

Responses to Trade Shocks in Emerging Economies

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Abstract

The paper investigates responses of emerging economies to external shocks originating from the international trade system. Emerging economies are characterised by increasing openness to foreign trade, which offer the promise of fast economic growth but also contain the risk of social disturbance in times of crisis. The effects of terms of trade shocks and shifting demand patterns are explored through an empirical model for the Bulgarian economy and compared to existing research on other emerging economies.

Keywords: trade shocks, terms of trade, emerging economies, Bulgaria, impulse response function

Introduction

During the past decade most emerging and developing economies experienced the booms and busts introduced by the onset of the Great Recession and the swings in commodity prices. A characteristic feature of this diverse group of countries is the assumption that their business cycles are driven to a large extent by external shocks, leaving them more vulnerable to processes beyond their control, compared to advanced economies. This is particularly true for small open economies. The susceptibility of a small open economy to exogenous shocks is described as economic vulnerability.

Economic vulnerability stems from several sources. One of them is trade openness, an important trait of emerging market economies that is positively related to rapid economic growth. While this relationship has been supported by a number of cross-country studies and the development path of individual economies, a number of countries with a focus on natural resource exports have poor growth record, at least since the 1970s. An explanation of this ambiguity can be export concentration. High levels of export concentration, especially limited to resource based and primary products, leave countries dependent on the world commodity markets. Commodity prices are notoriously difficult to predict, which creates uncertainties about the type of policy that decision-makers should pursue. Export booms of primary commodities have repeatedly led to the Dutch disease, when left unmanaged. Subdued demand for major export products, on the other hand, pressures countries into increasing current account deficits. The same effect produces dependence on strategic imports.¹

Confronted with the challenges of the changing environment small open economies, especially emerging ones, should look for measures towards increased inherent balances and resilience. Economic resilience is seen as the ability to recover from or adjust to the negative impacts of external economic shocks. If the shock is not too big we can expect that the economy will return to its long-term development path. If the stress goes over a certain threshold the economic system may exhibit hysteresis, meaning that the shock may have permanent effects and lead to inferior performance, such as lower growth path or higher unemployment due to institutional and structural changes.²

As a first step towards gaining insights about the conditions for economic resilience this paper looks at the response of emerging economies to trade shocks. It explores the interaction between the terms of trade and output for several economies based on recent empirical studies. After a brief literature review we test a simple vector autoregressive model of the Bulgarian economy with two variables: terms of trade and gross domestic product (GDP).

¹ Lino Briguglio et al. Economic vulnerability and resilience: concepts and measurements. *Oxford Development Studies* 37, no. 3, 2009: 229-247.

² See Blanchard, O. and Cerutti, E. What Is the Effect of Recessions? In: IMF. *World Economic Outlook*, October 2015. Washington, DC: International Monetary Fund, 2015, 51-52.

Factors for economic vulnerability

The trade links between a country and the rest of the world are conventionally represented by indicators of *trade openness*. The trade to GDP ratio is one of the most often used measures, and it also displays the degree of a country's integration in the world economy. The indicator points at the aggregate importance of exports and imports of goods and services for an economy. It demonstrates the dependence of domestic producers on foreign demand and of domestic consumers and producers on overseas supplies. Thus, a high level of trade openness may be viewed as a measure of vulnerability to potential trade shocks.

At the same time there is a well-established correlation between GDP and openness to trade in the trade economics literature. Generally, as countries become wealthier, they tend to trade more as a percentage of their GDP. While this correlation is complex and not fully understood, it provides a trade-off between the aspirations of emerging and developing economies for higher levels of per capita income and the increased exposure to shocks that may affect negatively the performance of these economies.

A brief inspection of trade openness within the group of countries described by the International Monetary Fund (IMF) as "Emerging and Developing Europe" (Table 1) reveals that the usual pattern holds for this sample. Larger economies as Turkey have lower dependence on the world markets due to sizable domestic consumption. At the other end is Hungary which relies on an export-oriented growth model, shared also by other countries in the region, e.g. the Czech Republic and Slovakia. The lower values of merchandise trade as share of GDP for Albania, Croatia and Montenegro may reflect the fact that these countries have service-oriented economies.

Table 1. Trade openness, average 2011–2015

<i>Country</i>	<i>Merchandise trade, % of GDP</i>	<i>Trade in services, % of GDP</i>	<i>Trade, % of GDP</i>
Albania	56	35	82
Bulgaria	112	26*	130*
Bosnia and Herzegovina	89	13	89
Croatia	62	30	87
Hungary	156	30	169*
Kosovo	na	20	70
Macedonia	107*	25	111
Montenegro	65	41	105
Poland	79	15	91
Romania	74	15	81
Serbia	77	20	94
Turkey	49	9	58

* Data covers the period 2011–2014.

Note: The indices for merchandise trade and trade in services do not add up to the trade (in goods and services) in the last column due to different estimation approaches.

Source: World Development Indicators

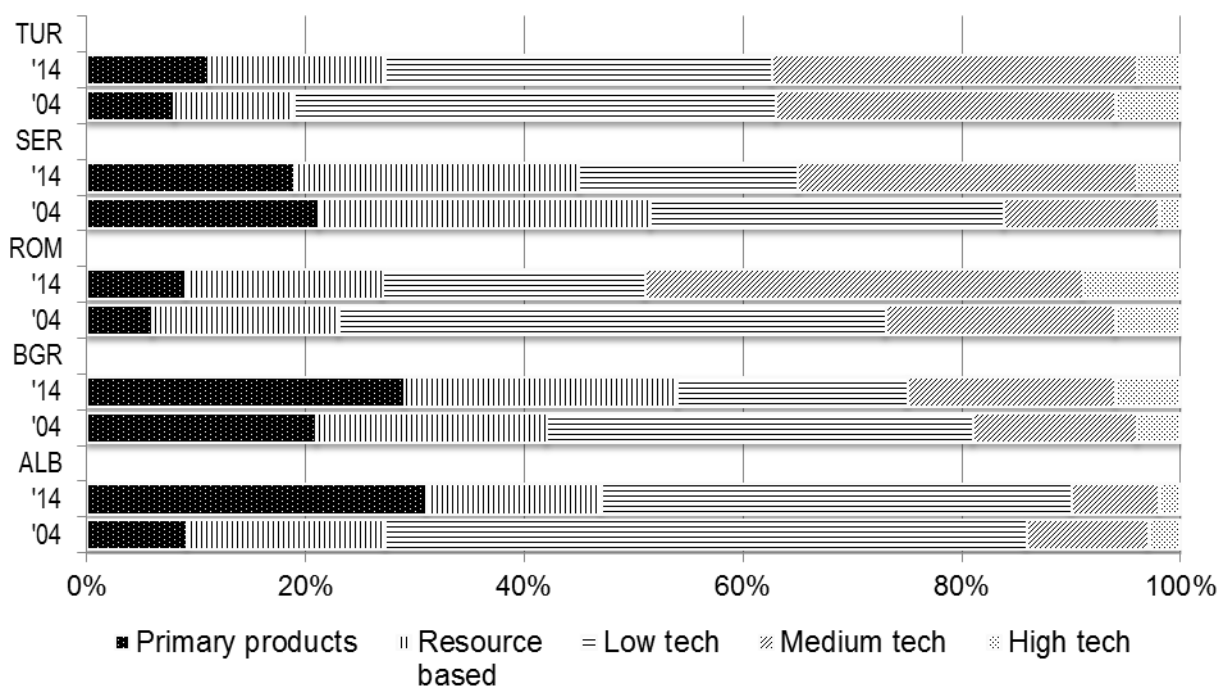
Trade openness alone cannot capture the degree of an economy's vulnerability to shocks originating from its foreign trade partners. A substantial factor is the composition of exports and imports. Reliance on a small number of partners and high concentration of export or import products bears the promise of a trade crisis.³

³ For a discussion on export concentration see Shivarov, A. Diversity in Bulgarian foreign trade. *Известия на Съюза на учените – Варна 2014*, Серия „Икономически науки“, 63–71.

Equally important is the *sophistication of export products*. The degree of innovation and complexity is presumed to increase competitiveness and build up resilience to external shocks. Technologically advanced products are less exposed to price volatility compared to primary products and raw materials. For the purposes of trade analysis products are ordered in five classes according to technological categories.⁴ The assignment of products to specific categories may be debatable, but a review spanning over several years provides an insight in the development of a country's export list and its exposure to demand and price swings. The categories are:

- primary products – agricultural products, coal, crude oil, natural gas, metals;
- resource based – ore concentrates, oil products, cement, stones and glass;
- low tech – textile and clothing, shoes, furniture, toys;
- medium tech – car parts, paints, chemicals, fertilisers, pipes, motors, pumps, switches, industrial machines, ships
- high tech – electrical machines, computers, telecommunication equipment, pharmaceutical products, products for the aviation and space industry.⁵

The development of the technological content of export for five countries from the Emerging and Developing Europe group for a period of ten years is presented in Fig. 1.



Source: Computed from data in WITS–UNSD Comtrade

Figure 1. Technological content of export in 2004 and 2014, share of total exports for Albania, Bulgaria, Romania, Serbia and Turkey

It is quite striking that all countries in the group, but one, have increased the share of primary and resource based products in their exports.⁶ There is no visible distinction between European Union and non-EU members. While the restructuring in the low, medium and high tech

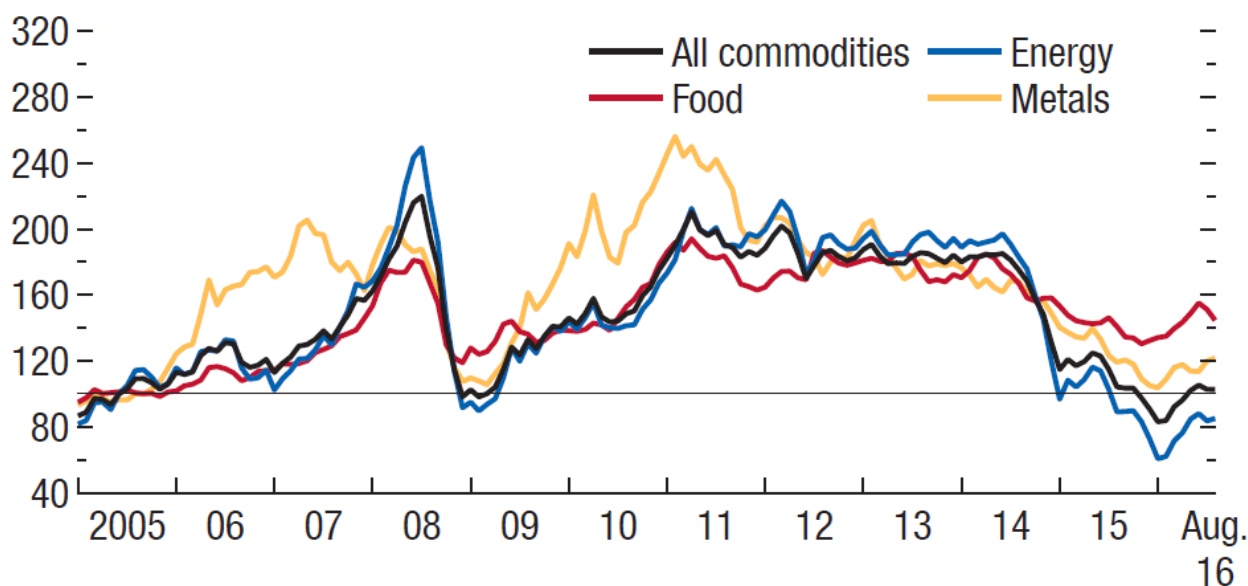
⁴ Lall, S. The technological structure and performance of developing country manufactured exports, 1985–98. *Oxford Development Studies* 28, no. 3, 2000: 337–369.

⁵ The full product classification is available from UNCTADstat: Product by technological categories (SITC Rev. 3 based on Lall (2000)) <http://unctadstat.unctad.org/EN/Classifications/DimSicRev3Products_Ldc_Hierarchy.pdf>.

⁶ The only exception is Serbia, but this may be influenced by the fact that the data for 2004 includes also Montenegro and Kosovo.

products varies among the countries, their dependence on primary products uniformly grows. This is especially pronounced for Albania, but also to a substantial degree for Bulgaria. The combined Bulgarian export of primary and resource based products reaches 54% of the total export in 2014. If these trends deepen, they might bring a set of typical issues associated with dependence on primary exports in the future.

The problems arising from *dependence on primary exports* is best illustrated by Fig. 2. It shows the large fluctuations of commodity prices over the last decade. Commodities have experienced two booms with prices increasing up to 250% over the baseline, in order to return back to the initial levels of 2005 in 2009 and 2015.⁷ There is a stabilisation and strengthening of commodity prices in 2016 but these large swings bring redistribution of income across countries and have a significant impact on macroeconomic outcomes.⁸



Source: IMF. *World Economic Outlook*, October 2016. Washington, DC: IMF, 2016, p 48.

Figure 2. Commodity price indices 2005–2016, 2005 = 100

Terms-of-trade shocks in emerging economies

Fluctuations in the prices of internationally traded goods, as well as the changes in the volume and product composition of trade, influence the gains from international trade. These gains are traditionally measured by the terms of trade or the ratio of a country's export prices relative to its import prices. The impact of price movements in commodity markets on a country's terms of trade is determined by the composition of the country's exports and imports in the short term. Over a longer time frame a decisive role plays the ability to adapt the composition of exports and imports to changing international demand and supply conditions. The more open is an economy, the bigger is the impact of changes in the terms of trade. Particularly in commodity-exporting countries, the terms of trade changes exercise strong impact on the economy and affect GDP growth rates and other macroeconomic variables.

The significance of the terms of trade concept has been recognised for a long time. In the early 1950s Prebisch and Singer argued that there is a secular decline in the terms of trade of primary commodities relative to manufactured products, putting developing countries at a disadvantage as main commodity exporters. This proposal has not been borne out by the data but

⁷ For a review of the recent developments in commodity markets see: UNCTAD. *World Commodity Trends and Prospects 2015*, New York and Geneva: UN, 2015.

⁸ IMF. *World Economic Outlook*, October 2016. Washington, DC: IMF, 2016.

commodity issues continue to be relevant for many emerging economies, even if developing countries as a group can no longer be labelled exporters of primary commodities.⁹

The question nowadays is not about the relationship between the prices of commodities and manufactures, but what is the interaction between the terms of trade and the performance of a small open economy? Answers to this question are sought within the framework of empirical models.

IMF is analysing changes in the cyclical versus structural components of output growth in small open net commodity-exporting economies during the commodity price cycle.¹⁰ Other major topics in the literature include the contribution of terms-of-trade shocks to macroeconomic volatility.¹¹ Several studies applying different approaches conclude that about 30% of the variance of output and other macroeconomic indicators is attributable to terms-of-trade shocks.¹²

We explore the behaviour of the Bulgarian economy under a terms-of-trade shock through a vector autoregressive (VAR) model. It provides the framework for analysing the changes in the variables under external shocks. Following the literature, changes in terms of trade are assumed to be exogenous shocks. Impulse response functions are employed to explore the reactions of the variables to shocks affecting the system.¹³ The model can be described as follows:

$$x_t = Ax_{t-1} + u_t,$$

where the vector x_t is given by

$$x_t = \begin{bmatrix} tot_t \\ y_t \end{bmatrix}$$

The variables tot_t and y_t represent terms of trade and output, A is a matrix of coefficients and u_t is a vector-column with the residuals of the equations (with mean zero and variance-covariance matrix Σ). The terms of trade are calculated using export and import price indices:

$$tot_t = \frac{P_t^x}{P_t^m}$$

The output is calculated as a logarithm of seasonally adjusted GDP data:

$$y_t = \ln GDP_t^s$$

The data for all variables is quarterly and is sourced from the Bulgarian National Statistical Institute. It covers the period 2001:Q1 – 2016:Q2 and includes 62 observations.

The terms of trade series is stationary, while the GDP data features a structural break during the recession of 2009.¹⁴ However the Zivot-Andrews unit root test¹⁵ rejects the unit root hypothesis, so we can proceed with the analysis.

⁹ UNCTAD. *Trade and Development Report* 2005. New York and Geneva: UN, 2005.

¹⁰ IMF. *World Economic Outlook*, October 2015. Washington, DC: IMF, 2015.

¹¹ Jääskelä, J. P. and Smith, P. Terms of trade shocks: What are they and what do they do? *Economic Record* 89, no 285, 2013: 145–159.; Schmitt-Grohé, S. and Uribe, M. How important are terms of trade shocks? *NBER Working Paper Series* 21253, Cambridge, MA, 2015.; Berkmen, P. Macroeconomic responses to terms-of-trade shocks: a framework for policy analysis for the Argentine economy. IMF working paper WP/09/117. Washington, DC: International Monetary Fund, 2009.

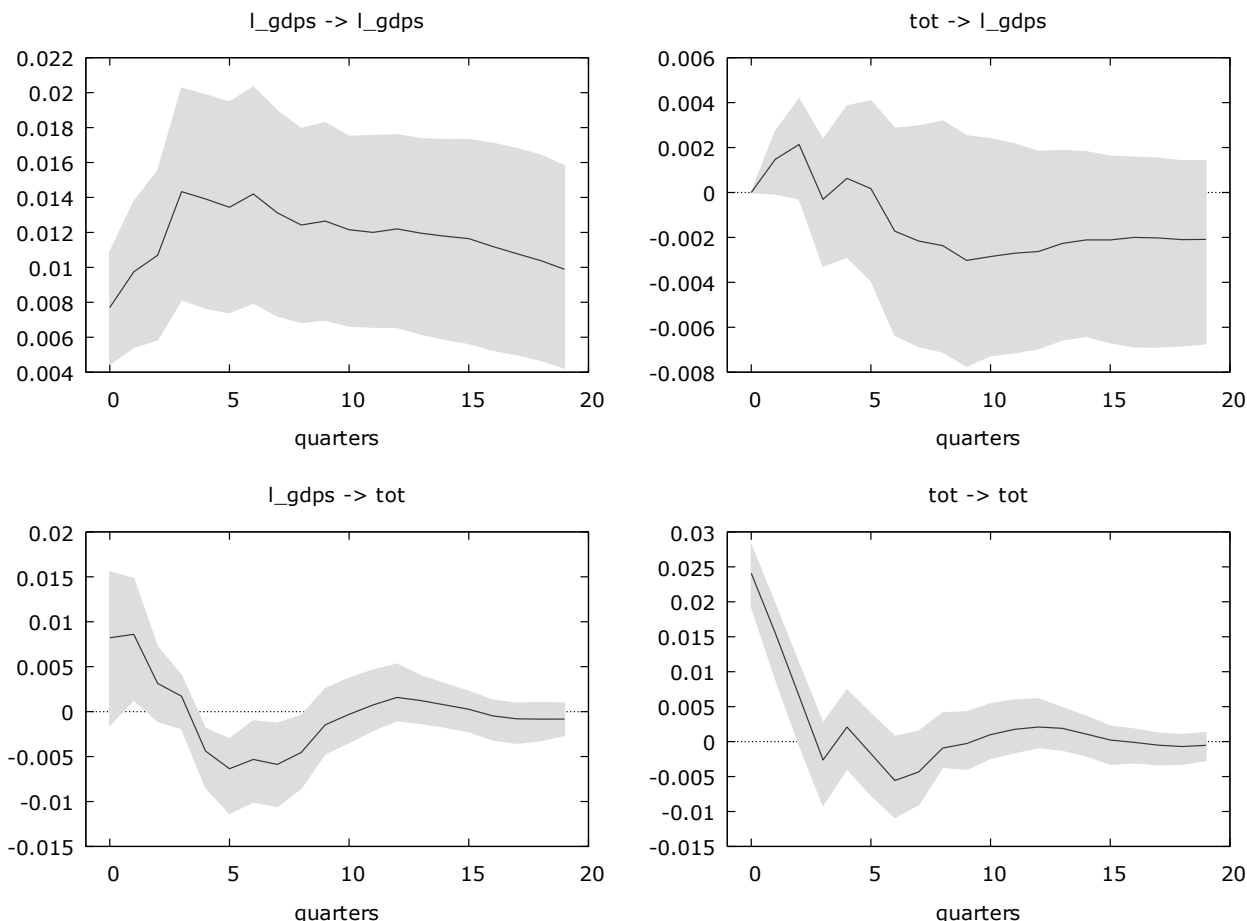
¹² Kose, M. Ayhan. Explaining business cycles in small open economies: ‘How much do world prices matter?’ *Journal of International Economics* 56, no. 2, 2002: 299–327.; Schmitt-Grohé, S. and Uribe, M. Op. cit.

¹³ Lütkepohl, H. “impulse response function.” *The New Palgrave Dictionary of Economics*. 2nd ed. Durlauf, S. and Blume, L. (eds.). Palgrave Macmillan, 2008.

¹⁴ In running the model we follow the procedures described by Marinov (Маринов, Г. Международни финанси. Варна: Онгъл, 2009.)

¹⁵ Pfaff, B. *Analysis of integrated and cointegrated time series with R*. 2nd ed. New York: Springer, 2008.

A substantial result from the model is the establishment of a lag equal to 5 quarters, which is consistent with expectations about the interaction of variables within the Bulgarian economy. The impulse responses of the terms of trade and GDP to each other and themselves are represented on Fig. 3.



Source: Computed from NSI quarterly data on export and import price indices, and seasonally adjusted GDP, 2001 – 2016 (2nd quarter)

Figure 3. Impulse response

A positive terms-of-trade shock supports economic growth in the initial periods and exerts long-term impact on output (Fig. 3 upper right panel), which does not disappear 20 quarters after the shock. Somewhat surprisingly, the trade shock after reverberating through the economy leaves output at a lower level in comparison to the stage before the disturbance. This result however is in line with the outcomes of the IMF model¹⁶ and the study of the Australian economy¹⁷, despite differing model specifications. A tentative explanation could be that in the medium term customers of the country's export products that have experienced a price hike can adapt to the new circumstances and find alternative solutions to satisfy the existing demand.

As expected, changes in GDP have much stronger impact on terms of trade (lower left panel). The lasting effect of output changes on terms of trade is confirmed by the decomposition of variance (Table 2, lower panel). It gradually increases with each subsequent period and by the 10th quarter after the shock is responsible for 24% of terms-of-trade variance.

¹⁶ IMF. *World Economic Outlook*, October 2015. Washington, DC: International Monetary Fund, 2015.

¹⁷ Jääskelä, J. P. and Smith, P. Op. cit.

Table 2. Decomposition of variance, 10 periods

Decomposition of variance for <i>l_gdps</i>			
<i>period</i>	<i>std. error</i>	<i>l_gdps</i>	<i>tot</i>
1	0.00770685	100.0000	0.0000
2	0.0125092	98.6133	1.3867
3	0.0165942	97.5544	2.4456
4	0.0219293	98.5804	1.4196
5	0.0259788	98.9299	1.0701
6	0.0292497	99.1524	0.8476
7	0.0325599	99.0365	0.9635
8	0.0351714	98.7960	1.2040
9	0.0373760	98.5327	1.4673
10	0.0395749	98.1072	1.8928

Decomposition of variance for <i>tot</i>			
<i>period</i>	<i>std. error</i>	<i>l_gdps</i>	<i>tot</i>
1	0.0254485	10.4317	89.5683
2	0.0310440	14.6907	85.3093
3	0.0318755	14.9092	85.0908
4	0.0320295	15.0510	84.9490
5	0.0323945	16.5436	83.4564
6	0.0330574	19.5833	80.4167
7	0.0339435	21.0290	78.9710
8	0.0347212	22.9625	77.0375
9	0.0350286	24.2396	75.7604
10	0.0350603	24.3701	75.6299

Source: Computed from NSI quarterly data on export and import price indices, and seasonally adjusted GDP, 2001 – 2016 (2nd quarter)

Conclusion

The deeper integration of emerging and developing economies within the world economy has changed the essence of the debate surrounding the terms of trade concept. What started as a hypothesis about the disadvantaged position of developing countries as suppliers of commodities in mid-20th century has evolved into deeper understanding about the effect of terms-of-trade shocks – both positive and negative – on a set of macroeconomic variables.

With greater openness to trade small emerging economies should strive to increase their ability to withstand external shocks and adapt to changing circumstances in the international markets. This is true both for commodity exporters and importers, in times of up- and downswings. Windfall gains can affect the economic systems in equally important ways as windfall losses.

As the growing literature on terms-of-trade shocks and our simple empirical model based on the Bulgarian economy demonstrate, there are statistically significant links between the external sector and economy's output. The reviewed studies indicate that 30% of the variance of output and other macroeconomic indicators is attributable to terms-of-trade shocks.

An outcome of our VAR model is that there is a statistically significant relationship between terms of trade and output for the Bulgarian economy. The model exhibits a lag of the order of 5 quarters. These results may contribute to enhanced understanding of the linkages between simultaneous processes in the economic system and provide insights for policy solutions and their timing. This is especially relevant as the Bulgarian economy is very open to trade and at the same time is moving in the direction of higher dependence on primary exports. The reasons of this shift

remain outside the scope of the paper but this very fact requires better grasp of the responses to trade shocks by the Bulgarian economy, which shares many features with other emerging economies.

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