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Classification and Interpretation of Macroeconomic Exogenous Shocks – The Case of Lithuania

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Abstract

While the notion of exogenous shocks has been part of economic discourse for a long time, the severity of recent shocks, especially in the financial sector culminating with a collapse of a major global bank in 2008, has had enormous real economic effects in terms of employment and output. This makes the task of identifying, classifying and measuring economic shocks most important, particularly in the context of possible both macro and microeconomic policy prescriptions that could potentially soften the effects of such shocks.

This paper reviews economic literature on different interpretation and measurement of economic exogenous shocks. A notion of economic shock as a 'process' (as opposed to an identifiable and measurable 'event') is expounded.

Classification of exogenous shocks into transitory and permanent is offered, a distinction that has important implications for relevant policy response which can either amplify or dampen the economic effects of shocks is laid out.

Two exogenous economic shocks are identified in the Lithuanian economy. Using statistical methods and economic data, the two shocks are classified into transitory or permanent. Policy implications of this classification are also proposed.

Keywords: exogenous macroeconomic shocks, transitory and permanent shocks.

Introduction

Gradual integration of the Lithuanian economy into the global economy has the effect of enhancing mutual economic inter-linkages with other economies, often characterised by very different levels of economic development. Academic studies undertaken at different levels of the economy also seem to confirm a volatile nature of economic development, especially during occurrences of the so-called exogenous shocks. Lithuania's experiences during the economic crisis of 2008-2009 bears out this as well.

A general economic issue of identifying economic shocks (including exogenous) defining their economic effects and quantifying them is duly recognised as a difficult and not easily definable task. Shocks, in the form of a high-impact but of very low-probability or even seemingly impossible events, have been most recently popularised by N. Taleb. His most important contribution has been an outline of the limitations of statistical methods such as a normal distribution to the task of prediction and forecasting. In traditional theoretical approach of such authors as Krugman, Dornbusch, etc. economic shocks have been variously defined as unexpected and big changes in exogenous economic variables that affect and influence endogenous variables. A substantial number of studies (reviewed further in this paper) have explored a quantitative aspect of identifying and measuring economic shocks by using econometric techniques.

In this context, it is worth emphasising that contrary to a traditional theoretical approach to an exogenous shock as identifiable in time occurrence and quantitatively measurable, this paper views exogenous shocks as an economic process as opposed to an event, the effects of which on endogenous variables (such as GDP) manifest themselves over a longer period. Therefore, the aim of this study is to identify exogenous economic shocks (applicable to Lithuania's economy) that have unfolded over time and classify them as either transitory or permanent. For this purpose, the main GDP identity (expenditure method) for a small open economy with fixed exchange rate (according to Krugman and Obstfeld, 2006) is used with a particular attention to distinguishing between transitory and permanent exogenous shocks. Thereafter, using quantitative statistical methods two exogenous shocks (firstly, Lithuania's integration into the common European market for goods and services, and, secondly, a global surge of capital flows into real estate markets during 2003-2007) will be classified as either transitory or permanent taking into consideration their effect on endogenous macroeconomic variables in Lithuania.

The reason why it is important to identify an exogenous shock as either transitory or permanent is that such classification of exogenous shocks enables to select a relevant macroeconomic policy that works either in a pro-cyclical or anti-cyclical manner to the direction of effects from exogenous shocks.

Definitions of an Economic Shock

A shock in the most general sense can be likened to the emergence of a Black Swan when it is commonly accepted that swans can only be white in colour. Hence, a sighting of a Black Swan creates a turmoil and 'shocks' the observer from the state of complacency "... the effect of these Black Swans has been increasing. It started accelerating, as the world started getting more complicated. This combination of low predictability and large impact makes the Black Swan a great puzzler..." (Taleb, 2007, p. 1).

From a statistical point of view, a shock represents an event that according to the parameters of the normal distribution is virtually impossible yet occurs much more often than predicted by normal distribution.

In an economic sense shocks are often associated with fluctuations of economic growth, structural shifts in importance of various industries as well as volatility relating to the path of economic development.

Macroeconomics broadly investigates economic fluctuations that are caused by various shocks such as changes in investment and government spending (Sachs, Larrain, 1993; Varangis, Varmas, de Plaa et al., 2004). At a higher level of generalisation shocks are linked to aggregate demand and aggregate supply " ....the economy is constantly hit by shocks to aggregate supply, or to aggregate demand, or to both" (Blanchard, 2006; 160). Also, "...shocks are likely to change the autonomous components of aggregate demand and shift the aggregate demand schedule" (Begg, Fischer, Dornbusch, 1994, p. 283).

For example, economic growth in the US is analysed as a result of four main shocks (two non-policy shocks: demand and supply, and two policy shocks: monetary and fiscal) (Forni, Gambetti, 2010).

Various distinctions to emphasise a temporal occurrence of economic shocks are employed. Authors such as Sachs, Larrain, 1993 describe the multifaceted nature of shocks using such terms as *temporary, current, permanent, random, anticipated matured shocks*, others, notably Caramazza, Kouvenaar, 2008, single out only transitory and permanent states.

The global economic crisis of 2008-2009 brought to the forefront the effects of changes in the major economies on smaller countries through the spatial propagation of shocks. With regard to the spatial propagation of shocks emanating from Germany "... these shocks have a significant impact on nearby countries and, subsequently, with a time lag, spread out across Europe" (Dewachter, Houssa, Toffano, 2010, p. 11).

From the discussion above it follows that there is no commonly accepted definition of a shock. "... shocks may be defined as a significant change in the value of a variable from its underlying trend, as determined using standard measures of dispersion such as the standard deviation or the coefficient of variation. Shocks may be classified as instances of extreme volatility, which, in statistical terms, fall in one of the tails of a distribution" (Varangis, Varma, de Plaa et al, 2004, p. 3).

Authors as Begg, Fischer, Dornbusch, 1994; Jones, Leiby, 1996, Selim, 2008 relate 'shocks' to very specific historic events such as a sharp rise in oil prices or start of a war.

Exogenous Shock: Meaning and Importance, Literature Review

An exogenous shock is defined as a sudden event beyond the control of the authorities that has a significant negative impact on the economy (Geithner, 2003). A very similar view is also taken by the IMF (Allen, 2006).

Exogenous shocks exert both direct and indirect effect on a variety of economic variables. "... exogenous shocks have both direct and indirect economic effects. … a direct impact is usually through damage to the stocks of physical and human capital and in some cases to output, while the direct impact of terms-of-trade shocks is on income of both the private and public sectors. Shocks also have indirect effects that reverberate throughout the economy and can affect output, investment, macroeconomic balances, debt and poverty" (Geithner, 2003, p. 9).

"Consider the following scenario: suppose that, in the context of a solvent banking system, a fully exogenous and unexpected shock causes financial markets to anticipate a surge in inflation and/or devaluation. Such a shock might be related to external factors, such as an abrupt deterioration in the country's terms of trade, increase in foreign exchange rates or a generalized loss of confidence due to developments taking place in other parts of the world. Alternatively, an exogenous shock could be internally generated; for instance, it could arise from unexpected election results, worsening of a leading indicator of recession or from decline in the net worth of a particular class or sector of bank borrowers affected by a change in relative prices. Such a shock would provide a negative signal to the domestic financial market but is exogenous in the sense that is not caused by any factor inherent to the functioning of the banking system" (Blejer, Feldman, Feltenstein, 2002, p. 34).

Major exogenous shocks "have a large real impact, generating a substantial drop and rebound in output and employment …" (Bloom, 2009, p. 623).

A variety of studies have come to a conclusion that effects emanating from exogenous shocks are

very uneven, especially when shocks from developed countries are affecting less developed ones.

"The most important exogenous economic shocks to developing countries were considerable fluctuations in the world market prices of primary commodities with increases in oil prices which were reflected in the deterioration in the terms of trade; slowdown in economic activities in the industrial countries which caused recession in world trade and decline in export volume of non-oil developing countries; sharp changes in the cost and the availability of foreign finance which were expressed in the rise in real interest rates in international capital markets and the decline in availability of foreign finance even with high cost resulted from the decline of developing countries credibility" (Selim, 2008, p. 2).

The interplay between developed and developing countries is not only reflected in the often divergent effects of exogenous shocks on them but also provides opportunities for either convergence or divergence of the levels of economic development (Astorga, Berges, Fitzgerald, 2005, p. 5). "Structural weaknesses contribute to developing countries' vulnerability. In many cases vulnerability has been magnified by policy choices over time that have failed to encourage diversification of output and exports" (Geithner, 2003, p. 4).

Nonetheless, the evaluation of the effects of exogenous shocks on developing economies still remains problematic. "... Existing methods remain controversial; we do not have models that convincingly isolate different types of shocks" (Agenor, McDermott, et al., 2000, p. 281).

"… A typical dynamic response of the economy to an exogenous shock may lead us to doubt the validity of some growth theories and hypotheses. The neo-classical model does not accord very well with the growth experience of developing (non-OECD) countries" (Noy, Nualsri, 2008, p. 17).

Further literature review, this time relating to the 'terms of trade' shocks, is conducted. Terms of trade (referring to relative prices of exports and imports) have a direct bearing on the particular shock (opening up of the EU markets for Lithuanian exports) of relevance to Lithuania that will be considered in the subsequent sections of this paper. Furthermore, various authors propose a number of ways to measure the 'persistency' of exogenous shocks, a notion linked to a permanency aspect of the shock that is under investigation in this paper.

Caramazza, Kouvenaar (2008) 6 attempted to identify the persistency of the 'terms of a trade' shock. They reviewed a number of possible definitions/calculations, including annual change in the terms of trade and its effect on growth accelerations and decelerations, applying the Bai-Perron test to identify a structural break (but the standard Bai-Perron test was found to be inadequate for measuring smaller breaks) using a 10% annual change threshold suggested by other authors (yet this method does not offer a way to distinguish between short-lived and persistent shocks). Having found the existing methodology to be in one or another way deficient the above authors analysed the terms of trade series for goods and services for an unbalanced panel of 159 countries using annual data for 1970 through 2006, defining a persistent trade shock to be if the five-year mean of the terms of trade for the period *t-4* to *t* compared to period *t+1* and *t+5* differs by a predetermined threshold, where *t* is the period of the shock. Initially, the threshold is set to minus 10% for negative shocks.

Following this methodology, the authors identified 228 persistent terms of trade shocks that exceeded the 10% threshold, 79 of which exceeded the extended definition of 30% threshold. An important finding of the above authors is that persistent terms of trade shocks have been more frequent in developing countries than in the advanced economies (the order of magnitude is from 10 to 20 times), and negative and positive shocks are about equally frequent.

The importance of government policy as a reaction to an exogenous shock has been emphasised in the literature (In search of..., 2011; Cas, Ota, 2008; Heppke-Falk, Tenhofen, Wolf, 2006).

Returning again to the work of Caramazza, Kouvenaar, 2008; 3, it is noteworthy that they are trying to identify appropriate government policies that deal with the negative effects of terms of trade shocks. Noting that a sudden, large and enduring change in export or import prices tends to affect income (especially relevant for developing countries), even though it is not always easy to classify such shocks as either transitory or permanent, the authors contend that governments need to stand ready to respond to such shocks. The experience of countries with shocks has been varied, some suffer from a negative shock for a prolonged period of time, while others seem to have recovered quickly and might have even managed to achieve higher economic growth in the aftermath. The authors make an assumption that appropriate macroeconomic policy, supported by structural reforms and solid institutions, can help revive growth after terms of trade decline and attempt to differentiate between immediately executable policies post experiencing a shock and growth momentum maintaining policies. An excerpt from another paper of the above authors below summarises their view on government policy response options.

"…According to the endogenous growth literature the effect of a terms of trade shock might leave

a permanent mark on the economy by undermining the learning-by-doing manufacturing process or because of forward and backward linkages. To become fully useful in other areas of the economy, industry-specific capital and skills tied to a given industry may require scrapping and retraining, with at least a temporary negative effect on growth. However, negative terms of trade shocks can have a positive effect on income growth if they change comparative advantages and lead to discovery of new growth opportunities. Negative terms of trade shocks could help improve income growth in the medium term if they help the economy to get rid of inefficient firms. What the literature misses is that policy failure is often at the core of lower growth following negative terms of trade shocks. For example, cutting real wages may be a necessary policy in the face of a negative shock, but they have been usually resisted by developing countries. The result is persistent fiscal deficits that bring about growth collapse. Therefore, it is important to identify the policies needed to recover from a negative terms of trade shock" (Caramazza, Kouvenaar, 2008, p. 4).

Exogenous Shock: Diagrammatic Interpretation

The main GDP identity is used in this section to illustrate diagrammatically the transitory and permanent exogenous shocks, similarly to Krugman, Obstfeld, 2006.

Y=C(Y-T)+I+G+CA(EP/p, E), where C – domestic consumption, I – investment, G – government spending, CA – current account balance, P/p – relative price levels, E- exchange rate.

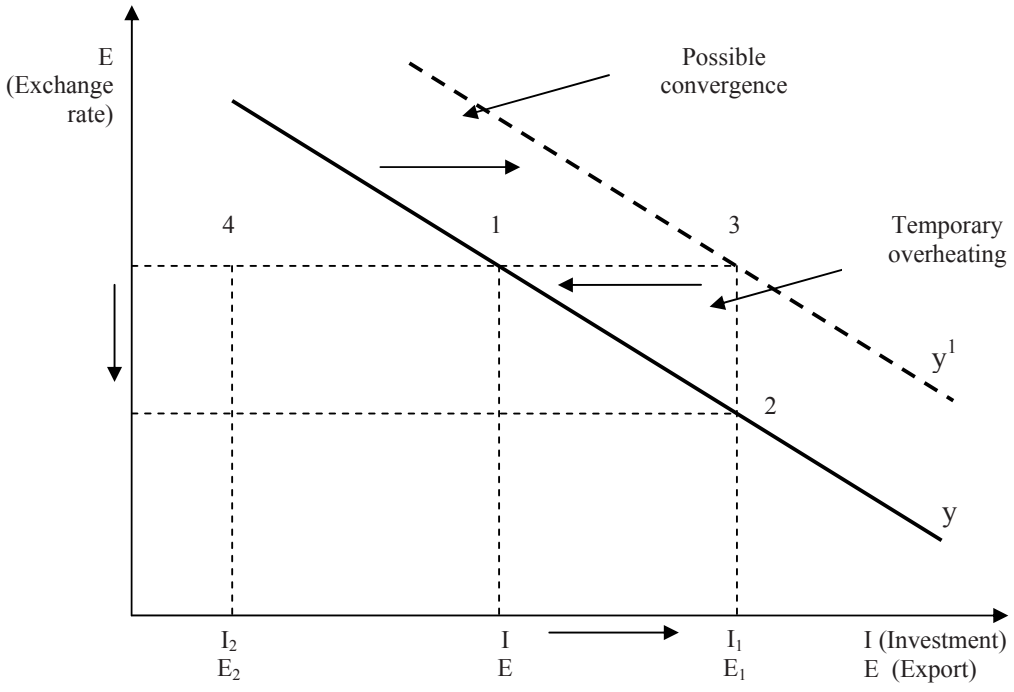

Fig. 1. Diagram of an exogenous shock

As shown in Fig.1, the economy is initially at equilibrium at point 1, the two exogenous shocks described in prior sections of this paper are affecting investment and exports (further details and figures on specific sub-sections of investment (those related to real estate activities) will be provided in subsequent sections. In this case, only direct effects are considered, it is of course possible that, for example, domestic consumption would be affected by increases in value of the real estate that provide further collateral to a household enabling borrowing and consumption. As a result of these shocks, the economy is moving towards point 3, where Y exceeds potential output therefore signalling economic „overheating". Under the flexible exchange rate regime, theoretically a revaluation of the real exchange rate would occur that would negatively affect the current account balance and bring the economy back to an equilibrium at point 2. However, taking into account the fixed exchange rate regime between the Lithuanian Litas and the Euro (and limited possibilities to affect the exchange rate with non-Eurozone trading partners), it is clear that this route of macroeconomic adjustment is not viable. Hence, the economy remains at point 3 and consequently lends itself to two conflicting interpretations: either the economy is in the state

of „overheating“ (this concept tends to be more frequently used in the case of developed countries, although Deutsche Bank Research (Overheating indicator still…, 2008) has applied this concept to Chinese economy in the past) or there exists an opportunity for a period of fast economic growth that in the case of a developing country could lead to economic convergence with more developed economies. In the latter case, 'overheating' would not be a right description of the economy, even though classical signs of 'overheating' such as rising wages and price level would be present (Y curve would shift to the right indicating a higher potential output level).

It is precisely because of this difficulty of classifying the effects of exogenous shocks on endogenous variables such as Y, that it is imperative to find a way to distinguish between transitory and permanent exogenous shocks. If an exogenous shock is transitory, it can be expected that the economy will return from point 3 to point 1, or potentially even to point 4, if, for example, as a result of an exogenous shock additional resources have been directed (jointly or singularly by both the private and public sectors as a result of fiscal or industrial policy) to the sector affected by the shock. However, the shock, having turned out to be transitory, occasioned overconcentration of resources that remain under-utilised, hence reducing potential output level.

Clearly, dire economic consequences stem from miss-diagnosing the nature of the exogenous shock. On the other hand, if an exogenous shock is permanent (and positive), it creates conditions for achieving higher levels of output. Therefore, if diagnosed correctly, such a shock may be positively amplified by relevant governmental policy, for example.

In the next section, a methodology to distinguish transitory and permanent shocks in the case of Lithuania is proposed.

Transitory or Permanent Exogenous Shock? Proposed Methodology

As already mentioned in the introduction, for the purposes of this paper an exogenous shock is not treated as an 'event' but rather as an economic process, the effects of which on endogenous variables take time to manifest themselves. Two such exogenous shocks can be identified in the case of the Lithuanian economy. Firstly, the opening up of the EU markets for goods and services to Lithuanian exports (this has been a gradual process that formally culminated with Lithuania's full membership in the EU in 2004). Secondly, the world has seen a real estate investment boom that reached its peak in 2007 (having started in earnest in 2003) and in the case of Lithuania has produced unprecedented investment into the real estate sector.

The effects of these two exogenous shocks will be measured through Lithuania's export growth and value add growth in construction and real estate operations using quarterly data for 2000-Q1 2012.

In order to identify whether both export and value add growth in real estate activities are the results of transitory or permanent shocks, the following statistical methods are used:

- Statistical standard deviation from the mean growth rate showing a potential change of the mean growth rate. In this case the ability of an indicator to return to its mean rate of growth post substantial declines in 2008 would indicate a permanent nature of the exogenous shock that drives an indicator, the decline of the mean growth rate would strengthen the case for a transitory classification of the shock.
- Mean-reversion characteristics of the growth rate indicating stability of an average growth rate, i.e. the more frequently the growth rate returns to its mean value, the more stable a longer-term growth tendency is. This indicator was used by R. Shiller in the context of mean reversion of the Price/Earnings ratio for major equity market indices; J. Grantham also utilised this indicator for corporate profit margins. The prevalence of mean-reversion characteristics would indicate a permanent nature of the exogenous shock.

Results

Before reviewing the results of this exercise, a few words on the significance of exports and real estate-related investments for the Lithuanian economy should be said. At the start of the year 2000 exports accounted for ca. 33% of the GDP. Due to an average annual growth rate of around 16% during Q1 2000-Q2 2012 period (close to twice as high as the growth rate for the overall GDP), by the start of the year 2012 exports have reached over 60% of GDP mark. While this is not the place to analyse in detail the domestic value-add content of exports, it is, however, undeniable that the importance of exports as a contributor to Lithuania's GDP has risen very substantially since 2000 and, therefore, the 'export shock' under consideration in this paper is indeed very sizeable.

Similarly, taking a closer look at the activity of the construction industry over Q1 2000-Q1 2012 timeframe, a very fast rate of growth is also discernible. Construction activity accounted for 3.7% of GDP in Q1 2000 and reached a peak of just over 11%

in Q3 2007 before falling back to just over 4% in Q1 2012. Again, it is undeniable that 'real estate investment shock' has been meaningful for Lithuania's GDP.

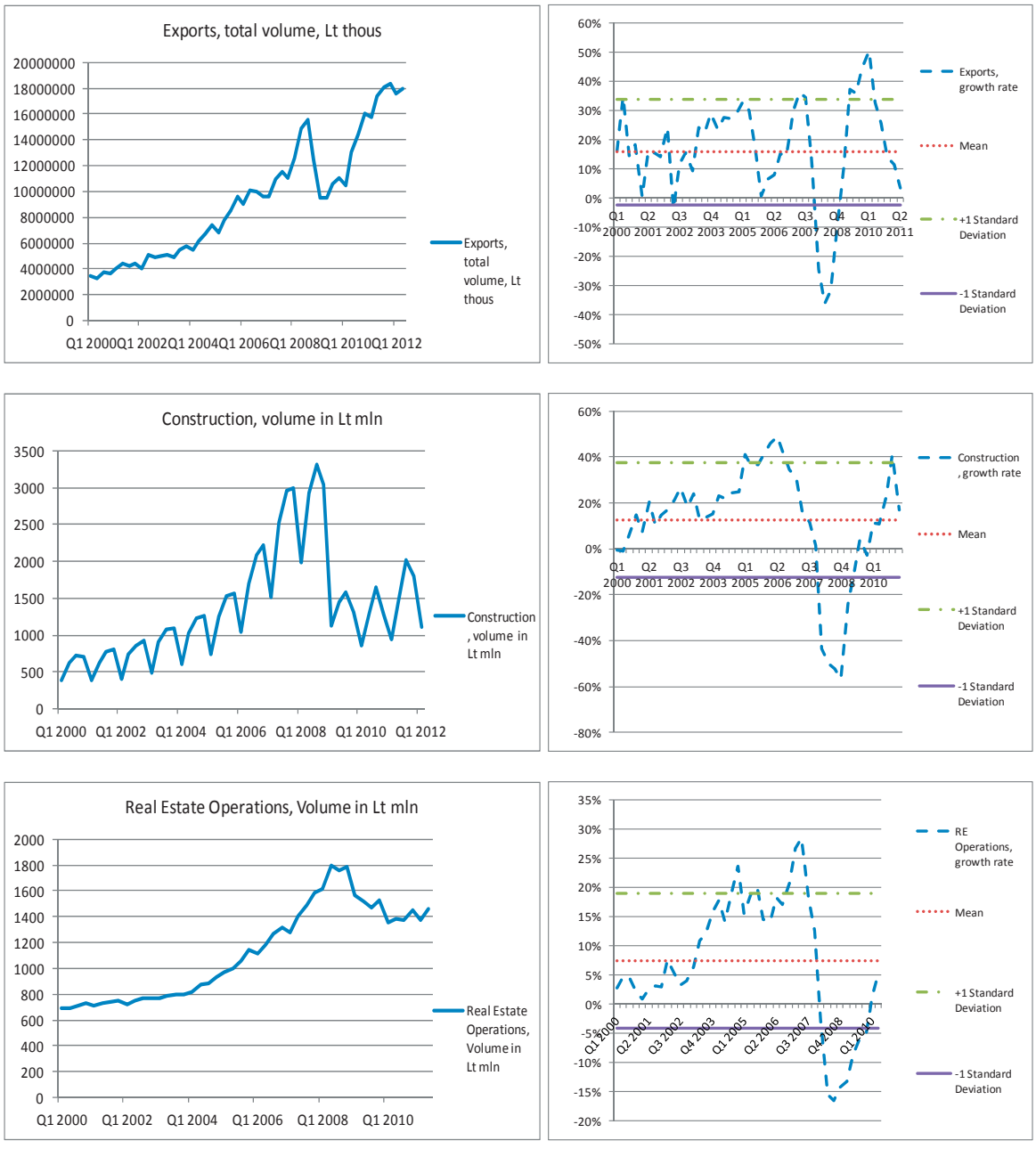

Fig. 2. Data analysis (volumes and growth rates)

Looking at the data for exports in Fig. 2, a very substantial decline in 2008 is visible. However, the level of exports recovered very swiftly and in fact exceeded the 2008 peak in 2011. Equally, the data for export growth showed a very strong consistency of trend, staying within one standard deviation of the mean growth rate for most of the time during 2000-Q2 2012 timeframe. Mean-reverting characteristics of this time series also seem to be present. Therefore, on the above evidence, the exogenous shock of opening up of the EU markets to Lithuanian goods and services can be classified as permanent.

The situation with another exogenous shock (strong global movements of capital to real estate investments), however, is much less clear cut. Taking the volume of construction output in Lithuania, it is abundantly clear from the graph above that volumes are far below the peak reached in 2008. However, the rate of growth of construction output recovered in 2011, making it difficult to classify the nature of the exogenous shock. It is possible that special one-off factors such as completion of construction works for EuroBasket 2011 tournament hosted by Lithuania distorted the data for the construction activity.

To remedy this situation, additional data for real estate operations out of national accounts is provided in the graph above. Clearly the peak activity of 2008 was not regained and, looking at the growth

rates, it would appear that so far reaching the average growth rate was a struggle. On the evidence of the data, therefore, it would be difficult to classify this exogenous shock as permanent. There is a better case for labelling the first exogenous shock as permanent and the second as more likely to be transitory.

Conclusion

In this paper the author has attempted to move away from a traditional interpretation of an exogenous economic shock as being a definable and measurable 'event' and suggest to view it as an 'economic process' that unfolds over time. In the case of an open and small economy such as Lithuania's, two such shocks as 'economic processes' have been identified.

Firstly, the gradual opening up of export markets of the EU to Lithuanian goods and services was the first shock considered and, secondly, a global surge in real estate investments was the second shock. The latter shock has been in operation since around 2003 (mortgage-backed securities, home equity loans and other instruments related to the real estate markets both in the US and Europe experienced very fast growth from 2003 to 2008). The former shock has been in operation probably since 1991, but the post 2000 period has been chosen as more relevant for the EU (in prior periods most of Lithuania's exports were destined for the CIS).

Two types of exogenous shocks, transitory and permanent, have been identified. Statistical methods of distinguishing between the two types of shocks have been proposed as well. With the help of these statistical methods, the first shock has been classified as permanent and the second shock is more likely to be viewed as transitory.

The reason why it is important to classify the shocks correctly is that such classification can result in appropriate recommendations for fiscal, industrial and other policies that enhance the positive aspects of a permanent shock. In the case of a permanent shock, tax and other incentives, for example, could be deployed as part of government policy. Conversely, in the case of transitory shocks, tax disincentives as well as, for example, tighter bank capital requirements for loans to a particular sector could be considered with the aim of preventing reallocation of resources to the sector affected by a transitory shock.

However, it is very important to bear in mind that the classification of exogenous shocks as presented in this paper is only applicable at a broad macroeconomic level. More detailed microeconomic studies are required in order to produce specific policy recommendations. Taking Lithuania's exports as an example, the total volume has not only recovered from a dramatic fall in 2008, but, in fact, has exceeded the previous high. Yet the nationwide unemployment rate still remains at over 14% (having reached a peak of just over 18% in 2010), much higher than 4.3% in 2007. Clearly, despite export volumes making new highs, the unemployment problem persists, necessitating further investigations into the nature (especially the value-add and employment intensity) of Lithuania's exports.

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Makroekonominių egzogeninių šokų klasifikavimas ir interpretavimas (Lietuvos pavyzdžiu)

Santrauka

Laipsniškas Lietuvos įsiliejimas į globalią ekonominę rinką neišvengiamai praplečia nacionalinio ūkio ir kitų, skirtingo išsivystymo lygio šalių ūkių ekonominės veiklos tarpusavio sąsajas. Įvairių lygių moksliniai tyrimai rodo tarptautinio ekonominio proceso vystymosi netolygumą, ypač paaštrėjantį vadinamų makroekonominių egzogeninių šokų (MEŠ) atvejais. Tai patvirtina šiandienės Lietuvos patirtis, ypač kriziniais 2008–2011 m.

Priešingai nei daugelis kitų autorių, šiame straipsnyje MEŠ nėra siejamas su konkrečiu „ekonominiu įvykiu“, kurį būtų galima tiksliai identifikuoti ir pamatuoti. Siūloma MEŠ traktuotė veikiau atitinka ‚ekonominį procesą‘, kurio poveikis pasireiškia per ilgesnį laiko tarpą.

Straipsnyje makroekonominis endogeninis šokas apibrėžiamas kaip svarbus ekonominės plėtros elementas, kurio poveikis endogeniniams ekonomikos rodikliams identifikuojamas per pagrindinę BVP lygtį

Y= C(Y-T)+I+G+CA(EP/p,E),

kur: C – vidaus vartojimas, I – investicijos, G – valstybės išlaidos, CA – einamosios sąskaitos balansas, E – valiutų kursas, P/p – santykinis vidaus ir pasaulinių kainų lygis.

Pokyčiai ekonomikoje gali būti interpretuojami dvejopai: arba ekonomika yra „perkaitimo“ stadijoje, arba egzistuoja galimybės sparčiam ūkio augimui. Dėl šios galimos dvejopos MEŠ įtakos endogeniniams ekonominės plėtros rodikliams, kyla MEŠ klasifikacijos į laikinus ir ilgalaikius problema. Pabrėžtina, kad tyrimo atlikta MEŠ klasifikacija taikoma makroekonominiame lygmenyje. Ši šokų klasifikacija svarbi nustatant vyriausybės vykdytinas ekonominės politikos priemones, formuojančias anticiklinio ir galimai prociklinio pobūdžio atsako į šokus variantus. Tam tikslui būtina atlikti detalizuotą ūkinės plėtros mikroekonominę analizę, tačiau tai nėra pristatomo tyrimo uždavinys.

Lietuvos atveju per praėjusį dešimtmetį išskirti du svarbūs makroekonominiai egzogeniniai šokai: laipsniškas Europos Sąjungos (ES) vidaus rinkos atvėrimas prekėms ir paslaugoms iš Lietuvos bei nekilnojamo turto (NT) investavimo bumas pasauliniu mastu, pasireiškiantį finansinių srautų nukreipimu į pastarąjį sektorių. Pastarųjų MEŠ svarba Lietuvos ekonomikai akivaizdi: 2000 m. pirmame ketvirtyje eksportas sudarė apie 33 proc. Lietuvos BVP, kai tuo tarpu 2012 m. šis rodiklis pasiekė apie 60 proc. ribą. Statybų sektoriaus BVP dalis 2000 m. pirmame ketvirtyje buvo 3,7 proc., aukščiausia vertė (apie 11 proc.) buvo pasiekta 2007 m. trečiame ketvirtyje. Šių MEŠ poveikis Lietuvos ekonomikos rodikliams matuojamas, pasitelkiant 2000–2011 m. ketvirtinius eksporto duomenis (ES plėtros šoko pasekmė) ir statybos sektoriaus bei NT operacijų pridedamąją vertę (NT bumo pasekmė). Siekiant klasifikuoti MEŠ į laikinus ir ilgalaikius pagal jų įtaką jau anksčiau minėtiems endogeniniams rodikliams, tyrime naudojami tokie statistiniai metodai:

- statistinė metinio augimo standartinio nuokrypio nuo vidurkio analizė, parodanti galimą augimo vidurkio vertės pasikeitimą. Šiuo atveju ypač įdomus po 2008 m. krizės laikotarpis ir rodiklių gebėjimas „grįžti į prieš krizę buvusias augimo vėžes“. Statistiškai reikšmingai pasikeitęs augimo vidurkis mažėjimo linkme reiškia MEŠ laikinumą, augimo vidurkio išlaikymas tapatinamas su ilgalaikio pobūdžio MEŠ;
- grįžimo prie vidutinės vertės tendencija (angl. *mean-reversion characteristics*), kaip tendencijos stabilumo matas, t. y. kuo dažniau nukrypimai nuo vidurkio grįžta vidurkio vertės link, tuo stabilesnė tendencija. R. Shiller taikė šią sąvoką, vertindamas akcijų kainos ir pelno santykį, J. Grantham akcentavo šią nuostatą korporacijų pelno maržos pokyčių kontekste. Šios tendencijos vyravimas reiškia ilgalaikį MEŠ.

Eksporto apimčių augimo dinamika atspindi ryškų kritimą 2008 m. ir tokį pat spartų atsigavimą vėlesniais metais. Be to daugelis duomenų, rodančių augimo tempą,

telpa į vieno standartinio nuokrypio nuo vidurkio rėmus. Pagrindinės išimtys iš šios taisyklės įvyko 2008 m. krizės ir vėliau sekusio atsigavimo stadijose; grįžimas prie vidutinės vertės taip pat pastebimas dažniau nei kitų rodiklių atvejais. Remiantis anksčiau išdėstytais eksporto augimo duomenų statistiniais požymiais, galima daryti išvadą, kad su Lietuvos eksportu susijęs MEŠ laikytinas ilgalaikio pobūdžio.

Statybų ir NT operacijų atveju, prieškriziniai lygiai, turimais 2011 m. duomenimis, akivaizdžiai nėra pasiekti. NT operacijų veiklos augimo tempai po 2008 m. negrįžo prie vidurkio reikšmės, sudarydami prielaidas galimam augimo vidurkio pokyčiui žemėjimo linkme ateityje. Pabrėžtinas mažesnis duomenų polinkis grįžti prie vidutinio augimo lygio nei eksporto duomenų atveju. Dėl jau išdėstytų priežasčių MEŠ, susijęs su Lietuvos NT rinka (išreikšta per statybų ir su NT operacijomis susijusių veiklų augimo pokyčius) laikytinas laikinu.

Pagrindiniai žodžiai: makroekonominiai egzogeniniai šokai, laikini ir ilgalaikiai šokai.

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