

## Chapter 2

# Does Euro Introduction Ensure Lower Vulnerability of the New Euro Area Members to the External Shocks? The Case of the Central and Eastern European Countries

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**Abstract** A very intense euro area enlargement during the last two decades rises the question about the impact of the euro introduction on vulnerability of the new euro area members [especially Central and Eastern European Countries (CEECs)] to the external shocks. Since 2007, five CEECs joined the euro area and the euro adoption reduced sovereign bond interest rates, credit default swap (CDS) prices of the new euro area members due to a decrease in foreign exchange risk, and positively affected the CEECs' credit ratings. However, the question about lower vulnerability of the new euro area members to the external shocks is still open. The objective of this study was to assess the impact of euro introduction on vulnerability of the new euro area members to the external shocks. The empirical results show that the announcement of positive convergence report and the euro introduction in the new euro area members did not manifest itself automatically in the short term and last into the long term (except in Latvia and Lithuania). This reaction of the financial market participants could be explained by the fact that most of the new euro area members (Slovenia, Cyprus, Malta, and Slovakia) introduced euro in 2007–2009 during the global financial crisis. The results of generalized impulse response analysis confirm that the new euro area members are still very sensitive to shocks in other CEECs sovereign bond markets. However, new euro area members became less sensitive to the external shocks after the introduction of euro.

**Keywords** Euro introduction • Euro area • CEECs • Sovereign bond markets

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## 2.1 Introduction

Economic and monetary union (EMU) represents a major step in the integration of European Union (EU) economies involving the coordination of fiscal and economic policies as well as a common monetary policy. Despite the fact that all EU Member States are part of EMU and coordinate their economic policy making to support the economic aims of the EU, however, a number of EU Member States have taken a step monetary integration further by replacing their national currencies with the single currency. When the euro was first introduced in 1999, the euro area was made up of 11 of the then 15 EU Member States. Greece joined the euro area in 2001, followed by Slovenia in 2007, Cyprus and Malta in 2008, Slovakia in 2009, Estonia in 2011, Latvia in 2014, and Lithuania in 2015.

The widespread use of the euro in the international financial and monetary system demonstrates its global presence. Firstly, the euro is widely used, alongside the US dollar, as an important reserve currency to hold for monetary emergencies; for example, in 2015, more than 20% of the global foreign exchange holdings were being held in euros. Secondly, the euro is also the second most actively traded currency in foreign exchange markets, and it is a counterpart in around 33% of all daily transactions, globally. Thirdly, the euro is widely used to issue government and corporate debt worldwide; for example, in 2015, the share of euro-denominated debt in the global markets was around 40%, on par with the role of the US dollar in the international debt market. Fourthly, the euro is also gaining momentum as currency used for invoicing and paying in international trade, not only between the euro area and third countries but also between third countries. Fifthly, several countries manage their currencies by linking them to the euro, which acts as an anchor or reference currency. For these reasons, today, the euro is the second most important international currency after the US dollar.

A very intense euro area enlargement during the last two decades rises the question about the impact of the euro introduction on vulnerability of the new euro area members [especially Central and Eastern European Countries (CEECs)] to the external shocks. Since 2007, five CEECs (Slovenia, Slovakia, Estonia, Latvia, and Lithuania) joined the euro area and the euro adoption reduced sovereign bond interest rates, credit default swap (CDS) prices of the new euro area members due to a decrease in foreign exchange risk, and positively affected the CEECs' credit ratings. However, the question about lower vulnerability of the new euro area members to the external shocks is still open. The objective of this study was to assess the impact of euro introduction on vulnerability of the new euro area members to the external shocks. The research object is the CEECs. The research methods are as follows: the systemic, logical, and comparative analysis of the scientific literature and statistical method—generalized impulse response (GIR) analysis.

The organization of the paper is as follows. Section 2.2 overviews the related literature. Section 2.3 describes the research methodology and data. Section 2.4 shows the research results. Section 2.5 discusses the findings and concludes.

## 2.2 Literature Review

The impact of the euro introduction on the new euro area members' economies can be classified into direct, which will manifest itself automatically in the short term and may also last into the long term, and indirect, which depends on various circumstances and more often manifests itself during a longer time. The direct impact of the euro introduction on the new euro area members can appear in different ways. The substitution of national currency for the euro would reduce interest rates due to a decrease in foreign exchange risk, reducing at the same time foreign exchange and accounting costs, enhancing the balance of the currency structure of the public and private sector's assets and liabilities, and expanding the possibilities for managing liquidity in the banking sector. The indirect impact of the euro adoption on the new euro area members will appear in different ways. The adoption of the euro may positively affect the countries' credit rating (which would reduce interest rates even more), encourage investment and foreign trade, and speed up the growth of the economies and the welfare of the societies.

Scientific literature provides very little evidence on the impact of the euro introduction on the new euro area members' economies. Some authors analyzed the opportunities and challenges of euro adoption in Central and Eastern Europe and carried out a quantitative assessment of the likely impact of the adoption of the euro on the national economy (Lavrač 2007, Bank of Lithuania 2013). The results of the quantitative research suggest that the positive impact of the euro would be long term and would significantly exceed the short-term costs as well as the amount of country's additional financial contributions (Bank of Lithuania 2013). In order for the country to be able to take full advantage of the benefits of being in the euro area to the best possible extent, it is necessary that the economy would effectively use the period of declining interest rates to enhance its competitiveness and that focused economic policy would ensure fiscal sustainability and macroeconomic stability (Bank of Lithuania 2013). Some authors studied the impact of membership in the EU as well as in the euro area on both economic and financial integration. The empirical results show that membership in the EU significantly lowered discount rate and expected earnings growth differentials across countries; however, the adoption of the euro was not associated with increased economic and financial integration (Bekaert et al. 2013). Some authors analyzed the impact of the euro adoption on the level of per capita GDP for a sample of 17 European countries. The empirical results show that in euro, the adoption may have raised the level of per capita GDP as well as the labor productivity by about 4%. However, the impact of the euro adoption has been smaller in countries with a high debt-to-GDP ratio (Conti 2014). Some authors revisited the issue of the appropriate domain of a currency area. The results show that the adoption of a common currency can be beneficial for the members of the monetary union (Forlati 2015). The results also show that the enlargement of the monetary union to another group of small open economies can bring about welfare gains for all countries involved (Forlati 2015). Some economists examined whether the euro introduction had a significant impact on economic integration of EMU. They found that

the euro adoption has significantly increased the economic integration of EMU in terms of business cycles synchronization substantially strengthening the conclusion by Frankel and Rose (1997), i.e., a country is more likely to satisfy the criteria for entry into a currency union *ex post* rather than *ex ante* (Gächter and Riedl 2014). Some authors investigated the financial liberalization in the context of European monetary and economic integration. They found that after the implementation of financial liberalization, measures of financial openness generate a strongly positive impact on economic growth, capital accumulation, and productivity growth. They also found a positive contribution from the EU membership, while no substantial effect from the euro adoption was identified (Gehring 2013). Some economists investigated the financial system–growth relationships in the Eurozone and non-Eurozone EU countries as well as the potential impact of the euro adoption on closer and more centralized economic, political, fiscal, and financial cooperation within Eurozone. The empirical results show that the financial sector contributes to economic growth in the Eurozone countries, while a significant negative impact of the banking sector on economic growth was observed in non-Eurozone EU countries (Georgantopoulos et al. 2015). Some economists tested the existence of a break in the macroeconomic dynamics in seven Eurozone countries and three non-Eurozone EU countries. The empirical results revealed very significant breaks for the Eurozone countries in the year of adoption of the Maastricht Treaty and euro. The empirical results also show an increase in the influence of supply shocks on the dynamics of output, unemployment, and the interest rate after the breaks for the Eurozone countries (Legrand 2014). However, some authors examined the impact of entry to the EU and the euro adoption on supply of capital for corporate financing. The empirical results suggest that following membership to EU firms increased equity financing while membership to EU eased access to equity capital. The empirical results suggest that firms also increased debt financing after the euro adoption, while this exogenous event improved access to international debt capital (Muradoğlu et al. 2014). Overall, the scientific literature provides substantial evidence on the positive impact of the euro introduction on the new euro area members' economies.

## 2.3 Research Methodology and Data

This empirical study focuses on the vulnerability of the sovereign bond markets of the new euro area members to the external shocks. The investigation of the impact of euro introduction on vulnerability of the new euro area members to the external shocks was examined by applying the generalized impulse response (GIR) analysis (Koop et al. 1996; Pesaran and Shin 1998). Impulse response functions measure the time profile of the effect of shocks on the expected future values of variables in a dynamic VAR system (2.1), i.e., the impulse responses outline the reaction of one sovereign bond yield spread to a shock in another (2.2 and 2.3).

$$\begin{bmatrix} Y_{1,t} \\ Y_{2,t} \\ \vdots \\ Y_{n,t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \\ \vdots \\ A_{n0} \end{bmatrix} + \begin{bmatrix} A_{11,k} & A_{12,k} & \dots & A_{1n,k} \\ A_{21,k} & A_{22,k} & \dots & A_{2n,k} \\ \vdots & \vdots & \ddots & \vdots \\ A_{n1,k} & A_{n2,k} & \dots & A_{nn,k} \end{bmatrix} \begin{bmatrix} Y_{1,t-k} \\ Y_{2,t-k} \\ \vdots \\ Y_{n,t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \vdots \\ \varepsilon_{n,t} \end{bmatrix}, \quad (2.1)$$

$$\varepsilon_{i,t} \sim \text{WN}(0, \Sigma_\varepsilon)$$

where  $Y_{1,t}, \dots, Y_{n,t}$  is a  $n$ -dimensional vector of variables (logarithmic changes in sovereign bond yield spreads) at time  $t$  (number of lags—2);  $A_{10}, \dots, A_{n0}$  is a  $n$ -dimensional vector of variables' intercept;  $A_{11,k}, \dots, A_{nn,k}$  is a  $n$ -dimensional coefficients' matrices; and  $\varepsilon_{1,t}, \dots, \varepsilon_{n,t}$  is an unobservable zero mean white noise vector process with time-invariant covariance matrix.

In order to solve variables' ordering problem, this empirical study applied the generalized approach that is invariant to the ordering of the variables in the VAR system, while the traditional impulse response analysis yields different results depending on the variables ordering.

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + U_t = \Phi(B) U_t = \sum_{i=0}^{\infty} \Phi_i U_{t-i} \quad (2.2)$$

$$\Phi_i = A_1 \Phi_{i-1} + A_2 \Phi_{i-2} + \dots + A_p \Phi_{i-p} \quad (2.3)$$

where  $Y_t$  is a  $n$ -dimensional vector of variables (logarithmic changes in sovereign bond yield spreads) at time  $t$ ;  $\Phi_i$  is the coefficient measuring the impulse response, e.g.,  $\Phi_{jk,i}$  represents the response of sovereign bond yield spread  $j$  to a positive shock of one standard deviation in sovereign bond yield spread  $k$  occurring  $i$ th period ago.

This empirical study focuses on daily data for EU-28 countries with a special focus on new euro area members: Slovenia, Cyprus, Malta, Slovakia, Estonia, Latvia, and Lithuania. This study also compares the vulnerability of the sovereign bond markets of all CEECs—the group of countries comprising Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, and the three Baltic States: Estonia, Latvia, and Lithuania. Daily sovereign bond yields' (the Maastricht Treaty EMU convergence criterion) data on EU-28 countries for the period of 2005–2015 have been obtained from Eurostat. The Maastricht Treaty EMU convergence criterion series relates to interest rates for the long-term government bonds denominated in national currencies and is based on central government bond yields on the secondary market, gross of tax, with a residual maturity of around 10 years (the bond or the bonds of the basket are replaced regularly to avoid any maturity drift).

## 2.4 Research Results

The economic theory suggests that participants of financial markets could not only react to the introduction of euro in the new euro area countries but also to the positive convergence assessment. The convergence reports examine whether the EU Member States satisfy the necessary conditions to adopt the single currency—euro. The European Community (EC) Treaty requires the Commission and the European Central Bank (ECB) to issue these reports at least once every two years or at the request of an EU Member State which would like to join the euro area. On the basis of its assessment, the Commission submits a proposal to the ECOFIN Council which decides whether the country fulfills the necessary conditions and may adopt the euro.

In October 2004, the ten countries (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, and Slovenia) that joined the EU on May 1, 2004 were assessed for the first time. Although the maximum two-year period referred to by the treaty had not yet elapsed for these countries in 2004, the obligatory reassessment of Sweden was taken as an opportunity to analyze also the state of convergence in the new Member States. The report concluded that none of the 11 assessed countries at that stage fulfilled the necessary conditions for the adoption of the single currency. In 2006, there were two sets of convergence assessments. Lithuania's and Slovenia's state of readiness was examined in convergence reports issued in May 2006 at their own request. While Slovenia was deemed to fulfill all the convergence criteria and ready to adopt the euro in January 2007, the report on Lithuania suggested that there should be no change in its status as a Member State with a derogation. The then remaining nine countries (the Czech Republic, Estonia, Cyprus, Latvia, Hungary, Malta, Poland, Slovakia, and Sweden) were assessed in December 2006. Although the report showed progress with convergence in many countries, none of them was deemed to meet the necessary conditions for adopting the single currency. Aiming to adopt the euro in 2008, Cyprus and Malta submitted requests for re-examination in spring 2007. On the basis of convergence reports issued by the Commission and the ECB in May 2007, the council concluded that both Cyprus and Malta fulfilled the necessary conditions for adoption of the single currency. Consequently, the council decided that the euro would be introduced in the two countries on January 1, 2008. In 2008, the convergence report adopted on May 7 examined progress toward convergence in remaining ten EU Member States with a derogation—Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia, and Sweden. The report concluded that Slovakia met the conditions to join the euro area in January 2009. In 2010, the Commission concluded on May 12 that Estonia met the requirements for joining the euro, as the result of determined and credible policy efforts and recommend Estonia's membership of the Eurozone from January 1, 2011. In 2012, the Commission concluded on May 30 that none of the countries examined (Bulgaria, the Czech Republic, Latvia, Lithuania, Hungary, Poland, Romania, and Sweden) fulfilled all the conditions for adopting the euro. In 2013,

**Table 2.1** Dates of positive convergence report announcement and euro introduction in the new euro area members

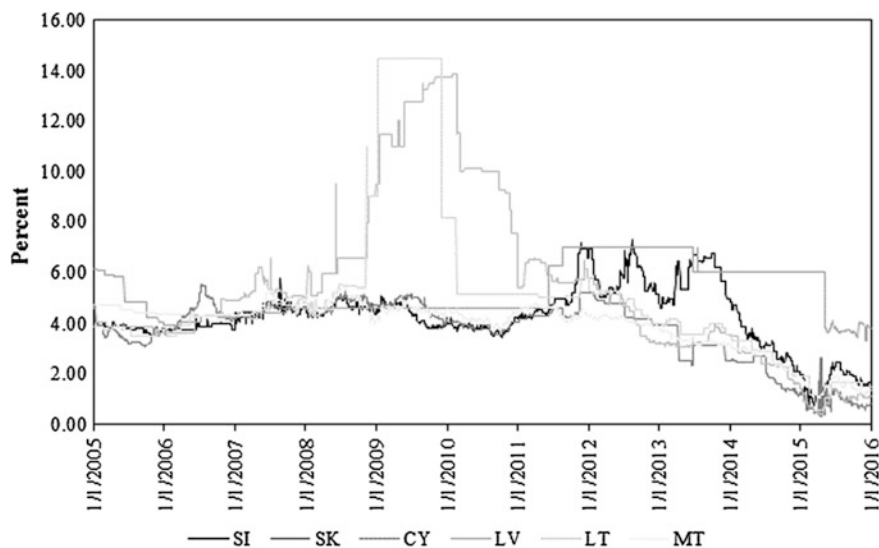
Country	Dates of positive convergence report announcements/dates of euro introduction
Slovenia	May 16, 2006/January 1, 2007
Cyprus	May 16, 2007/January 1, 2008
Malta	May 16, 2007/January 1, 2008
Slovakia	May 7, 2008/January 1, 2009
Estonia	May 12, 2010/January 1, 2011
Latvia	June 5, 2013/January 1, 2014
Lithuania	June 4, 2014/January 1, 2015

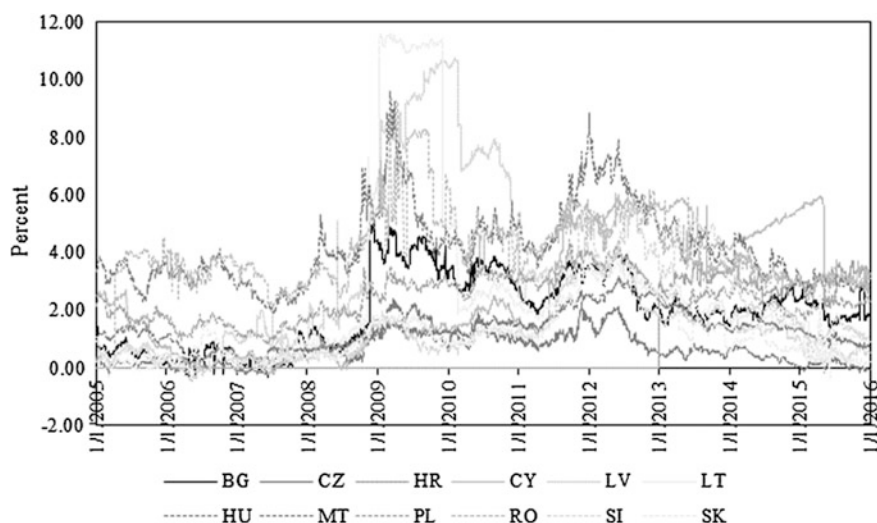
Source [http://ec.europa.eu/economy\\_finance/euro/adoption/convergence\\_reports/index\\_en.htm](http://ec.europa.eu/economy_finance/euro/adoption/convergence_reports/index_en.htm)

the Commission concluded on June 5 that Latvia fulfilled all the conditions for adopting the euro. In 2014, the Commission concluded on June 4 that Lithuania fulfilled all the conditions for adopting the euro. Table 2.1 summarizes the dates of positive convergence report announcements and euro introduction in the new euro area members.

Figure 2.1 demonstrates the dynamics of the sovereign bond yields of the new euro area members during period of 2005–2015.

The statistical data provided by Eurostat show that the announcement of positive convergence report and the euro introduction in the new euro area members did not manifest itself automatically in the short term and last into the long term (except in Latvia and Lithuania). This reaction of the financial market participants could be

**Fig. 2.1** Dynamics of the sovereign bond yields of the new euro area members. *Source* Eurostat



**Fig. 2.2** Dynamics of the sovereign bond yield spreads of the new euro area members and CEECs. *Source* Own calculations based on data from Eurostat

explained by the fact that most of the new euro area members (Slovenia, Cyprus, Malta, and Slovakia) introduced euro in 2007–2009 during the global financial crisis. However, the short-term effect of euro introduction was observed in Latvia and Lithuania—countries which introduced euro in more stable time (during 2014–2015). Despite the fact that dynamics of the sovereign bond yields of the new euro area members did not show any short-term effect of the euro adoption, the dynamics of sovereign bond CDS prices showed a significant reaction of financial market participants to positive convergence report announcement and euro introduction in the new euro area members. These differences in reaction of financial market participants can be explained by the fact that sovereign bond CDS market is more liquid compared to sovereign bond market.

Dynamics of the sovereign bond yield spreads of the new euro area members and CEECs are shown in Fig. 2.2.

The sovereign bond yield spreads dynamics of selected countries demonstrate that the reaction of financial market participants to the external shocks (global financial crisis in 2007–2009, sovereign debt crisis in Greece, Ireland, and Portugal) was significant in most of selected countries, especially in Latvia and Lithuania due to the high degree of financial and economic openness of these countries. Besides, some local factors such as banking crisis in Latvia in 2008 increased political risk of selected countries. The reaction of financial market participants shows that this group of countries is very homogeneous in terms of political risk despite existing differences in economic and financial stability of these countries.



**Table 2.2** Responses of sovereign bond markets of the new euro area members to generalized one S.D. innovations

Period	Response of LT sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	LT	CZ	CY	SE	MT	LT	ES	MT	CY	BG
1	11.58	2.53	2.46	1.12	0.71	8.66	4.08	2.94	2.87	2.76
2	-3.35	-1.48	-0.92	-0.45	-1.36	1.17	1.98	0.32	1.31	1.41
3	0.18	-0.30	0.59	0.38	0.59	-0.06	1.00	1.12	0.54	0.78
4	0.43	0.05	-0.17	-0.22	-0.24	-0.49	-1.02	-0.93	-0.81	-0.70
5	-0.18	-0.11	0.13	0.06	0.15	-0.58	0.03	0.38	0.38	-0.37
Period	Response of LV sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	LV	ES	IE	FI	CY	LV	ES	MT	AT	CY
1	6.14	0.90	0.71	0.69	0.69	7.59	3.30	3.18	2.80	2.76
2	-1.11	-0.11	0.35	0.28	0.07	-1.31	0.89	-0.97	-2.99	1.52
3	0.98	0.30	0.58	-0.24	0.70	0.50	0.40	0.54	1.20	0.44
4	-0.44	-0.27	-0.80	0.01	0.30	-0.56	-0.67	-0.42	-0.16	-0.77
5	0.34	0.12	0.37	0.01	0.17	0.58	0.24	0.35	0.09	0.48
Period	Response of SK sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	SK	FR	NL	PT	MT	SK	FI	MT	LT	BG
1	10.79	5.23	5.03	4.87	4.78	16.57	3.78	3.24	2.28	2.16
2	-4.66	-4.64	-5.24	-4.00	-4.07	-4.42	-0.98	-2.68	0.05	0.24
3	1.62	2.35	2.35	1.54	1.55	-1.83	-0.23	1.08	0.59	0.83
4	-0.93	-1.13	-0.86	-0.42	-0.66	1.34	-0.27	-0.52	-0.30	-0.44
5	0.33	0.54	0.37	0.06	0.11	0.04	0.48	0.17	-0.14	-0.09
Period	Response of MT sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	MT	NL	SK	FR	PT	MT	FR	NL	PT	SI
1	4.31	2.73	2.60	2.58	2.57	3.68	1.84	1.62	1.55	1.54
2	-2.37	-2.06	-1.30	-1.37	-1.98	-1.98	-1.63	-1.60	-0.59	-0.56
3	0.22	1.31	0.98	0.75	1.01	0.40	0.50	0.40	0.25	0.29
4	0.63	-0.81	-0.49	-0.48	-0.55	-0.10	0.01	0.06	-0.03	-0.11
5	-1.35	0.69	0.15	0.10	0.17	0.00	-0.08	-0.08	-0.01	0.00
Period	Response of CY sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	CY	CZ	HU	PL	MT	CY	BE	BG	SI	PT
1	17.59	8.82	7.52	6.51	5.51	7.69	1.96	1.96	1.92	1.72
2	-0.42	-2.60	2.65	2.24	-7.26	2.24	0.64	0.43	-0.97	-1.60
3	0.35	2.17	5.03	1.20	-0.79	3.14	0.41	0.92	-0.25	0.05
4	-5.00	-1.00	-1.13	-2.72	-0.52	1.67	0.25	0.30	-0.57	-0.65
5	2.55	2.49	3.94	-0.06	2.14	1.57	0.22	0.24	-0.34	-0.32
Period	Response of SI sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	SI	CZ	MT	LV	BG	SI	MT	PT	ES	IT
1	48.70	14.25	12.26	9.72	8.39	13.31	3.42	3.16	3.12	2.71
2	-24.54	-10.70	-9.29	-16.89	-4.62	-4.81	-2.30	-0.93	-0.59	-0.09

(continued)

**Table 2.2** (continued)

Period	Response of SI sovereign bond market to generalized one S.D. innovation									
	Before euro introduction					After euro introduction				
	SI	CZ	MT	LV	BG	SI	MT	PT	ES	IT
3	-17.34	-2.14	5.34	15.73	-4.22	-3.79	0.26	1.15	-0.21	0.83
4	14.68	2.82	-10.11	-8.55	3.85	3.57	0.00	-0.86	-0.63	-0.56
5	4.39	0.15	10.08	11.01	-0.01	0.39	0.20	-0.10	0.56	-0.24

Source Own calculations based on data from Eurostat

The generalized impulse response analysis was used to analyze the responses of one sovereign bond market to a shock in another. The responses show short-lasting effects on sovereign bond markets following a shock in other markets (see Table 2.2). After four days, the sovereign bond markets of the new euro area members have in all cases settled back to their pre-shock level. Even though the impact is generally short-lived, all responses are moderate in scale. In order to investigate the impact of euro introduction on vulnerability of the new euro area members to the external shocks, the whole data sample was divided into two subsamples: before euro introduction and after euro introduction. However, the results did not change significantly after the euro introduction except to Malta, Cyprus, and Slovenia. These countries had introduced euro in 2007–2008, and the perception of political risk has changed already. The results of generalized impulse response analysis confirm that the new euro area members are still very sensitive to shocks in other CEECs sovereign bond markets.

## 2.5 Conclusion

The empirical results provided by this study show that the announcement of positive convergence report and the euro introduction in the new euro area members did not manifest itself automatically in the short term and last into the long term (except in Latvia and Lithuania). This reaction of the financial market participants could be explained by the fact that most of the new euro area members (Slovenia, Cyprus, Malta, and Slovakia) introduced euro in 2007–2009 during the global financial crisis. The results of generalized impulse response analysis confirm that the new euro area members are still very sensitive to shocks in other CEECs sovereign bond markets. However, new euro area members became less sensitive to the external shocks after the introduction of euro (except for Latvia and Lithuania).

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