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Transmission effects in the presence of structural breaks: Evidence from South-Eastern European countries

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ABSTRACT

In this paper, we investigate the monetary transmission mechanism through interest rate and real effective exchange rate channels, for five South-Eastern European countries, namely Bulgaria, Croatia, Greece, Romania and Turkey. Recent unit root and cointegration techniques in the presence of structural breaks in the data are used in the analysis. The empirical results validate the existence of a valid long-run relationship, with parameter constancy, for each of the five sample countries. Additionally, the estimated impulse response functions regarding the monetary variables and the real effective exchange rate converge and follow a reasonable pattern in all cases.

1. Introduction

The process of integration of the South-Eastern European economies into the European Union (EU) is continuously evolving and has intensified during the last decade. Some of the South-Eastern European countries are either already members of the European Union (EU) or the Eurozone, or associated with the EU; some others are set to become EU members. This implies that developments in the EU affect the above countries in a more systematic way. At the same time, economic transactions in this region have become more significant and systematic, leading banks, enterprises and individuals to extend their activities in the whole region. Thus, there is a need for systematic and detailed research about the economic policies of the countries in this region, especially at this time with the financial and debt crises in the Eurozone. On the one hand, Greece, a Eurozone member since 2001, is in a deep recession with high sovereign debt, and having agreed to two Economic Adjustment Programmes with the ECB-EU-IMF, is fiscally consolidating and faces high unemployment. On the other hand, the emerging economies of the South-Eastern Europe are characterised by relatively high current account deficits and are more vulnerable to a deterioration in the international economy, since they have been negatively affected by the reduction of external demand and the increase in the cost of borrowing from abroad.

In the present paper we attempt to investigate the monetary transmission mechanism for five countries of South-Eastern Europe, namely Bulgaria, Croatia, Greece, Romania and Turkey. For the transition economies (Bulgaria, Croatia and Romania), this investigation is especially important, since it allows us to understand how fast, and to what extent, a change in the central bank's policy instruments influences domestic variables such as inflation. Note that an increasing number of transition economies are already making use of an inflation targeting regime, or are planning to do so. Additionally, it is important to evaluate whether the monetary transmission mechanism operates differently in the transition economies. Coricelli et al. (2006) analysed monetary policy transmission in Central and Eastern Europe through four channels: (i) the interest rate channel; (ii) the exchange rate channel; (iii) the asset price channel; and (iv) the broad lending channel. In the present analysis, we focus on the interest rate and real effective exchange rate channels.

The literature on the monetary policy transmission mechanism is quite large and extensive, with both theoretical and empirical papers. Regarding the interest rate channel, there are three approaches. The 'cost of funds' approach examines how market interest rates are transmitted to retail bank interest rates of

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comparable maturity (De Bondt, 2002); the 'monetary policy' approach directly tests the impact of changes in the policy rate on retail rates (Sander and Kleimeier, 2004a); and a unifying approach that involves two stages, namely the pass-through from the policy rate to market rates and the transmission from market rates to retail rates. Note that interest rate pass-through is usually investigated using an error correction model (ECM) framework. During the last two decades, several researchers have focused on the transition countries of the Central and Eastern Europe. They have largely focused on the asymmetry of the adjustment process, in relation to the Eurozone countries, and the long-run pass through. Regarding the former, their results are mixed (Crespo-Cuaresma et al., 2004; Égert et al., 2006; Horváth et al., 2004; Opiela, 1999; Sander and Kleimeier, 2004b); regarding the latter their results indicate that both the contemporaneous and long-run pass-through increase over time, while the mean adjustment lag to full pass-through decreases, as more recent data can be used (Crespo-Cuaresma et al., 2004; Horváth et al., 2004; Sander and Kleimeier, 2004b). The exchange-rate pass-through in the transition economies has also been studied by several researchers, using mainly vector autoregressive (VAR) and vector error-correction (VECM) models (see, for instance, Bitâns, 2004; Coricelli et al., 2003; Dabušinskas, 2003; Darvas, 2001; Gueorguiev, 2003; Kara et al., 2005; Korhonen and Wachtel, 2005; Mihaljek and Klau, 2001).

The novelty of this paper lies in the following. Firstly, we use the most recent data from the mid-1990s to 2011, in order to establish a valid long-run relationship for each sample country and to estimate impulse response functions. Secondly, recently developed Lagrange Multiplier (LM) unit root (Lee and Strazicich, 2003) and cointegration tests (Johansen et al., 2000 and Lütkepohl and Saikkonen, 2000, and their extensions in several recent papers noted below) have been implemented in the analysis. These tests allow for structural breaks in the data. Such breaks are important in this context, since the economic policies implemented in the sample countries are likely to have caused structural shifts in both the levels and trends of particular variables. Additionally, the countries examined are heterogeneous and at different stages of the process of integration into the EU: Bulgaria and Romania joined the EU in 2007 after a long transition period from centrally-planned to free market economies; Croatia joined the EU in 2013 having also followed a long transition period; Greece has been a Eurozone member since 2001; and Turkey agreed to a customs union with the EU in 1996, is under negotiations for future EU membership, and has also had a stand-by agreement with the IMF for a number of years.

In summary, the empirical evidence validates the existence of structural breaks and identifies a valid long-run relationship among industrial production, the consumer price index, the money supply, the money market rate and the real effective exchange rate, for each of the five countries under consideration. Additionally, the estimated impulse response functions for the monetary variables and the real effective exchange rate converge and seem reasonable in all cases.

The rest of the paper is organised as follows. Section 2 describes briefly the theoretical framework of the analysis and outlines the unit root and cointegration tests in the presence of structural breaks. Section 3 describes the data and analyses the empirical results, while Section 4 provides some concluding remarks.

2. Theoretical framework

In the present study, we estimate a reduced-form model in order to investigate the monetary transmission mechanism for Bulgaria, Croatia, Greece, Romania and Turkey. The analysis will focus on the interest rate channel and the real effective exchange

Table 1
Two-break minimum LM unit root test results.

Country	Variable	Model	$\hat{k}$	$\hat{T}_B$	$\hat{\lambda}_1,\ \hat{\lambda}_2$	LM − statistic
Bulgaria	IP	C	12	2003:12, 2008:08	0.4, 0.8	-5.4237
	CPI	C	12	2002:04, 2007:10	0.2, 0.6	-4.4316
	M3	C	12	2005:02, 2007:08	0.4, 0.6	-4.4335
	MMR	C	10	2001:12, 2009:02	0.2, 0.8	-4.0249
	REER	C	2	2007:10, 2010:01	0.6, 0.8	-5.0334
Croatia	IP	C	11	2006:02, 2008:10	0.4, 0.8	-5.6393
	CPI	C	12	2006:03[n], 2008:01	0.4, 0.6	-4.5633
	M1	C	12	2005:03[n], 2008:11	0.4, 0.8	-3.9050
	MMR	C	1	2008:02[n], 2008:11	0.6, 0.8	-5.6928
	REER	C	1	2007:11, 2010:01	0.6, 0.8	-5.5588
Greece	IP	C	11	1999:12, 2008:08	0.4, 0.8	-5.5307
	CPI	C	10	1999:02, 2001:10	0.2, 0.4	-5.0288
	TB	C	6	2004:02, 2008:09	0.6, 0.8	-3.9003
	REER	C	12	1999:02, 2002:11	0.2, 0.4	-5.2925
Romania	IP	C	12	2008:08, 2010:03	0.6, 0.8	-5.4496
	CPI	C	10	2003:07, 2005:01	0.2, 0.4	-4.3414
	M2	C	12	2004:12, 2007:11	0.4, 0.6	-4.8818
	MMR	C	6	2006:09, 2009:03	0.4, 0.8	-4.7614
	REER	C	1	2004:11, 2007:10	0.4, 0.6	-4.4244
Turkey	IP	C	12	2008:09, 2009:10	0.6, 0.8	-5.5628
	CPI	C	12	2004:10, 2007:11	0.2, 0.6	-5.2050
	M3	C	6	2005:10, 2007:07	0.4, 0.6	-5.1521
	MMR	C	3	2004:10, 2006:10	0.2, 0.4	-5.2923
	REER	C	1	2008:04, 2009:12	0.6, 0.8	-4.7017

Break points	Critical values for model C	
$\lambda = (\lambda_1, \lambda_2)$	1%	5%
$\lambda = (0.2, 0.4)$	-6.16	-5.59
$\lambda = (0.2, 0.6)$	-6.41	-5.74
$\lambda = (0.2, 0.8)$	-6.33	-5.71
$\lambda = (0.4, 0.6)$	-6.45	-5.67
$\lambda = (0.4, 0.8)$	-6.42	-5.65
$\lambda = (0.6, 0.8)$	-6.32	-5.73

$\hat{k}$ is the estimated number of to correct for serial correlation. $\hat{T}_B$ denotes the estimated break points. $\hat{\lambda}_1$ and $\hat{\lambda}_2$ are the estimated relative break points. IP stands for industrial production, CPI for consumer price index, M1, M2 and M3 for money supply, MMR for money market rate, TB for Treasury bill rate, and REER for real effective exchange rate. [n] indicates no significant break at the 10 percent level of significance. The critical values are from Table 2 of Lee and Strazicich (2003).

Table 2
The JMN and LST cointegration tests with structural breaks.

Country	$(p - r_0)$	$LR_{JMN}(r_0)$	$LR_{LST}(r_0)$	p-Values JMN	p-Values LST	$\hat{k}$
Bulgaria (breaks on:	5	233.75**	95.90**	0.000	0.001	9
2005:02, 2007:08)	4	150.55**	41.77	0.000	0.428	
	3	94.57**	17.49	0.001	0.916	
	2	51.26**	7.58	0.023	0.938	
	1	20.88	3.32	0.140	0.756	
Croatia (breaks on:	5	195.25**	93.81**	0.000	0.001	2
2006:02, 2008:11)	4	118.78**	37.92	0.004	0.624	
	3	71.95*	20.42	0.080	0.796	
	2	36.64	9.70	0.379	0.828	
	1	16.77	5.08	0.364	0.503	
Greece (breaks on:	4	164.08**	54.90**	0.000	0.048	8
1999:12, 2008:08)	3	84.99**	11.92	0.003	0.996	
	2	42.12	4.01	0.118	0.998	
	1	13.21	2.48	0.551	0.838	
Romania (breaks on:	5	178.26**	81.54**	0.000	0.017	1
2004:12, 2007:11)	4	109.44**	40.26	0.025	0.500	
	3	69.62	17.58	0.123	0.915	
	2	36.25	3.27	0.414	0.999	
	1	16.75	0.02	0.380	0.999	
Turkey (breaks on:	5	162.06**	73.26*	0.001	0.084	1
2004:10, 2008:08)	4	99.43*	34.87	0.090	0.765	
	3	61.17	27.50	0.309	0.356	
	2	34.08	8.16	0.471	0.912	
	1	12.42	1.07	0.668	0.987	

$\hat{k}$ denotes the estimated lag length in the VECM. ** and * denote rejection of the null hypothesis at the 0.05 and the 0.10 level of significance, respectively.