market indicators - unemployment and employment. While in Romania labour supply shocks dominate the variability of unemployment rate, in Bulgaria technology shocks, pushes to prices and demand shocks also contribute considerably (accounting together for almost 75% of the forecast error variance at long-term horizon) to the forecast error variance in unemployment. As tables 11a and 11b show, whereas in Romania the variability of employment is attributable mainly to its own shocks and to a much lesser extent to pushes to wages, in Bulgaria the forecast error variance of employment due to various sources. The largest contribution comes from technology shocks followed by shocks to labour supply. The finding that unemployment in Bulgaria can not be explained by a single shock is similar to the results found for Spain by Dolado and Jimeno (1997) and for Germany by Linzert (2001). However unlike Spain in Bulgaria different shocks do not play relatively the same role in explaining unemployment. Variability in Bulgarian unemployment is dominated by technology and labour supply shocks where labour supply shocks are the most important determinants in short-run while technology shocks are more influential in long-run.

Forecast error variance decomposition reveals the importance of each type of macro shocks for the labour market developments. In particular in Romania pushes to wages are the most influential shock because it contributes most to the variance of error made in forecasting other macro variables in the system (having in mind that the main source of variation for each variable is its own shocks) compared to other types of innovations. In Bulgaria demand shocks, technology shocks and pushes to prices appear to be the shocks to which the labour market variables are most sensitive. Wages play insignificant role in variability of other variables except for prices. Labour supply shocks affect productivity and employment in Bulgaria and only productivity in Romania. In both countries labour supply does not affect wages thus reflecting the fact that outsiders do not influence wage determination process.

Figures 3 and 4 show the response of each of the endogenous variables to various shocks. Before providing comments on the graphs it has to be underlined that the periods covered by the VAR models for both countries are very short. Therefore one has to be very careful in deriving conclusions about the long-run effect of various shocks on labour market indicators. The graphs show the reaction of various labour market indicators for 20 quarters that means five years after a particular shock appears. It is not surprising then that most of the variables do not display return to the pre-shock level after the short-run response in the initial periods. For both Romania and Bulgaria the responses of all variables vary in the first six quarters and afterwards stabilised.

[14] Probably this fact may be explained in part by the low variation of employment and unemployment during the period under the consideration (see graph 2).

In accordance with the theory assuming constant returns to scale in the production process *the impulse response functions of productivity* show that productivity shocks are the most influential factor affecting positively productivity level in long run in Bulgaria. Romanian productivity however, increases most in response to pushes to wages. Labour supply shocks result also in rise in the productivity levels in both countries while pushes to play insignificant role although yielding opposite effects. One interesting finding refers to the negative impact of aggregate demand shock to the productivity in Bulgaria. Most likely it reflects the unfavourable structure of the economy with concentration of labour in low productivity sectors and with tendency to expand them further on.

Impulse response functions suggest that in Bulgaria in response to technology shocks, pushes to prices and labour supply shocks *unemployment* increases in the first three quarters, then slightly reduce its level in the next five periods and afterwards stabilises. This result is consistent with Dolado and Jimeno (1997) that also find technology shocks to increase unemployment in Spanish labour market but differ from the findings of no long-term impact on unemployment for other European countries (Lindbeck, 1993). Positive aggregate demand shock decreases Bulgarian unemployment but wages exert rather neutral effect. The latter finding is in line with previous studies that have pointed out to the insignificancy of wage flexibility in Bulgaria (World Bank, 2005; Beleva and Tzanov, 2001).

Unlike Bulgaria the impulse response functions reveal strong influence of pushes to wages on unemployment rate in Romania. Increases in prices and productivity also generate a quick rise in unemployment and this effect appears to be persistent for a long period of time. Similar to Bulgaria, in Romania positive aggregate demand shock decreases unemployment but the effect is of smaller magnitude. As regards to prices they impact negatively although insignificantly unemployment. Obviously in Bulgaria that is a smaller and more sensitive to the prices of inputs economy than the Romanian one, pushes to prices force employers to adjust labour demand accordingly and this results in rise in unemployment rate.

Impulse response functions of employment reveal a number of interesting differences in the labour market performance of the two countries. As in case of unemployment pushes to wages appear to be the most influential source of variability in Romanian employment after the own shocks to aggregate demand. Labour supply generates a negligible positive effect on employment while prices and technology shocks exert a negative but quite modest impact on employment. Completely different is the situation with factors explaining variability of employment in Bulgaria. Positive aggregate demand shock is the only one that results in a permanent positive effect on labour demand. Wages play insignificant role (as with unemployment) and technology, price and labour supply shocks result in substantial short-run decline in employment that has a permanent effect because the employment does not come back to its pre-shock level in the next 20 quarters (5 years).

Despite that wages play different role in the labour market dynamics their own response to different shocks is quite similar in the two countries. Pushes to prices is the only one factor that results in decline in real wages. All other shocks lead to increase in the wages.

5. Conclusions

The primary goal of the empirical analysis was to measure the response of the labour markets systems in each country to a series of macroeconomic shocks using structural co-integrated VAR model. Estimates show that Bulgarian labour market is more sensitive to macro-economic shocks than the Romanian one. This is well expressed in the dynamics of the most often analysed labour market indicators - unemployment and employment. In addition a more substantial interaction among macro variables is present in Bulgaria. In Romania even after a long period of time the major source of errors in the forecasts of variables is their own shocks. While in Romania labour supply shocks dominate the variability of unemployment rate, in Bulgaria technology shocks, pushes to prices and demand shocks also contribute considerably (accounting together for almost 75% of the forecast error variance at long-term horizon) to the forecast error variance in unemployment. Whereas in Romania the variability of employment is attributable mainly to its own shocks and to a much lesser extent to pushes to wages, in Bulgaria the forecast error variance of employment due to various sources. The largest contribution comes from technology shocks followed by shocks to labour supply.

In Romania pushes to wages are the most influential shock because it contributes most to the variance of error made in forecasting other macro variables in the system compared to other types of innovations. In Bulgaria demand shocks, technology shocks and pushes to prices appear to be the shocks to which the labour market variables are most sensitive.

The findings of empirical estimates of the co-integrated VAR model can be used for deriving implications for the policies needed to be undertaken in order to cope with the potential macro economic shocks that EU accession may trigger. The results suggest that the attention has to be paid on the stimulating aggregate demand in both countries because it would play a crucial role in decreasing unemployment. Moreover there are favourable conditions of sustainable economic growth that the two countries have enjoined and a further trade liberalisation and increase of foreign direct investment is expected after joining EU. In case of Bulgaria these is a room for improving wage flexibility and use it for coping with the potential shocks. In addition, a special attention should be paid on the impact of potential pushes to prices that are expected with joining EU in Bulgaria because empirical analysis reveals price shocks as conducive to unemployment.

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Figure 1: Dynamics of quarterly individual time series in Bulgaria : 1998 - 2005

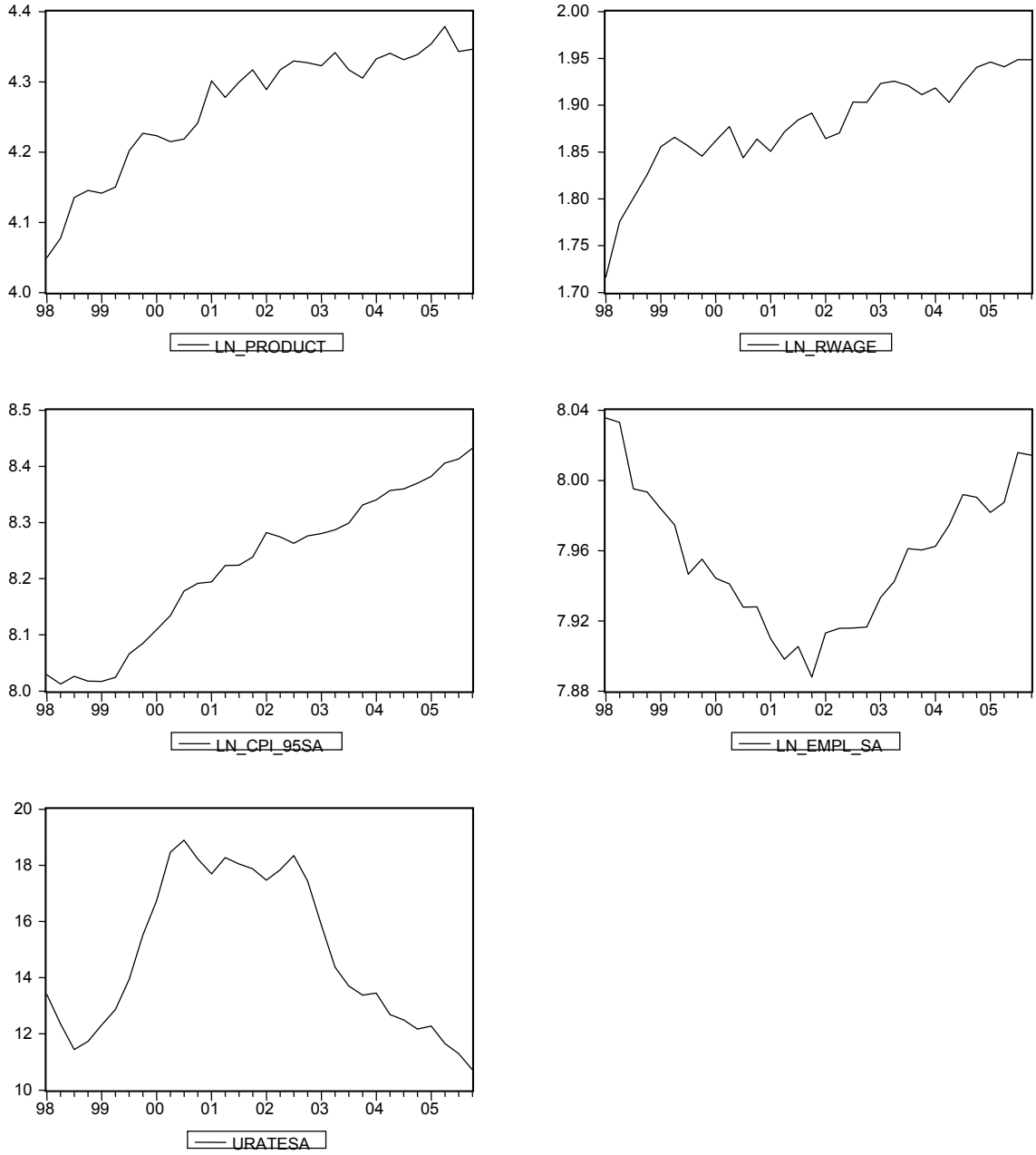

Figure 2: Dynamics of quarterly individual time series in Romania: 1996 – 2004

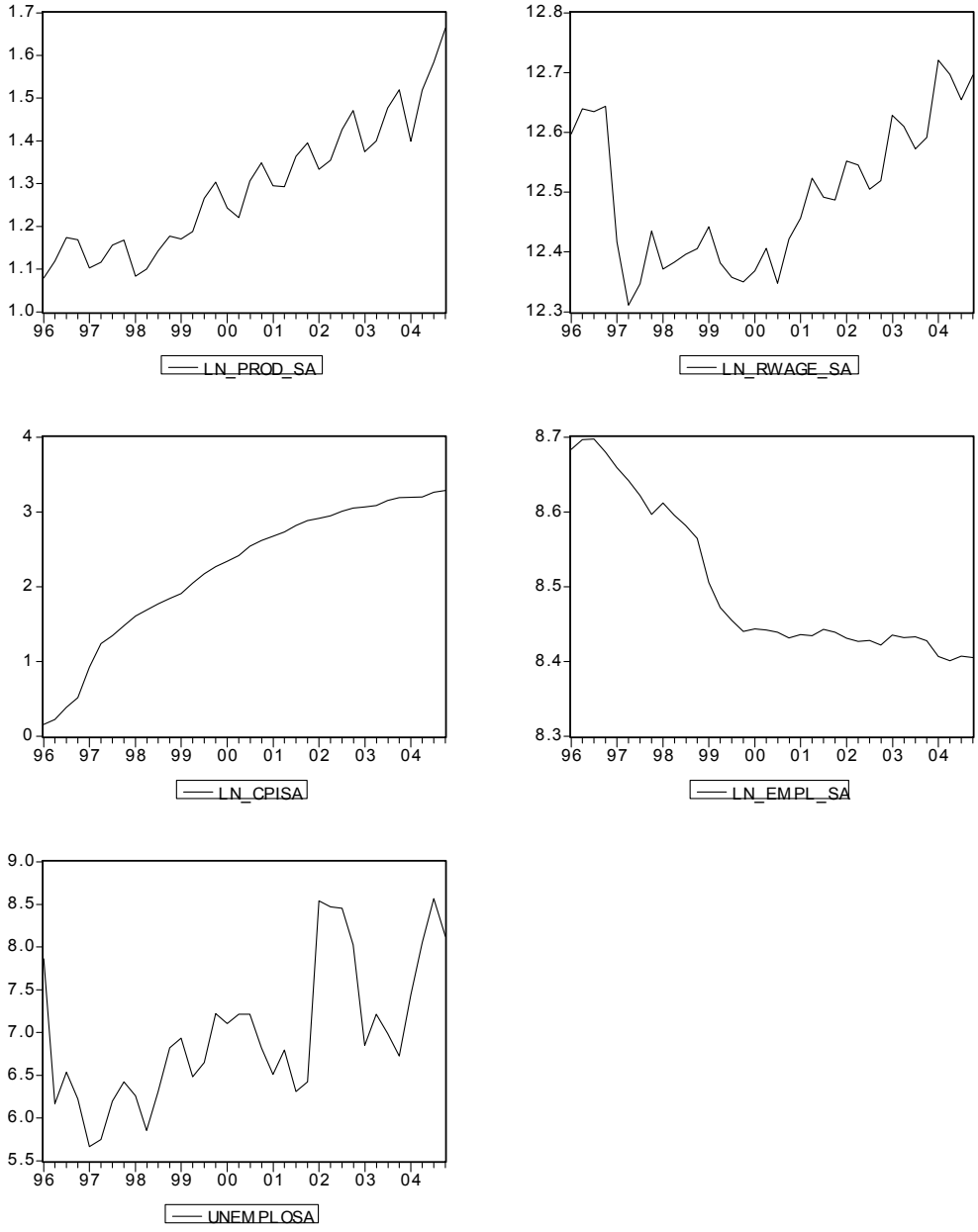

Table 11a: Forecast error variance decomposition - BULGARIA

Period/shock	productivity	wages	prices	demand	labour supply
productivity					
1	100.0	0.00	0.0	0.0	0.0
4	67.2	4.2	3.4	17.7	7.5
8	60.3	3.0	4.5	20.0	12.2
12	56.9	2.7	4.5	21.7	14.1
∞	51.0	2.2	4.5	24.9	17.4
wages					
1	25.9	74.1	0.0	0.0	0.0
4	29.9	51.8	9.6	8.5	0.1
8	32.6	47.8	8.7	8.4	2.4
12	35.0	46.0	7.6	8.1	3.3
∞	38.0	43.6	6.3	7.8	4.2
prices					
1	10.6	58.2	31.1	0.0	0.0
4	5.7	50.9	35.3	5.0	3.2
8	3.8	48.6	38.9	5.9	2.8
12	3.3	48.3	39.8	6.1	2.5
∞	2.7	47.7	41.0	6.4	2.2
employment					
1	31.8	6.5	13.8	47.8	0.0
4	22.8	4.2	5.4	58.5	9.1
8	23.6	2.1	5.7	56.1	12.5
12	23.8	1.4	5.6	55.8	13.2
∞	24.0	0.7	5.5	55.7	14.1
unemployment					
1	15.0	0.15	7.4	21.0	56.4
4	36.9	0.9	17.6	9. 9	34.6
8	40.2	0.5	18.8	11.2	29.2
12	41.6	0.3	19.0	11.4	27.6
∞	43.1	0.2	19.3	11.6	25.8

Table 11b: Forecast error variance decomposition – ROMANIA

Period/shock	productivity	wages	prices	demand	labour supply
productivity					
1	100.0	0.00	0.0	0.0	0.0
4	58.0	23.4	10.0	1.9	6.9
8	43.3	38.5	6.6	0.9	10.6
12	36.0	45.7	5.5	0.7	12.0
∞	27.0	54.5	4.5	0.6	13.5
wages					
1	2.7	97.3	0.0	0.0	0.0
4	13.3	69.4	7.9	8.7	0.9
8	9.5	69.6	8.5	11.3	1.1
12	8.3	69.3	8.7	12.4	1.2
∞	7.1	68.9	8.9	13.6	1.4
prices					
1	0.9	75.1	24.0	0.0	0.0
4	0.5	64.7	28.2	3.3	3.2
8	0.2	63.0	27.2	5.7	3.9
12	0.2	62.4	26.7	6.6	4.1
∞	0.1	61.7	26.2	7.6	4.3
employment					
1	6.3	0.0	5.0	88.6	0.0
4	5.3	6.2	2.5	86.0	0.0
8	4.3	9.6	3.3	82.6	0.2
12	4.0	11.0	3.8	80.9	0.3
∞	3.6	12.7	4.2	79.1	0.4
unemployment					
1	1.4	3.2	2.2	3.8	89.3
4	2.2	3.1	3.6	3.6	87.5
8	2.3	2.8	3.5	3.7	87.8
12	2.3	2.6	3.4	3.8	87.9
∞	2.3	2.5	3.3	3.8	88.0

Figure 3: Impulse response functions for Bulgaria

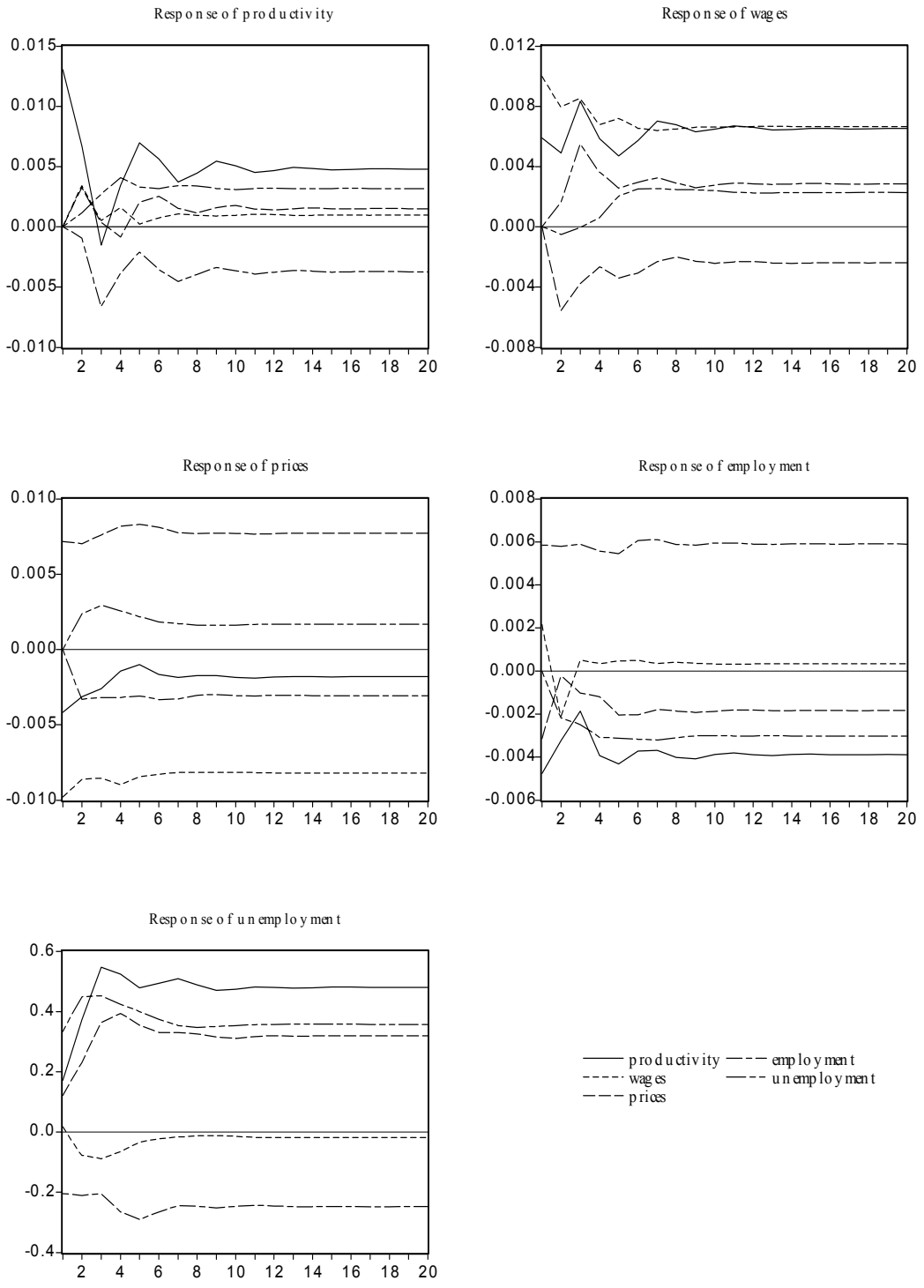

Figure 4: Impulse response functions for Romania