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# Managing Global Transitions

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# *Managing Global Transitions*

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# *Euro Area Scenarios and their Economic Consequences for Slovenia and Serbia*

Klaus Weyerstrass  
Daniela Grozea-Helmenstein

Since 1999, divergences in international competitiveness led to an accumulation of current account deficits in the south and surpluses in the north of the euro area. With the aid of macroeconomic models, this paper estimates the effects of an exit of Greece or of all GIIPS countries (Greece, Italy, Ireland, Portugal, Spain) on the economies of Slovenia and Serbia. An exit of one or more countries would affect other economies via the trade channel and credit constraints. Euro area members would additionally suffer from an increase of public debt due to non-performing loans of the European Stability Mechanism and devaluations of public bonds purchased by the European Central Bank. An exit of Greece alone would only marginally affect the economies of Slovenia and Serbia. An exit of all GIIPS countries or a euro area break-up would have dramatic negative consequences for output, unemployment and public finances.

*Key Words:* sovereign default; euro area break-up

*JEL Classification:* C54, F41

## **Introduction**

After the foundation of the European Economic and Monetary Union (EMU) in 1999, the diverging competitiveness of the peripheral and the core countries resulted in the accumulation of sizeable current account imbalances. At the same time, some countries built up large stocks of public debt. The countries, which lost international price competitiveness, have now to undergo painful reforms aiming at restoring their competitiveness. During this period, domestic demand declines which spills over to other countries via the trade channel. As the deficit countries became unable to finance their public budgets via capital markets, the other euro area countries, the European Central Bank (ECB) and the International

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Monetary Fund (IMF) have established financial rescue plans and new institutions, particularly the European Stability Mechanism (ESM). While the financial assistance is conditional on painful reform programs in the recipient countries, the other EU countries have assumed large claims and guarantees. If the recipient countries fail to repay the loans, public debt in the donor countries would increase, necessitating restrictive fiscal policies with negative short-run effects on domestic demand also in these countries. Furthermore, banks are affected by a write-down on their holdings of public bonds if the yields of these bonds rise sharply due to unsound fiscal policies of the respective countries. As a result, banks may be forced to reduce their credit supply. As many banks are operating internationally, credit supply in other than the home countries of the respective banks would also be affected. Should the reform programs underway in the peripheral countries fail to restore international competitiveness and the sustainability of public finances, one or more of the respective countries might eventually have to leave the euro area in order to devalue its currency and to increase competitiveness in this way.

In this paper, the macroeconomic consequences of different scenarios regarding the future euro area development for Slovenia and Serbia are determined by means of simulations with macroeconometric models for these economies. The choice of these countries enables interesting insights. On the one hand, both countries are successor states of the former Yugoslavia; hence they share common characteristics and a common economic and political heritage. However, already in the 1980s and early 1990s they followed different reform paths which materialised in a higher degree of economic openness and stronger trade relations with the Western countries in Slovenia. For Serbia, Russia was traditionally the main trade partner. Major differences between the two countries are related to their size in terms of territory and population, as well as their level of economic and social development (GDP per capita and size of unemployment) (Mencinger 2001). On the other hand, already in 2004 Slovenia became a member of the European Union, and in 2007 it was the first country from Central and Eastern Europe to introduce the euro as legal tender. Being a euro area member state, Slovenia has assumed obligations within the ESM, and by its capital share it participates in the ECB bond purchase programmes and in the payment system Target2. However, Slovenia came itself into troubles and may be forced to ask for ESM support, as due to the bursting of a housing and real estate bubble many loans became non-performing, pushing Slovenian banks into liquidity

problems. Due to the low capitalisation, the liquidity problem turned into severe solvency problems, and ultimately the government had to inject large amounts of capital into the banking sector, which pushed public debt up. Moreover, when joining the EMU in 2007, Slovenia gained access to large amounts of finance, while a clear strategy for using these funds was missing. Serbia, on the other hand, is only a EU candidate country. Hence, Serbia is until now outside the fiscal policy and financial architecture of the EU in general and the euro area in particular. In both countries, a lax credit policy by private banks, fuelled by substantial cross-border funding in the period preceding the crisis, led to a sharp rise in the indebtedness of companies and private households. Debtors are now facing difficulties to service the loans, resulting in a sharp increase of the share of non-performing loans and debt write-offs.

### **Accumulation of Imbalances in the Euro Area**

Since the foundation of the EMU in 1999, three major imbalances built up: (i) diverging competitiveness in the euro area, which intensified during the financial crisis of 2008; (ii) a banking sector which has proven to be under-capitalised and non-resilient against adverse shocks; (iii) high indebtedness of both public and private sectors in some member countries. Due to the mutual interdependences, these three problems reinforce each other, having resulted in a widespread confidence crisis. The developments are driven by pessimistic expectations concerning the solvency of the public and private sectors, respectively, in the crisis countries. This led to high interest rates in these countries. At the same time, capital fled into those countries, which are perceived as 'safe havens,' leading to historically low interest rates there. Due to high uncertainty, exaggerated pessimism may easily become self-fulfilling. The diverging development of unit labour costs among the euro area member countries since 1999 is one of the major, if not the single most important source of the current problems. This has caused substantial current account deficits in the countries with fast growing unit labour costs, mirrored by large surpluses in the economies experiencing an improvement in their international price competitiveness. At the same time, in the Southern peripheral countries public deficits and debt levels have swollen markedly (Roubini 2011).

Over a long period, these deviating trends had not been corrected by either exchange rate or wage adjustments. For an uncompetitive economy, such an adjustment would imply either an external or an internal

devaluation, both ways making the respective country's exports cheaper and imports more expensive. While Germany went through a prolonged period of wage moderation and painful labour market reforms (Hartz reforms), Greece, Portugal, Spain, Italy (and also Ireland, although Ireland's situation is not entirely comparable to the problems of the Southern countries) have increasingly fallen behind. Rigid labour markets and nominal wage stickiness prevented the required adjustment in these economies. When wages grow faster than labour productivity, unit wage costs rise. If unit labour costs rise by more than in other countries, the trade balance of the respective economy deteriorates.

The rising unit wage costs in the Southern periphery countries have partly been driven by capital market failure. Interest rate differentials in the euro area relative to Germany largely disappeared after the introduction of the euro, eliminating risk premia and inducing real estate and investment booms in those countries with still higher wage and price inflation and thus low or even negative real interest rates. The inflow of capital and low capital costs facilitated wage increases not backed by corresponding productivity gains. As interest rate differentials have appeared again during the financial crisis, a large part of these investments is no longer profitable with increased capital costs.

The failure of capital markets to price in risk premia and the resulting allocation of capital towards uncompetitive economies and sectors is probably itself the consequence of lacking credibility of fiscal rules and regulatory failure in Europe. The Maastricht criteria were not effectively imposed and lacked credibility right from the beginning. Capital markets also seemed to conclude that the no-bailout rule would not hold up in crises since the bankruptcy of a highly indebted member country would be perceived by the EU to be even more costly. In this way, high debt creates a negative externality on other countries. Under these conditions investors were inclined to expect to get their money back in any case, making government bonds an apparently very safe investment. Under these circumstances, there was no need to include a risk premium, which would have increased interest costs in Southern countries and could have helped to impose market discipline and to restrain the tendency towards excessive debt financing.

### **Scenarios of the Future Euro Area Development**

In this section, four scenarios of the future euro area development are delineated: a baseline scenario assuming that the current problems will

be solved without the exit or default of any euro area member state, and three more pessimistic scenarios.

**Baseline.** In the baseline scenario, it is assumed that the countries that are currently confronted with structural problems manage to solve their problems by implementing painful structural reforms. This implies that investor confidence is restored with the support from the ESM programs and the implicit ECB guarantees through the commitment to buy any amount of government bonds necessary to secure reasonable interest rates and risk premia. The euro area countries decide to finance a further haircut for Greece or additional re-capitalisations for the Spanish banking sector if necessary. Under these conditions, the crisis countries manage to implement structural reforms, resulting in a sustainable reduction of unit labour costs. This internal devaluation helps to restore international price competitiveness. In addition, the countries will regain the confidence of international investors, which helps to decrease public deficits and to reduce wealth losses that resulted from the financial crisis. Furthermore, the capitalisation of the banking sector will gradually be strengthened. However, since it takes time for structural reforms to become fully effective, in the crisis countries growth will remain subdued and unemployment will remain elevated for many years. The following, more pessimistic scenarios will be defined as deviations from this baseline.

**Greece exit.** In this scenario, Greece leaves the euro area, while the other countries in crisis manage to solve their problems. In this case, the new Greek currency would devaluate drastically. Due to this event the value of Greek debt, which is denominated in euro, would at the same time rise substantially. Hence, Greece would be unable to repay its debt, and a further haircut on Greek public bonds would be inevitable. Hence, Slovenia's public debt would increase, since Slovenia participates in the ESM and in the ECB bond purchase programs. Since neither Slovenian nor Serbian banks are significantly engaged in Greece, in this scenario no substantial losses of Slovenian or Serbian banks are likely. Hence, from this side there is no reason to expect reductions in credit supply in Slovenia or Serbia. However, Greek banks are engaged in Serbia with a share of 15 percent of total assets. If Greece leaves the euro area, it can be expected that Greek banks come under pressure due to the devaluation of the currency and the ensuing write-downs on their Greek sovereign bonds. Hence, it is assumed that upon Greece's exit from the euro area Greek banks will reduce their exposure abroad which could result in a

decrease of credit availability in Serbia. For Slovenia, such consequences would not occur, since Greek banks are not engaged in Slovenia. But also other Western European banks are present in Central and Eastern Europe. These banks would have to write down their Greek debt as well. This may impact upon credit availability in the countries in which they are engaged. While in Slovenia Western European banks own about 20 percent of all bank assets, in Serbia they account for more than 70 percent of the bank assets.

GIIPS exit. In a highly pessimistic and unlikely scenario, it is assumed that all peripheral countries with structural problems, i. e. the so-called GIIPS countries Greece, Ireland, Italy, Portugal and Spain leave the euro area. The remaining countries keep the common currency. In this scenario, the exit countries will be unable to repay large parts of their public debt, since their respective currencies would devalue drastically, pushing up their public debt which is denominated in euro. Investors would claim significantly higher risk premia to compensate for the increased risk of default of these countries. In Spain, the continuous fall of real estate prices aggravates the problems of the banks with non-performing loans, requiring higher public capital injections. In this scenario, also in Italy public resistance against the drastic government spending cuts and tax hikes rises, rendering it impossible for the government to implement the necessary budget consolidation measures. For this scenario, it is irrelevant whether the countries under consideration leave the euro area under their own deliberation or whether they are forced to leave because the euro area partners are no longer willing to finance the drastically increasing financial needs of these countries by additional ESM loans or ECB bond purchases. Regarding the economic consequences for Slovenia and Serbia, it is also not relevant whether each of the exiting countries introduces its own currency or whether they form a 'Southern euro area,' since the new currency or currencies would drastically devalue against the 'Northern euro' in any case. The impact of Italy and Spain leaving the euro area would be considerable for Slovenia. These two countries alone account for 80.6 percent (330.7 million euro) of the total amount of debt securities of the GIIPS countries owned by Slovenian residents. Moreover, according to the 2012 Financial Stability Review of the Bank of Slovenia, by the end of March 2012 Slovenian residents (mainly insurance companies and banks) held a total of 410.3 million euro in debt securities from Portugal, Ireland, Italy, Greece and Spain, accounting for 8.5 percent of their total investment in foreign debt securities. The share

of investment in the debt securities of Greece was low, amounting to 2.5 million euro in March 2012.

Total euro area break-up. Finally, in the fourth scenario it is assumed that the euro area breaks up altogether and all countries introduce their own currencies. This implies that Slovenia returns to the tolar, Slovenia's currency prior to its euro area accession in 2007.

### **Transmission Channels to Slovenia and Serbia**

An exit of one or more countries from the euro area would affect the economies of Slovenia and Serbia via several channels of which reduced exports and credit constraints might be considered the most important ones. The reasons for credit constraints differ between the two countries, as will be described later. Slovenia would also be confronted with additional fiscal costs, caused by write-downs on credits and guarantees given by the EU institutions to the crisis countries. Investment may in addition be affected by reducing the value of collateral available to back credits. In a business cycle expansion, the ratio of debt to asset values may rise to such a high level that a business cycle turning point sets in motion a deflation of Tobin's Q, which causes a spiralling decline in credit access and in the price and quantity of collateral assets. Output and investment then decline because the collateral constraint limits access to working capital financing (Mendoza 2008). In addition, private consumption is probably affected by negative wealth effects as in the financial crisis the value of housing and financial wealth decreased substantially. The decrease of real estate prices was particularly severe in Slovenia where a housing bubble burst which had been fuelled by very low real interest rates in the boom period prior to the outbreak of the crisis.

To keep the analysis manageable, the empirical investigations have been confined to these transmission channels, which can be regarded the quantitatively most important ones for the economies under consideration. In the following, these transmission channels, which have been accounted for in the simulations, are elaborated in more detail.

### **INTERNATIONAL TRADE**

The main cause of the current problems of several euro area economies is their loss in international price competitiveness, having resulted in an accumulation of current account deficits. Hence, upon a euro area exit of these countries, their new currencies would depreciate significantly against the euro. Based on a Meta study of existing analyses with differ-

ent methodologies, Born et al. (2012) conclude that most studies estimate the depreciation, which is necessary to induce a sizeable improvement of Greece's current account to 20 to 30 percent. Based on historical experiences of other countries, the required real depreciation could even reach 50 percent (Alcidi, Giovannini, and Gros 2012). If Greece stays in the euro area, wages and prices would have to decrease by this amount. If Greece leaves the euro area and prices and wages remain constant, the new Greek currency would depreciate in nominal terms (Seidel 2012). Based on these considerations, in the scenario of a Greece exit from the euro area, the ensuing nominal depreciation of the new Greek currency is assumed to be 30 percent. Although the current account deficits of the other crisis countries are smaller as compared to Greece, it is assumed that their respective new currencies would also depreciate by 30 percent against the euro in the scenario of the exit of all G11PS countries. This depreciation would boost exports and decrease imports of the countries leaving the euro area, since imported goods and services would become much more expensive in the respective domestic currencies. For the trading partners this implies significantly lower exports to the exiting countries.

The implementation of the reduced import demand on Slovenia and Serbia in the simulations takes account of the different international economic ties of the two countries. Slovenia has traditionally been closely linked to the German economy, while Russia and the other countries from the former Yugoslavia still account for the highest share in Serbia's trade. Common to both economies is the fact that exports to Greece only account for a small share of their total exports. An isolated euro area exit of Greece would thus only have a negligible direct impact on Slovenia's or Serbia's external trade. Greece accounts for just 0.26 percent of Slovenia's and 1.7 percent of Serbia's exports, respectively. Even if indirect effects are taken into account, Slovenia's and Serbia's exports would be only marginally affected when only Greece leaves the euro area. Indirect effects would be due to the fact that other economies would also be negatively affected by Greece's euro area exit, resulting in lower import demand. The picture would change if all G11PS countries, i. e. Greece, Ireland, Italy, Portugal, and Spain would leave the euro area. These countries absorb 13.6 percent of both Slovenia's and Serbia's exports. Italy alone accounts for about 12 and 11 percent of Slovenia's and Serbia's exports, respectively. Furthermore, an exit of these five countries, including the two large economies of Italy and Spain, would cause significant drops in

economic activity and hence import demand in several other countries (Colijn and van Ark 2012).

#### CREDIT CONSTRAINTS

Banks from Slovenia or Serbia with a substantial exposure in one or more of the crisis countries would incur large negative wealth effects (Petersen and Böhmer 2012). In the models for Slovenia and Serbia, which have been used for the simulations the banking sectors are not explicitly modelled. It has been assumed that Slovenian or Serbian banks confronted with write-downs on public bonds of the countries leaving the euro area would not be able to bear these losses without reducing their balance sheets. Hence, these banks would have to be re-capitalised by the government, similar to the re-capitalisations that have already been necessary in Slovenia. These injections of public capital raise public debt further. This would require additional restrictive fiscal policy measures (Eichengreen 2007). Furthermore, the banks would react to the negative equity effects by reducing their credit supply, with negative consequences for the financing of investment.

Since neither Slovenian nor Serbian banks are significantly engaged in Greece, in this scenario no substantial losses of Slovenian or Serbian banks are likely. Hence, from this side there is no reason to expect reductions in credit supply in Slovenia or Serbia. However, Greek banks are engaged in Serbia, and if Greece leaves the euro area it can be expected that Greek banks come under pressure due to the devaluation of the currency and the ensuing write-downs on their Greek sovereign bonds. Hence, it is assumed that upon Greece's exit from the euro area Greek banks reduce their exposure abroad, which could result in a decrease of credit availability in Serbia. For Slovenia, such consequences would not occur, since Greek banks are not engaged in Slovenia.

In the scenario with a euro area exit of Italy, Ireland, Portugal, and Spain in addition to Greece, much more adverse effects on credit supply would have to be expected. In particular, Italy has large banks with significant assets in Slovenia and Serbia. These banks, such as UniCredit and Intesa Sanpaolo, have an especially high GIIPS exposure. Upon an exit of Italy and other countries their banks would incur losses on their equities, mainly due to the ensuing devaluation of the new domestic currencies. Hence, it is assumed that these banks would reduce their activities abroad, which for this paper would imply decreasing credit supply in Slovenia and Serbia. The banks under majority foreign ownership rely to

a large extent on the coverage of loans through their parent bank funding, e. g. in Slovenia this ratio amounts to about 50 percent. In addition, as far as Slovenian or Serbian banks are engaged in the countries leaving the euro area, they would also be confronted with losses on their assets, which would induce them to reduce their balance sheets, implying a drop in credit supply. Slovenian residents' investment in debt securities (mainly bank and government bonds) of Portugal, Ireland, Italy, Greece and Spain is concentrated in the insurance and banking sectors. Government bonds from the periphery countries account for 6 percent of the Slovenian banking system's portfolio of debt securities, while bank bonds account for slightly less than 10 percent. The equivalent figures for the insurance sector are about 10 percent for government bonds and 11.5 percent for bank bonds, respectively. Already in 2011, the worsening situation on the euro area interbank market was mirrored by a drop of 36 percent in the stock of new loans, raised by Slovenian banks from banks in the rest of the world. This sharp fall shows Slovenian banks' limited access to the international financial markets coupled with lower credit availability in the economy.

#### ADDITIONAL PUBLIC DEBT (SLOVENIA)

As a euro area member state that participates in the European Stability Mechanism and via its capital subscriptions in the ECB bond purchase programs, Slovenia would suffer from irrecoverable loans and guarantees given to the crisis countries (Alcidi, Giovannini, and Gros 2012). Since it is reasonable to assume that countries leaving the euro area would at least partly default, the creditors would have to write down their loans. Hence, public debt would increase. Slovenia itself struggles with problems in the banking sector, since the financial crisis caused a bursting of a housing bubble, and many banks are now confronted with bad loans and debt write-offs. For this reason, the public sector had to inject considerable amounts into some large banks so as to strengthen their capital basis. This has already considerably driven up public debt in Slovenia. The debt ratio rose from 22 percent in 2008 to 54 percent in 2012. Public debt in Slovenia increased also due to the centre-left government decision to considerably increase social transfers in order to cushion the impact of the crisis, which reached Slovenia with some delay (e. g. Institute of Macroeconomic Analysis and Development 2012). From 2009 to 2011, the general government realised a budget deficit of around 6 percent in relation to GDP, followed by only a slight improvement to 4 percent in 2012. Due

to declining real GDP in 2012 and 2013 and only a sluggish recovery afterwards, the European Commission (2013) expects that the budget deficit widens again, and as a result the debt ratio could rise further to more than 66 percent of GDP in 2014, even without any additional debt accumulation due to write-downs on ESM loans or additional capital subscriptions to the ECB.

### **The Macroeconomic Models for Slovenia and Serbia**

The simulations of the macroeconomic consequences of different scenarios of the future euro area development for Slovenia and Serbia have been performed with macroeconometric models for these two countries. Both models have similar structures and will be verbally described in this section. A detailed description of a previous version of the model for Serbia may be found in Weyerstrass and Grozea-Helmenstein (2013). Earlier versions of the model for Slovenia have been described in e. g. Weyerstrass and Neck (2008) and Weyerstrass (2011). The model for Serbia has been used several times to generate forecasts for the Serbian economy (e. g. Grozea-Helmenstein et al. 2012). The model for Slovenia has been applied in several studies to analyse various aspects of Slovenia's continuous European integration process. In a recent paper, Neck, Haber, and Weyerstrass (2012) analyse the design of macroeconomic policies for Slovenia on its way into the euro area.

As described in detail in Weyerstrass (2011), weak exogeneity of the right-hand side variables of a structural econometric model is required for efficient estimation and hypothesis testing. Weak exogeneity means that no useful information is lost when other variables are made conditional on these variables without specifying their generating process. Strong exogeneity is the combination of weak exogeneity and Granger non-causality. It ensures valid forecasting of the endogenous variables, conditional on assumptions about the explanatory variables. Finally, super exogeneity requires weak exogeneity of the model variables and structural invariance. A conditional model is structurally invariant if all parameters are invariant to changes in the distribution of the conditioning variables. Super exogeneity is required for policy analyses, since such analyses assume that the parameters of the model do not change when the policy regime changes. The super-exogeneity condition may be investigated using a test for weak exogeneity combined with a test for parameter invariance. The CUSUM test and a Chow breakpoint test were performed to test the Slovenian model for parameter stability. For almost

all behavioural equations, the tests indicate that the parameters have been stable over time. Granger causality tests indicate that in almost all equations the right-hand side variables, i. e. the explanatory variables, are indeed not directly influenced by the endogenous variables. Based on the Granger causality and parameter stability tests, the model for Slovenia can be viewed as being appropriate for both forecasting and policy analysis, although it cannot be excluded that future changes in the policy regimes might induce private agents to change their behaviour in a different way than they did in the past (see Weyerstrass 2011). For the model for Serbia, only parts of these tests have been performed. Model evaluations based on the mean absolute percentage error and Theil's inequality coefficient, indicate that the ability of the macroeconomic model for Serbia to replicate the endogenous variables can be regarded as satisfactory (Weyerstrass and Grozea-Helmenstein 2013). Due to the shortness of the time series, particularly for Serbia, formal tests for Heteroscedasticity were refrained from, since they are designed for large samples. In addition, the estimated coefficients are valid even under heteroscedasticity, and any methods for dealing with heteroscedasticity like instrumental variables would also require longer time series without structural breaks. Finally, when setting up the equations, theoretical considerations have been given priority over statistical properties when choosing the variables and functional form of the equations.

Unit root tests identify most variables as integrated of order one, i. e. the variables are non-stationary in levels, but the first differences are stationary. In many cases, the results of the unit root tests are inconclusive. This problem is caused by the shortness of the time series and by the fact that some quarterly time series had to be derived from the respective annual figures. Based on the results of the unit root test, for almost all behavioural equations error correction models (ECM) were chosen as the most appropriate modelling technique for both country models, despite the short history of reliable time series especially for Serbian macroeconomic data.

The macroeconomic models for Slovenia and Serbia combine Keynesian and neoclassical elements. The former determine the short and medium run solutions in the sense that the models are demand-driven and persistent disequilibria in the goods and labour markets are possible. The supply side incorporates neoclassical features. The models are based on the conventional aggregate supply / aggregate demand (AS-AD) framework, where the long-run relationships have mainly been chosen on the

basis of theoretical considerations. The wage-price system is based on a bargaining model between employers and trade unions (Layard, Nickell, and Jackman 1991). In this labour market model, prices are set as mark-up over marginal costs. The wage-setting rule is based on a Nash bargaining process that produces an expected real wage that varies inversely with the unemployment rate. As unemployment falls, insiders know that, should they be laid off, they could quickly find work elsewhere. This raises the value of their fall-back point. The econometric estimations are based on quarterly data for the period 1997q1 to 2011q4 (Serbia), and 1995q1 until 2011q4 (Slovenia), respectively. However, for some variables the time series for Serbia start later. In particular, for this country quarterly time series for the public sector are only available from 2003q1 onwards. Furthermore, for some macroeconomic aggregates quarterly data are not available for Serbia. In these cases, quarterly data were derived from the respective annual aggregates by recurrence to related variables for which higher-frequency data have been available.

In the supply blocks of the models, potential GDP is determined. The estimation of potential output is based on a Cobb-Douglas production function with constant returns to scale and with the production factors labour, capital and autonomous technical progress. Since potential GDP is a measure of the long-run production possibilities of an economy, it is the long-run trends rather than the actual realisations of the production factors that enter the production function. Autonomous technical progress is defined as total factor productivity (TFP). Trend employment is calculated by subtracting natural or structural unemployment from the labour force. Since structural unemployment is non-observable, this variable has to be approximated. In the models for Slovenia and for Serbia, this is done by applying a Hodrick-Prescott (HP) filter to the actual unemployment rate in order to extract the trend. Structural unemployment is then defined as the long-run trend in actual unemployment. In order to endogenise the NAIRU, it is modelled as a moving average (MA) process. Total factor productivity (TFP) is calculated as the Solow residual, i. e. that part of the change in real GDP that is not due to increased labour and capital input, where both production factors are weighted with their production elasticities, i. e. 0.35 for the capital stock and 0.65 for labour, respectively. The actual TFP series is smoothed by applying the Hodrick-Prescott filter so as to remove short-run fluctuations that are caused by the business cycle or by any short-run shocks.

On the demand side, the models comprise the labour, goods, mone-

tary and foreign exchange markets. Hence, the models are made up of equations for the GDP expenditure components (private and public consumption, capital formation, exports, and imports), prices, wages, employment, unemployment, interest rates, and exchange rates. In addition, the most important revenue and expenditure items of the Serbian and the Slovenian general governments, respectively, are modelled. Consumption of private households depends on current real disposable income (the Keynesian consumption theory), and on the real long-term interest rate. The latter incorporates the permanent income hypothesis according to which it is the expected future rather than current income, which is relevant for private consumption. Discounted future income may be approximated by wealth. Lacking reliable data on private wealth in Slovenia and in Serbia, in the models wealth effects are approximated by the real long-term interest rate. The interest rate as a determinant of consumption accounts also for the fact that some households finance part of their consumption via bank credits, and for the intertemporal decision on the allocation of income to consumption in the present period and in the future. Gross fixed capital formation is undertaken to renew the capital stock and to adjust it to changes in final demand. Hence, the accelerator theory stipulates that changes in demand determine fixed capital formation. According to theories focussing on the profitability of investment projects, the value of the capital stock equals the discounted future income that can be generated by employing the capital stock. Therefore, the interest rate, which is used to discount future income, is crucial for the profitability of an investment project. The market interest rate is formed on the basis of the time preferences of the individual investors. According to this strand of theories, investment is a function of the real interest rate. The neoclassical investment theory combines the investment determinants according to the accelerator hypothesis and profitability considerations. In this case, the optimal capital stock equalises the marginal revenue product of capital and the user cost of capital. In the models for Slovenia and for Serbia, due to data availability as well as significance and sign of the estimated coefficients, the user cost of capital is approximated solely by the real long-term interest rate. In particular time series of company taxation, which would be relevant for investment decisions, are lacking. Exports of goods and services depend on international demand and on the relative price of domestic exports on the world market. Worldwide demand is approximated by world trade, while the real effective exchange rate accounts for price effects. Imports of goods and services depend on total

demand in Serbia and in Slovenia, respectively, and on relative prices. Similar to exports, relative prices are approximated by the real effective exchange rates of Serbia and of Slovenia, respectively. Labour demand by companies (i. e. actual employment) is influenced by the production level (real GDP) and by labour costs. In the models, labour costs consist of the average gross wage per employee. Due to the limited availability of reliable data, in the model for Serbia labour supply by private households is exogenous. In contrast, in the Slovenian model labour supply is made endogenous via the labour force participation rate, which depends on the real net wage, implying that the substitution effect of higher wages dominates over the income effect. The consumer price index (CPI) is related to internal and external determinants. The most important internal cost-push factors are wages. In addition, rising capacity utilisation exerts upward pressure on prices. Moreover, in the long run the CPI in Serbia is positively influenced by the money stock, supporting the Monetarist view according to which inflation is ultimately a monetary phenomenon. As an important external cost factor, the oil price in dinar enters the consumer price equation in the Serbian model. In the model for Slovenia, total import prices are included as the external cost component. The GDP deflator and other deflators are linked to the development of the consumer price index. In an extended Phillips curve equation, the wage rate is negatively influenced by the difference between the actual unemployment rate and the non-accelerating inflation rate of unemployment, or the NAIRU. In addition, wages are positively influenced by consumer prices and by labour productivity. On the financial market, interest rates and exchange rates are determined. Since the National Bank of Serbia (NBS) runs an independent monetary policy, the NBS interest rate for open market operations has been included in the Serbian model as the relevant monetary policy instrument. The model contains a Taylor rule type equation, i. e. the NBS interest rate depends positively on the inflation rate and on the output gap in Serbia. This approach implies that the National Bank of Serbia follows both an inflation and an output target. Real money demand is positively influenced by real GDP and negatively by the long-term interest rate. Since Slovenia as a euro area member state cannot pursue an independent monetary policy, in the model for Slovenia the short-term interest rate is solely determined by the three months EURIBOR. In term structure equations, in both models the respective long-term interest rates depend on the short-term interest rates. The long-term market interest rates then determine the respective implicit interest rates

on outstanding public debt. The nominal effective exchange rate of the Serbian dinar is determined by important bilateral exchange rates. Since the countries of the euro area are Serbia's most important trading partners, the nominal effective exchange rate of the Serbian dinar is mainly determined by the exchange rate vis-à-vis the euro. The real effective exchange rate is influenced by the nominal effective exchange rate and by price developments. In the Serbian model, the latter are approximated by the inflation rate in Serbia. In theory, it is the inflation differential rather than exclusively inflation in Serbia that matters. However, it would have been difficult to construct an international inflation rate consistent with the regional pattern of Serbia's external trade as reflected in the effective exchange rate. Therefore, in the real effective exchange rate equation only inflation in Serbia has been included in addition to the nominal effective exchange rate. In the model for Slovenia, the foreign exchange market is modelled by an equation for the real effective exchange rate against a group of 41 countries. To take developments before Slovenia's euro area accession in 2007 into account, the bilateral exchange rate between the Slovenian tolar and the euro is included as an explanatory variable. In addition, the exchange rate between the euro and the US dollar, the consumer price index (CPI) in Slovenia and the inflation rate are considered as further explanatory variables. In the public sector blocks, the models contain behavioural equations for the most important revenue and expenditure items of the consolidated general governments of Slovenia and Serbia, respectively.

### **Assumptions for the Simulations and Their Implementation in the Macromodels**

This section presents the implementation of the scenarios and transmission channels to Slovenia and Serbia, respectively, for the model simulations, which run over the period 2013 to 2017. The unprecedented nature of the different scenarios of the possible future of the euro area implies that the error margins of the calibrations are necessarily wide; they involve a larger than usual element of art rather than science. Nevertheless, we believe that what follows gives some guidance of the broad orders of magnitude of the macroeconomic consequences in the different scenarios. The same qualification was also made by Cliffe (2011) and Cliffe et al. (2010) in their attempt to quantify the economic costs of a Greek exit from the euro area or a complete euro area break-up. Cliffe et al. (2010) estimate the cumulative loss of output in the first two years at close to

10 percent of euro area output. In a revised assessment, Cliffe (2011) estimates this cumulative loss in the first two years at over 12 percent of euro area GDP.

For all simulations, it is assumed that the parameters of the macroeconomic models remain stable. This implies the supposition that consumers and companies do not change their fundamental behaviour (e. g. the marginal propensity to consume or the interest rate elasticity of investment) in response to the crisis. While it may be possible that some consumers or companies change their behaviour as a response to such an economic shock, the direction and magnitude of these possible changes are impossible to gauge *ex ante*. Hence, it is common in model simulation studies to assume parameter stability, even in simulations of large adjustments like deleveraging in the Spanish economy (In 't Veld et al. 2012), or in simulations of structural reforms (e. g. Vogel 2012) which by their nature should have long-lasting effects.

The most obvious transmission channel is international trade, resulting in lower exports from Slovenia and Serbia to the countries leaving the euro area. In addition, banks might have to reduce their credit supply so as to deleverage as they would incur losses on their holdings of public bonds. This reduced credit availability would negatively affect gross fixed capital formation. Slovenia would in addition be confronted with an increase of public debt as the countries leaving the euro area would be unable to repay their financial assistance in part or in full. Hence, the Slovenian government would have to write-down its loans and guarantees which implies an increase in public debt. As Slovenia's public indebtedness has already increased sharply during the economic and financial crisis, this additional debt would necessitate further fiscal consolidation efforts. This consolidation is implemented by a reduction of public consumption.

Table 1 shows Slovenia's exposure to the euro area peripheral countries. The calculations are based on those undertaken by the German ifo Institute for Germany. Slovenia's exposure is derived from the potential bail-out funds plus Target2 claims within the Eurosystem.

The calculation of the Slovenian share in the exposure is different for the various items. For the Target2 liabilities of the crisis countries, Slovenia's exposure is based on the country's share of 0.47 percent of the ECB capital. However, should one or more of the crisis countries become insolvent and leave the euro area, only the remaining euro area countries would be exposed to the Target liabilities. In this case, Slovenia would

TABLE 1 Slovenia's public exposure for the euro area scenarios in billion euro

Item	Greece exit	GIIPS exit	Euro area break-up
ESM capital	0.34	0.34	0.34
ESM guarantees	2.65	2.65	2.65
Greece 1	0.27	0.27	0.27
Greece 2	0.62	0.62	0.62
Ireland	—	0.18	0.18
Portugal	—	0.24	0.24
IMF not yet disbursed	0.22	0.22	0.22
ECB Target2	0.52	7.03	7.03
ECM SMP	0.98	0.98	0.98
Total	5.60	12.53	12.53

NOTES Authors' calculations based on data from <http://www.cesifo-group.de/ifoHome/policy/Haftungspegel.html>.

be liable for 0.48 percent of the total exposure if only Greece leaves the euro area. Should in addition to Greece also Portugal, Ireland, Italy and Spain exit the euro area, Slovenia's share would rise to 0.74 percent. Since the central banks of all euro area countries, including those of the crisis countries themselves, are involved in the ECB public bond purchases, Slovenia's share is also calculated on the basis of the general ECB capital key and consequently totals around 0.47 percent. To the first bailout program for Greece, Slovenia contributed bilateral loans amounting to 243.5 million euro. Regarding the second programme for Greece, Slovenia would be liable for around 0.5 percent of the European Financial Stability Fund (EFSF) loans. This again represents Slovenia's share according to the capital key of the euro area countries excluding the crisis countries. Slovenia's part of the two International Monetary Fund (IMF) bailout packages granted at the same time is in line with its contribution to the IMF's capital of 0.12 percent. The EFSF and the IMF contributed the same share of bail-out funds for Ireland and Portugal as they did to Greece. Slovenia contributed about 0.3 percent to the funds already made available by the ESM since this corresponds to Slovenia's current share of the revenues in the EU budget. Since the ESM does not provide for any specific liability on the part of member countries for concrete financial assistance, the Slovenian share in the programme to re-capitalise Spanish banks is included in Slovenia's overall exposure to the ESM. The ESM permanent bail-out fund has a capital of 700 billion euro. Slovenia's ex-

posure is calculated from its share of 0.43 percent. The capital to be paid in (0.34 billion euro) and the available capital (2.65 billion euro) are represented separately. For the simulations it is assumed that upon an exit of a country from the euro area, the Slovenian government would have to write down all its claims to the respective country. According to table 1, this would push up Slovenia's public debt level by 5.6 billion euro if only Greece leaves the euro area and by 12.53 billion euro if all GIPS countries exit or if the euro area completely breaks up. It is further assumed that this would happen at the end of 2012, i. e. before the start of the simulation period. The additional public debt would then be repaid by reducing public consumption linearly by one fifth of the additional debt in each of the five simulation years. This implies that additional interest payments for this part of public debt that is repaid later and not immediately in the first year are not taken into account. Hence, in the Greek exit scenario, public consumption is reduced by 1.12 billion euro per year and by 2.51 billion euro p. a. in the other two scenarios. The reduction in public consumption would exert substantial negative macroeconomic effects. Before the outbreak of the financial and economic crisis, in the literature on fiscal policy effects it had been widely accepted that multipliers of public consumption are well below 1, in particular due to crowding out, mainly via higher interest rates, causing both a decline in investment and appreciation of the domestic currency with negative impacts on exports. However, in the current environment of substantial economic slack, monetary policy constrained by the zero lower bound, and synchronised fiscal adjustment across numerous economies, multipliers may be well above 1 (see, e. g., Auerbach and Gorodnichenko 2012; Batini, Callegari, and Melina 2012; International Monetary Fund 2012a; 2012b).

For the implementation of the export reduction, following Born et al. (2012) it is assumed that the currencies of the exiting countries would devaluate by 30 percent against the euro. The same devaluation rate is assumed for the exchange rates between the exiting countries and the Serbian dinar. If the necessary adjustment of the trade balance of the crisis countries happens entirely via volumes, the imports of the respective countries would decline by 30 percent. If this is spread evenly across goods and trade partners, this implies that Slovenia's and Serbia's exports to these countries would also decrease by 30 percent. As mentioned above, Greece accounts for 0.26 percent of Slovenia's exports and for 1.7 percent of Serbia's exports. Hence, the assumed direct effect is set to an

export reduction by 30 percent of 0.26 percent for Slovenia and to 30 percent of 1.7 percent for Serbia, respectively, in the Greek exit scenario. The total export share of all GIIPS countries, i. e. Greece, Ireland, Italy, Portugal and Spain equals 13.6 percent both for Slovenia and for Serbia. Accordingly, the direct effect is set to an export reduction of 30 percent of 13.6 percent for both countries in the more extreme scenario of a euro area exit of the GIIPS countries. For the scenario of a euro area break-up, it is assumed that the direct impacts on exports are three times as large as in the GIIPS exit scenario. As other trading partners of the countries leaving the euro area would also experience a decline in economic activity, they would need less imports as well, which also affects Slovenia's and Serbia's exports. This additional indirect effect is assumed at 50 percent of the direct effects. It might be however objected that the assumption that the indirect effects make up half of the direct effect, is rather arbitrary. Of course any larger or smaller indirect effect would also be conceivable. However, a larger effect seems less likely since more distant regions of the world economy like the US or Asia would probably be affected only to a lesser extent, and hence exports to this regions would only decline slightly. It is furthermore assumed that the largest negative effect of a euro area exit of one or more countries would last for two years. For the third year of the simulation period, 75 percent of the original effect is assumed. For the fourth year, a further reduction to 50 percent of the original impact is taken, and for the final year a return to the baseline path is assumed. The final exogenous reduction of exports (as compared to the baseline simulation) in the three euro area scenarios can be summarised as follows. 2013 and 2014: Greece exit: Slovenia (SLO) 0.12%, Serbia (SRB) 0.77%. GIIPS exit: SLO and SRB 6.1%. Euro area break-up: SLO and SRB 18.4%. 2015: Greece exit: SLO 0.09%, SRB 0.57%. GIIPS exit: SLO and SRB 4.6%. Euro area break-up: SLO and SRB 13.8%. 2016: Greece exit: SLO 0.06%, SRB 0.38%. GIIPS exit: SLO and SRB 3.1%. Euro area break-up: SLO and SRB 9.2%. Finally, it is expected that in 2017 exports return to their baseline path, implying that their level is permanently lower as compared to the baseline.

Finally, it is expected that investment would be negatively affected in the scenarios involving the euro area exit of one or more countries. Clearly, companies would invest less in reaction to the decline in final demand. However, an additional negative effect can be expected. As banks incur losses of their wealth since they have to write-down on public bonds of the exiting countries, they might be forced to re-

duce their credit exposure. This lower credit availability would impair those investment projects that are financed by bank credit. According to data from the Slovenian and the Serbian National Banks, about 40 percent of all company investment is financed by bank credit. Regarding the credit supply, it is assumed that bank credit availability in Slovenia and in Serbia would decline by 5 percent and by 10 percent, respectively, if only Greece leaves the euro area. In the GIIPS exit scenario, the assumed credit rationing is set at 20 percent in Slovenia and 30 percent in Serbia, respectively. Finally, for the most dramatic scenario of a total euro area break-up, the corresponding figures are 30 percent in Slovenia and 50 percent in Serbia. For Serbia, larger impacts on credit supply are assumed so as to account for the larger engagement of banks from the crisis countries in Serbia. Following these calculations and assumptions, investment is additionally reduced by the assumed decline in credit supply, multiplied by the share of bank financing of investment (i. e. 40 percent). Similar to the implementation of the export reduction, it is assumed that the largest impact lasts for the first two years and then drops to 75 percent in the third year and to 50 percent in the fourth year. In the fifth year, the additional negative impact on investment is set to zero. The final exogenous reduction of gross fixed capital formation in the three euro area scenarios is summarised as follows: 2013 and 2014: Greece exit: Slovenia 2%, Serbia 4%. GIIPS exit: Slovenia 8%, Serbia 12%. Euro area break-up: Slovenia 12%, Serbia 20%. 2015: Greece exit: SLO 1.5%, Serbia 3 %. GIIPS exit: SLO 6%, SRB 9%. Euro area break-up: SLO 9%, SRB 15%. 2016: Greece exit: SLO 1.5%, Serbia 3%. GIIPS exit: SLO 4%, SRB 6%. Euro area break-up: SLO 6%, SRB 10%. As in the case of exports, it is expected that from 2017 onwards investment returns to its baseline path, implying that their level is permanently lower as compared to the baseline scenario of an orderly resolution of the euro area crisis.

To summarise the assumptions behind the simulations and their implementation in the macromodels for Slovenia and Serbia, real exports and real investment (which are determined endogenously in both models) are reduced via add factors. Furthermore, in the case of Slovenia the public debt level is exogenously increased once to account for the additional public debt resulting from the write down on public assistance to countries leaving the euro area and defaulting. Government consumption in the Slovenian model is then reduced so as to recover the additional public debt incurred upon defaults of the crisis countries.

### **Effects of the Euro Area Scenarios on the Economies of Slovenia and Serbia**

Tables 2, 3, and 4 show the macroeconomic consequences of the different scenarios regarding the future development of the euro area. The tables depict the deviations from the baseline scenario in which no current member state leaves the euro area. For all variables, assumptions regarding the most important exogenous variables (world trade, oil price, exchange rates, fiscal policy instruments) have been chosen in such a way that the baseline simulation results come close to the most recent forecasts of the European Commission, the OECD and the IMF for the economies of Slovenia and Serbia. The baseline results themselves are not reported here since we are exclusively interested in deviations from the baseline in the different euro area scenarios.

Following the assumptions and definitions of the scenarios, the maximum effect occurs in the second simulation year, i. e. in 2014. In all scenarios, exports and investment are those demand components that decrease the most. Exports are affected directly via the trade channel. Investment is negatively affected via two channels. Firstly, the decline in demand results in lower capacity utilisation, inducing companies to cut back their investment plans. Secondly, it is assumed that private banks are forced to reduce their credit supply as a reaction to the write-down on their assets as the value of their public bonds declines. Due to the larger engagement of banks from the EU peripheral countries in Serbia as compared to Slovenia, Serbia would be affected more by a decrease in credit supply. Hence, also investment declines more in Serbia. The decline of GDP is smaller than the decrease of exports and investment since lower domestic demand reduces also imports. Slovenia is in addition affected by an increase in public debt as it is assumed that those countries that have to leave the euro area would not be able to repay their financial assistance to the other EU countries, the ESM, the IMF, and the ECB. For the simulations, it is assumed that those write-downs would push-up public debt at the end of 2012, necessitating an additional fiscal consolidation by reducing public consumption over the following years. This consolidation is implemented in such a way that at the end of the five-year simulation period the additional public debt is compensated by the lower public spending. However, in both countries public debt is higher than in the baseline simulation, both in absolute terms and in relation to GDP. This is caused by the working of the automatic stabilisers. Lower domestic demand and

employment causes declining tax revenues, while rising unemployment leads to higher spending on unemployment benefits. The debt ratio is additionally pushed up by the decrease in the denominator, i. e. in nominal GDP. Due to the working of the automatic stabilisers, also the budget balance deteriorates in both countries. However, in Slovenia the effect of the additional consolidation dominates, hence the budget balance improves over the entire simulation horizon in Slovenia.

In contrast to an isolated Greek exit (table 2), a euro area exit of Greece, Ireland, Italy, Portugal, and Spain (GIIPS) (table 3), and in particular a total euro area break-up (table 4) would have dramatic negative consequences for Slovenia and for Serbia. In the worst case, real GDP might shrink by almost 10 percent in Slovenia and by 6 percent in Serbia, respectively. This is caused by a collapse of exports by more than 18 percent and of investment by around 30 percent. Interestingly, at the end of the simulation period, fixed capital formation in Serbia is even higher than in the baseline. This recovery can be explained by the assumption that credit supply returns to the baseline in the final year of the simulation period. Hence, companies are then able to undertake investment, which they had to postpone during the crisis. Also real exports recover and exceed their baseline levels in the final year of the simulation period. This is brought about by a real devaluation of the Slovenian and Serbian currencies which results from the decline in wages and prices relative to the baseline. In the case of an exit of Greece, Ireland, Italy, Portugal, and Spain, employment would decline by up to 0.9 percent in Slovenia and 0.8 percent in Serbia, respectively, as compared to a successful resolution of the euro area crisis. As a consequence, the unemployment rate would be 0.8 and 0.5 percentage points, respectively, higher. The maximum effect of 0.8 percentage points in Slovenia would occur in the second year, while the largest effect of 0.5 percentage points in Serbia would be visible in the third year. Should the euro area break up totally, employment might decline by up to 2.6 percent in Slovenia and by 1.7 percent in Serbia, respectively. This would push up the unemployment rate by 2.1 percentage points in Slovenia and by 1.2 percentage points in Serbia. The larger effects in Slovenia as compared to Serbia are caused by the additional fiscal consolidation aiming at reducing the higher public debt incurred by the write-down on the fiscal assistance. Slovenia participates in the EU financial rescue packages for Greece, Ireland, Portugal, and Spain, and as a euro area member state also in the ECB Target2 system, while Serbia does not participate in these programs.

TABLE 2 Effects of euro area exit of Greece

Item	2013			2014			2015			2016			2017		
	SLO	SRB	SRB												
Real GDP	-0.2%	-0.4%	-0.6%	-0.2%	-0.6%	-0.6%	-0.2%	-0.2%	-0.5%	-0.1%	-0.4%	-0.4%	0.0%	0.0%	-0.1%
Nominal GDP	-0.2%	-0.4%	-0.7%	-0.3%	-0.7%	-0.7%	-0.2%	-0.2%	-0.6%	-0.2%	-0.5%	-0.5%	0.0%	0.0%	-0.3%
Real private consumption	0.0%	-0.1%	-0.2%	0.0%	-0.2%	-0.2%	0.0%	0.0%	-0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.3%
Real gross fixed capital formation	-2.3%	-5.2%	-2.4%	-2.4%	-5.3%	-3.7%	-1.9%	-1.9%	-3.7%	-1.3%	-2.2%	-2.2%	-0.1%	-0.1%	0.6%
Real exports	-0.1%	-0.8%	-0.1%	-0.1%	-0.7%	-0.5%	-0.1%	-0.1%	-0.5%	0.0%	-0.3%	-0.3%	0.0%	0.0%	0.1%
Real imports	-0.5%	-1.7%	-0.5%	-0.5%	-1.5%	-0.8%	-0.4%	-0.4%	-0.8%	-0.2%	-0.3%	-0.3%	0.0%	0.0%	0.6%
Real personal disposable income	0.0%	-0.2%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.0%	0.0%	0.5%
Employment	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%	-0.2%	0.0%	0.0%	-0.1%
Inflation rate	0.0	-0.2	0.0	0.0	-0.2	-0.1	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0
Unemployment rate	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1
Deficit ratio	2.4	-0.1	2.4	2.4	-0.2	-0.2	2.3	2.3	-0.2	2.3	-0.1	-0.1	2.2	2.2	0.0
Debt ratio	12.5	0.3	9.6	9.6	0.6	0.6	6.7	6.7	0.7	4.0	0.7	0.7	1.5	1.5	0.5

TABLE 3 Effects of euro area exit of Greece, Spain, Portugal, Ireland and Italy

Item	2013			2014			2015			2016			2017		
	SLO	SRB	SRB	SLO	SRB	SRB	SLO	SRB	SRB	SLO	SRB	SRB	SLO	SRB	SRB
Real GDP	-3.4%	-1.8%	-2.6%	-3.6%	-2.6%	-2.6%	-3.0%	-2.3%	-2.3%	-2.1%	-1.6%	-1.6%	-0.2%	-0.2%	-0.5%
Nominal GDP	-3.5%	-2.0%	-2.9%	-3.9%	-2.9%	-2.9%	-3.3%	-2.8%	-2.8%	-2.5%	-2.1%	-2.1%	-0.5%	-0.5%	-1.0%
Real private consumption	0.0%	-0.6%	-0.2%	-0.2%	-0.6%	-0.6%	-0.3%	-0.3%	-0.1%	-0.3%	0.5%	0.5%	-0.3%	-0.3%	1.2%
Real gross fixed capital formation	-14.1%	-16.8%	-16.0%	-16.0%	-17.0%	-11.7%	-13.6%	-11.7%	-10.5%	-10.5%	-6.5%	-6.5%	-2.7%	-2.7%	2.7%
Real exports	-6.1%	-6.1%	-6.0%	-6.0%	-6.0%	-4.4%	-4.3%	-4.4%	-2.6%	-2.6%	-2.8%	-2.8%	0.5%	0.5%	0.4%

Real imports	-6.6%	-7.3%	-7.1%	-6.1%	-5.4%	-3.3%	-3.6%	-1.1%	2.8%
Real personal disposable income	-0.1%	-0.7%	-0.3%	-0.5%	-0.4%	0.2%	-0.4%	1.0%	2.0%
Employment	-0.7%	-0.1%	-0.9%	-0.5%	-0.9%	-0.8%	-0.8%	-0.7%	-0.5%
Inflation rate	-0.1	-1.1	-0.2	-1.0	-0.1	-0.5	0.0	-0.3	0.2
Unemployment rate	0.6	0.1	0.8	0.4	0.6	0.5	0.4	0.4	0.3
Deficit ratio	4.7	-0.6	4.5	-1.0	4.5	-0.8	4.6	-0.5	4.8
Debt ratio	31.2	1.6	25.6	2.8	19.3	3.3	13.0	3.0	6.3

TABLE 4 Effects of euro area break-up

Item	2013		2014		2015		2016		2017	
	SLO	SRB	SLO	SRB	SLO	SRB	SLO	SRB	SLO	SRB
Real GDP	-9.1%	-4.4%	-9.8%	-5.7%	-8.0%	-4.7%	-5.7%	-2.7%	-0.7%	-0.4%
Nominal GDP	-9.3%	-4.9%	-10.4%	-6.5%	-8.9%	-5.9%	-6.7%	-4.0%	-1.4%	-1.7%
Real private consumption	-0.1%	-1.6%	-0.4%	-1.2%	-0.7%	0.2%	-0.8%	1.8%	-0.7%	3.2%
Real gross fixed capital formation	-27.8%	-30.1%	-31.9%	-25.2%	-28.4%	-14.8%	-22.9%	1.7%	-8.1%	7.0%
Real exports	-18.4%	-18.3%	-18.1%	-18.1%	-13.1%	-13.2%	-8.0%	-8.5%	1.5%	0.8%
Real imports	-17.4%	-16.7%	-18.5%	-12.4%	-14.2%	-6.0%	-9.4%	0.7%	0.4%	6.3%
Real personal disposable income	-0.4%	-1.6%	-0.9%	-0.6%	-1.1%	1.2%	-1.2%	3.1%	-1.1%	4.9%
Employment	-2.0%	-0.3%	-2.6%	-1.3%	-2.5%	-1.7%	-2.2%	-1.4%	-1.2%	-0.8%
Inflation rate	-0.4	-2.8	-0.6	-2.2	-0.3	-1.1	0.1	-0.3	0.5	0.2
Unemployment rate	1.8	0.2	2.1	0.9	1.7	1.2	1.2	0.9	0.2	0.6
Deficit ratio	3.2	-1.6	2.7	-2.3	3.0	-1.8	3.4	-0.8	4.5	0.2
Debt ratio	38.0	4.0	34.6	6.7	28.5	7.4	21.7	6.3	12.5	4.1

NOTES Deviations from the baseline in percent or percentage points.

The fact that Slovenia as an EU and euro area member state participates in the European assistance programs for the peripheral countries, while Serbia as a non-EU member country does not, leads to considerable effects of the different euro area scenarios for the public finances of the two countries. In both countries the debt ratio is higher than in the baseline of a successful crisis resolution, but in Serbia this deterioration is solely caused by the working of the automatic stabilisers, i. e. lower tax revenues due to the lower demand and employment and higher expenditures for unemployment assistance. These mechanisms result in a deterioration of the fiscal balance and in a corresponding increase of the debt level. For Slovenia, it has been assumed that upon a euro area exit the respective countries are not able to repay the financial assistance. The write-down of these loans and guarantees pushes up public debt in the creditor countries. For the simulations it is assumed that Slovenia incurs this additional debt at the end of 2012, and the Slovenian government fully compensates for this higher debt by reducing public consumption accordingly over the simulation horizon. Hence, while in Serbia the budget balance deteriorates due to the working of the automatic stabilisers, in Slovenia it improves due to the additional fiscal consolidation. However, as in Slovenia the automatic stabilisers also result in lower public revenues and in higher expenditures, in line with the deteriorating macroeconomic situation, at the end of the five-year simulation period public debt is still higher than in the baseline. This happens despite the fact that the additional debt from the write-down of the loans and guarantees is totally recovered by the reduced public consumption.

### **Conclusions**

The simulations in this paper show that a euro area exit of Greece alone would only have marginal effects on the economies of Slovenia and Serbia. In contrast, if in addition to Greece also Italy, Ireland, Portugal and Spain leave the euro area or if the euro area even breaks completely up, the negative economic impacts on Slovenia and on Serbia would be dramatic. It is obvious that the scenario of a successful resolution of the current problems would be preferable to any scenario involving the exit of one or more countries from the euro area. If the financial assistance by the euro area countries and international institutions indeed helps the peripheral countries to restore their international competitiveness by implementing painful structural reforms aiming at redirecting capital and

labour away from the public and import sectors towards the export industries, the countries will be able to fulfil their financial obligations. In this case, the loans given by the international community will be fully repaid, and the guarantees will not become due. In this sense, the ESM loans and ECB interventions with their strict conditionality on structural reforms in the beneficiary countries may be viewed as an investment into the ability of the countries to repay their loans. If the reform processes result in an adjustment of labour markets with more flexible wage bargaining processes which take the international competitiveness with a single currency into account, this can at least partly compensate for the loss of independent exchange rates as adjustment mechanisms. Such reforms help to avoid new imbalances in the future. The ESM as a new European institution as well as the new macroeconomic imbalance procedure support these reform and adjustment programs. Should, on the other hand, the crisis countries fail to successfully implement the necessary structural reforms then they will continue to accumulate external deficits. The impaired economic growth and the very high unemployment would make fiscal consolidation impossible. In such a scenario, the countries would permanently need financial assistance from the international community and eventually be forced to leave the euro area so as to devalue externally. In this case, the countries would also not be able to repay large parts of their loans. As our simulations have shown, this would have dramatic consequences for the trade partners and the creditor countries like Slovenia and Serbia.

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# *Testing of Dependencies between Stock Returns and Trading Volume by High Frequency Data*

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This paper is concerned with a dependence analysis of returns, return volatility and trading volume for five companies listed on the Vienna Stock Exchange and five from the Warsaw Stock Exchange. Taking into account high frequency data for these companies, tests based on a comparison of Bernstein copula densities using the Hellinger distance were conducted. The paper presents some patterns of causal and other relationships between stock returns, realized volatility and expected and unexpected trading volume. There is a linear causality running from realized volatility to expected trading volume, and a lack of nonlinear dependence in the opposite direction. The authors detected strong linear and nonlinear causality from stock returns to expected trading volume. They did not find causality running in the opposite direction. In addition, the existence of fractional cointegration was examined. Despite the equality of the long memory parameters of realized volatility and trading volumes, they do not move together in the long term horizon.

*Key Words:* realized volatility; trading volume; dynamic interrelations; copulas; fractional cointegration

*JEL Classification:* G15, C32

## **Introduction**

Market participants usually think that a share price reflects investors' predictions about the future performance of a company. These expectations are based on available information about the firm. The release of new information forces investors to change their expectations about the future performance of the company. New announcements are the main source of price changes. Since investors evaluate the content of new information differently, prices may remain constant even though new information is important for the market. This can be the case if some investors think that the news is good, whereas others understand the same announcements as

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bad news. The direction of movements of prices depends on the average reaction of investors to news.

It is obvious that share prices can be observed if there is a positive trading volume. As with prices, trading volume and changes in it react to the available set of important information on the market. Trading volume reacts in a different way in comparison to stock prices. A change in investors' expectations always leads to a rise in trading volume. The size of trading volume reflects the sum of investors' reactions to news.

A valid response to the question of whether the knowledge of one variable (e. g. volatility) can improve short-run forecasts of other variables is essential for analysts as well as market participants. Thus, in recent years both researchers and investors have focused on the relationship between trading volume, stock returns and return volatility. Most early empirical examinations were concerned with the contemporaneous relationship between price changes and volume.

Both from a theoretical and practical point of view, the dynamic relationship between returns, return volatility and trading volume is much more interesting than the contemporaneous one. One of the most important and useful topics in empirical economics is the examination of the causal relationship between particular variables. The notion of causality was introduced by Granger (1969). It is based on the idea that the past cannot be influenced by the present or future. Thus, if one event is observed before another event, causality can only take place from the first event to the second one.

Many economic and financial time series exhibit the property of long memory. Long-term dependence, called long memory, describes the high-order correlation structure of a time series. If a time series possesses long memory, there is a persistent temporal dependence between observations even when considerably separated in time. The same degree of long memory of two or more time series may indicate some relation between time series. This issue will be addressed in subsequent sections.

The remainder of the paper is set out as follows. A brief review of some aspects of causality and relevant contributions will be given in the next section. The concepts of nonlinear causality and Bernstein copulas are outlined in the third section. A description of the data and the method for estimating volatility are presented in the fourth section.

The empirical results are discussed in the fifth section. Brief conclusions and outlook are given in the last part of the paper.

## Literature Review

Karpoff (1987) in his survey of early research about price–volume relations cited important reasons for examining price–volume dependencies. These relations give an insight into the structures of financial markets, and into the information arrival process and how information is disseminated among market participants. This is strictly connected with two hypotheses: the mixture of distributions hypothesis (Clark 1973; Epps and Epps 1976; Tauchen and Pitts 1983; Harris 1986), and the sequential information arrival hypothesis from Copeland (1976) and Tauchen and Pitts (1983).

A knowledge of price–volume relations is useful e. g. in technical analysis and is important with respect to investigations of options and futures markets and in fashioning new contracts.

One of the most often used approaches in research into return–trading volume interrelations is the concept of Granger causality. Causality in the Granger sense can be understood as a kind of conditional dependency.

A serious problem with the linear approach to testing for causality is the low power of tests necessary to detect some kinds of nonlinear causal relations. This problem was raised in contributions, which are concerned with nonlinear causality tests (see e. g. Abhyankar 1998 and Asimakopoulou, Ayling, and Mahmood 2000). The starting point for further investigations was a nonparametric statistical method for uncovering nonlinear causal effects presented by Baek and Brock (1992). In order to detect causal relations the contributors used the correlation integral, an estimator of spatial probabilities across time based upon the closeness of points in hyperspace. The concept of Baek and Brock was improved by Hiemstra and Jones (1994) and Diks and Panchenko (2005; 2006).

The linear and nonlinear causality of companies listed on the DAX index was investigated by Gurgul and Lach (2009). They used daily data at close from January 2001–November 2008. For the testing of nonlinear causality the Diks and Panchenko test was used, while linear dependencies were checked by traditional Vector Autoregressive Models and by a model derived by Lee and Rui (2002). The contributors confirmed the hypothesis that traditional linear causality tests often fail to detect some kinds of nonlinear relations, while nonlinear tests do not. In many cases the test results obtained by the use of empirical data and simulation confirmed a bidirectional causal relationship while linear tests did not detect such causality at all.

Rossi and de Magistris (2010) investigated the relationship between volatility, measured by realized volatility, and trading volume. They showed that trading volume and volatility exhibit long memory but that they are not driven by the same latent factor as suggested by the fractional cointegration analysis. They used fractional cointegration by VAR models as in Nielsen and Shimotsu (2007), and also extended the analysis of Robinson and Yajima (2002) for stationary and nonstationary time series. They found that past (filtered) log-volume has a positive effect on current filtered log-volatility and on current log-volume as well. Their analysis was complemented by using copulas in order to measure the degree of tail dependence.

Bouezmarni, Rombouts, and Taamouti (2012) derived a nonparametric test based on Bernstein copulas and tested using high frequency data for causality between stock returns and trading volume. The contributors proved that at a 5% significance level the nonparametric test clearly rejected the null hypothesis of non-causality from returns to volume, which is in line with the conclusion which followed from the linear test. Further, their nonparametric test also detected a non-linear feedback effect from trading volume to returns at a 5% significance level.

In the next part of this paper in order to check links between the financial variables under study, realized volatility will be used as a proxy for volatility. Our dataset consists of five large companies listed on the WIG20 and five companies listed on the ATX20. The Vienna Stock Exchange is an example of a well-developed small capital market and the Warsaw Stock Exchange represents small emerging markets. The stock markets under study exhibit similar capitalization. Both indexes cover a similar period. ATX index is quoted from 2 January 1991 and the WIG index is used from 16 April 1994.

The Vienna Stock Exchange has been in recent years a local rival of the Warsaw Stock Exchange in Central and Eastern Europe. However recently the stock markets in Vienna and Warsaw have been considering cooperation and in the future a merger of them is possible.

### **Main Research Conjectures**

At the very beginning of our empirical analysis we will check for the stationarity, normality and autocorrelation of the investigated time series. Stationarity is the main assumption of most statistical causality tests, especially of VAR modeling. The literature overview and a preliminary reading of the dataset encouraged us to formulate the following:

CONJECTURE 1 *All time series under study are stationary, non-normal and exhibit an autocorrelation pattern.*

On the basis of previous results derived by the authors for companies listed on the DAX index a linear link between stock returns and expected trading volume may be hypothesized.

In addition, in order to check linear causality a bivariate VAR model is recommended.

CONJECTURE 2 *There is linear causality running from stock returns to expected trading volume for all selected stocks listed on the ATX20 and WIG20.*

However we do not expect a similar interdependence in the case of unexpected trading volume. We predict that:

CONJECTURE 3 *There is no causality between stock returns and unexpected trading volume for stocks selected from ATX20 and WIG20.*

In order to check linear dynamic links for Polish and Austrian stock return volatility and trading volume we will check linear and nonlinear causality between realized volatility and expected (unexpected) trading volume. Taking into account the findings of the other contributors mentioned in the overview we formulate the following conjecture:

CONJECTURE 4 *There is both linear and nonlinear causality running from realized volatility to expected trading volume.*

However, in the light of the economic literature and a preliminary correlation analysis there are no clear linear and nonlinear links between stock return volatility and unexpected trading volume. The correlation analysis does not supply evidence of such interdependencies.

Therefore our next hypothesis is as follows:

CONJECTURE 5 *There is neither linear nor nonlinear causality between realized volatility and unexpected trading volume in either direction.*

In the literature the long memory of financial time series is reported. This property is important in the context of the Mixture of Distribution Hypothesis, which assumes the contemporaneous arrival of random information on the stock market. In particular it is interesting to examine the suggested existence of a latent directing variable which exhibits long memory characteristics and is responsible for the dynamics of realized volatility and volume. The results in previous contributions did not support MDH for daily return volatility and trading volume. Therefore, we also conjecture for the ATX20 and WIG20 that:

**CONJECTURE 6** *Realized volatility and trading volume are not fractionally cointegrated. There is no common long-run dependence, and therefore MDH with long memory should be rejected for these stock markets.*

The conjectures listed above will be checked by some recent tests. The details of the testing procedures will be shown in the following sections. The test outcomes depend to some extent on the testing methods applied. After a description of the methodology in the next sections, we will give descriptive statistics of the time series included in our sample.

### **Nonlinear Causality, Bernstein Copulas and Fractional Cointegration**

Now we will present an extension of the Granger causality notion taking into account three variables  $X$ ,  $Y$  and  $Z$ . Variable  $Z$  is in a causal relation to variable  $Y$ , in the Granger sense, if the current values of variable  $Y$  can be forecasted more precisely by means of the known past values of variable  $Z$ , and those of auxiliary variable  $X$ , than in the case where the values of variable  $Z$  are not involved in the forecasting process.

In the recent literature on nonlinear dependencies in the sense of Granger causality nonparametric tests are used for the conditional independence of random variables. The conditional independence of random variables implies a lack of causality in the Granger sense. Linton and Gozalo (1997) tested conditional independency by means of a test statistic based on empirical distributions. Su and White (2003) derived a test based on smoothed empirical likelihood functions and in 2007 developed a nonparametric test for the conditional independence of distributions. To this end they applied conditional characteristic functions. The test for conditional independence by Su and White (2008) is based on a kernel estimation of conditional distributions  $f(y|x)$  and  $f(y|x, z)$ . If the null holds true then the last functions are equal. A serious drawback of this test is the restriction of the sum of the dimensions of variables  $X, Y, Z$  to seven. In addition, it is necessary to define a weight function for the Hellinger distance necessary to measure the distance between the conditional distributions. The contributors applied their test to examine Granger non-causality in exchange rates. It is used their approach and methodology which is used in the empirical part of this paper. The causality test applied to the detection of nonlinear causality is based on Bernstein copulas (see for example Bouezmarni, Rombouts, and Taamouti 2012).

Bouezmarni, Rombouts, and Taamouti (2012) focused on the differences between their test (henceforth called the BRT test) and the test by Su and White (2008). The main differences and advantages of the BRT test can be summarized as follows:

1. There is no restriction on the sum of the dimensions of the variables under study.
2. The application of nonparametric Bernstein copulas in order to estimate the joint conditional distributions guarantees the non-negativity of their distributions. This is important with respect to a true determination of the distance between them by means of Hellinger distance.
3. It is necessary to determine only one parameter, which determines the accuracy of the estimation of nonparametric copula density.

The contributors demonstrated by means of simulation studies that their test has appropriate power and facilitates the recognition of different nonlinear dependencies between variables. By means of simulation exercises evidence is presented for the uselessness of a classic linear causality test for the detection of causal dependencies between nonlinear processes. The authors applied their test in a Granger non-causality examination of many macroeconomic and financial variables.

**NONLINEAR CAUSALITY VERSUS  
CONDITIONAL DEPENDENCE**

Let  $\{(X'_t, Y'_t, Z'_t) \in \mathbb{R}^{d_1} \times \mathbb{R}^{d_2} \times \mathbb{R}^{d_3}, t = 1 \dots T\}$  be the realization of the stochastic process in  $\mathbb{R}^d$ , where  $d = d_1 + d_2 + d_3$  with joint distribution  $F_{XYZ}$  and density function  $f_{XYZ}$ . The test of conditional independency between variables  $Y$  and  $Z$  under condition  $X$  can be written down for density functions as (Bouezmarni, Rombouts, and Taamouti 2012):

$$H_0: P(f_{(Y|X,Z)}(y|x, z) = f_{(Y|X)}(y|x)) = 1, \quad \text{for } \forall y \in \mathbb{R}^{d_2} \quad (1)$$

$$H_1: P(f_{(Y|X,Z)}(y|x, z) = f_{(Y|X)}(y|x)) < 1, \quad \text{for some } y \in \mathbb{R}^{d_2} \quad (2)$$

where  $f_{(\cdot|\cdot)}(\cdot|\cdot)$  stands for the conditional density function.

It is worth noting that a lack of causality in the Granger sense can be understood as conditional independence. Let  $(Y, Z)'$  be a Markov process of order 1. The variable  $Z$  does not cause in the Granger sense variable  $Y$  if and only if the following null hypothesis holds true:

$$H_0: P(f_{(Y|X,Z)}(y_t|y_{(t-1)}, z_{(t-1)}) = f_{(Y|X)}(y_t|y_{(t-1)})) = 1,$$

i. e.  $y = y_t, x = y_{(t-1)}, z = z_{(t-1)}$  for  $d_1 = d_2 = d_3 = 1$ .

For the sake of simplicity of notation we assume  $d_i = 1$  for  $i = 1, 2, 3$ . Taking into account this notation the well-known Sklar theorem can be put down in the form:

$$F_{XYZ}(x, y, z) = C_{XYZ}(F_X(x), F_Y(y), F_Z(z)).$$

The respective density function  $f_{XYZ}$  is given by the equation

$$f_{XYZ}(x, y, z) = f_X(x)f_Y(y)f_Z(z)c_{XYZ}(F_X(x), F_Y(y), F_Z(z)),$$

where  $c_{XYZ}$  is the density function of copula  $C_{XYZ}$ . The null hypothesis (1) can be expressed by means of the copula notion in the following form:

$$\begin{aligned} H_0: & P(c_{XYZ}(F_X(x), F_Y(y), F_Z(z))) \\ & = c_{XY}(F_X(x), F_Y(y))c_{XZ}(F_X(x), F_Z(z))) = 1, \quad \forall y \in \mathbb{R} \end{aligned}$$

while an alternative hypothesis fulfills the inequality:

$$\begin{aligned} H_1: & P(c_{XYZ}(F_X(x), F_Y(y), F_Z(z))) \\ & = c_{XY}(F_X(x), F_Y(y))c_{XZ}(F_X(x), F_Z(z))) < 1 \end{aligned}$$

for some  $y \in \mathbb{R}$ , where  $c_{XY}$  and  $c_{XZ}$  stand for the densities of the copulas of two dimensional distributions  $(X, Y)$  and  $(X, Z)$ . The test statistics suggested by Bouezmarni, Rombouts, and Taamouti (2012) is based on the Hellinger distance between two distributions i. e. the density of the copula  $c_{XYZ}$  and the product of the densities of copulas  $c_{XY}$  and  $c_{XZ}$ . This measure

$$H(c, C) = \int_{[0,1]^3} \left( 1 - \sqrt{\frac{c_{XY}(u, v)c_{XZ}(u, w)}{c_{XYZ}(F_X(x), F_Y(y), F_Z(z))}} \right)^2 dC_{XYZ}(u, v, w) \quad (3)$$

is equal to 0 if the null hypothesis holds true.

The distance (3) exhibits important advantages. First of all it is symmetric and invariant with respect to monotone transformations. In addition, it is not sensitive to outliers, because their weights are lower than the weights of other observations. For empirical data Hellinger distance (3) can be estimated by means of the following formula:

$$\begin{aligned} \hat{H} &= H(\hat{c}, C_T) = \int_{[0,1]^3} \left( 1 - \sqrt{\frac{\hat{c}_{XY}(u, v)\hat{c}_{XZ}(u, w)}{\hat{c}_{XYZ}(u, v, w)}} \right)^2 dC_{XYZ}(u, v, w) \\ &= \frac{1}{T} \sum_{i=1}^T \left( 1 - \sqrt{\frac{\hat{c}_{XY}(\hat{F}_X(X_T), \hat{F}_Y(Y_T))\hat{c}_{XZ}(\hat{F}_X(X_T), \hat{F}_Z(Z_T))}{\hat{c}_{XYZ}(\hat{F}_X(X_T), \hat{F}_Y(Y_T), \hat{F}_Z(Z_T))}} \right)^2, \end{aligned}$$

where  $\hat{F}(\cdot)$  is the empirical form of marginal distribution  $F(\cdot)$ . In addition, the densities of copulas are estimated by means of nonparametric methods.

The test statistics (called *BRT*) and the method for computing the *p*-value is given in Bouezmarni, Rombouts, and Taamouti (2012).

$$BRT = \frac{Tk^{-\frac{3}{2}}}{\sigma} (4\hat{H} - C_1 T^{-1} k^{\frac{3}{2}} - \hat{B}_1 T^{-1} k - \hat{B}_2 T^{-1} k - \hat{B}_3 T^{-1} k^{\frac{1}{2}}),$$

where  $C_1 = 2^{-3}\pi^{\frac{3}{2}}$ ,  $\sigma = \sqrt{2(\frac{\pi}{4})^{\frac{3}{2}}}$  and

$$\begin{aligned} \hat{B}_1 &= -2^{-1}\pi + T^{-1} \sum_{t=1}^T \frac{(4\pi\hat{G}_{t1}(1 - \hat{G}_{t1}))^{-\frac{1}{2}}(4\pi\hat{G}_{t2}(1 - \hat{G}_{t2}))^{-\frac{1}{2}}}{\hat{c}_{XY}(G_{t1}, G_{t2})}, \\ \hat{B}_2 &= -2^{-1}\pi + T^{-1} \sum_{t=1}^T \frac{(4\pi\hat{G}_{t1}(1 - \hat{G}_{t1}))^{-\frac{1}{2}}(4\pi\hat{G}_{t3}(1 - \hat{G}_{t3}))^{-\frac{1}{2}}}{\hat{c}_{XY}(G_{t1}, G_{t3})}, \\ \hat{B}_3 &= \pi^{-\frac{1}{2}} T^{-1} \sum_{t=1}^T \frac{1}{\sqrt{\hat{G}_{t1}(1 - \hat{G}_{t1})}}. \end{aligned}$$

The densities  $\hat{c}_{XYZ}$ ,  $\hat{c}_{XY}$  and  $\hat{c}_{XZ}$  are estimated by means of Bernstein copulas. Under the null hypothesis the test statistics is distributed asymptotically according to standard normal distribution. The null hypothesis is rejected for a given significance level  $\alpha$  if  $BRT > z_\alpha$  holds true, where  $z_\alpha$  denotes the critical value given in the tables of standard normal distribution. Taking into account that the test statistic is asymptotically normal, the contributors advise in the case of a finite sample the calculation of *p*-values by means of bootstrap methods. Classical bootstrap methods referring to empirical distribution cannot be applied. That is why Paparoditis and Politis (2000) suggested a local bootstrap method for nonparametric kernel estimators. They take into account the fact that the densities of the variables are conditional. This method was applied by Bouezmarni, Rombouts, and Taamouti (2012) and Su and White (2008). The *p*-values can be determined for samples  $\{X_t^*, Y_t^*, Z_t^*\}_{t=1}^T$  generated by bootstrapping under condition  $d_1 = d_2 = d_3 = 1$  in the following steps:

1. In the first step  $X_t^*$  is generated by means of a kernel estimator:

$$\tilde{f}(x) = T^{-1}h^{-1} \sum_{t=1}^T L\left(\frac{X_t - x}{h}\right),$$

where  $L$  stands for the density of the one dimensional distribution.

For  $t = 1, \dots, T$  the values of  $Y_t^*$  and  $Z_t^*$  should be generated independently from conditional densities:

$$\tilde{f}(y|X_t^*) = \frac{\sum_{s=1}^T L\left(\frac{Y_s - y}{h}\right) L\left(\frac{X_s - X_t^*}{h}\right)}{\sum_{s=1}^T L\left(\frac{X_t - X_s^*}{h}\right)},$$

$$\hat{f}(z|X_t^*) = \frac{\sum_{s=1}^T L\left(\frac{Z_s - z}{h}\right) L\left(\frac{X_s - X_t^*}{h}\right)}{\sum_{s=1}^T L\left(\frac{X_t - X_s^*}{h}\right)}.$$

2. For the generated sample test statistic  $BRT^*$  should be established.
3. Steps 1–3 should be repeated  $M$  times in order to receive  $\{BRT_j^*\}_{j=1}^M$ .
4. Finally, the bootstrap  $p$ -value is given by

$$p^* = \frac{1}{M} \sum_{j=1}^M 1_{\{BRT_j^* > BRT\}}.$$

#### FRACTIONAL COINTEGRATION

For any  $d$  and  $d_e$  two  $I(d)$  processes are fractionally cointegrated if there exists a linear combination that is  $I(d_e)$  with  $d_e < d$ . In this case there exists long-run dependence and a common stochastic trend. Assume that  $z_t = (x_t, y_t)$  with  $x_t \in I(d)$  and  $y_t \in I(d)$ . If there exists  $\beta \neq 0$  such that the linear combination  $y_t - \beta x_t \in I(d_e)$ ,  $0 \leq d_e < d$ , then  $x_t$  and  $y_t$  are fractionally cointegrated. We write  $z_t \in CI(d, b)$ , for  $b = d - d_e$ . Robinson and Yajima (2002) consider the case of stationary variables, while Nielsen and Shimotsu (2007) also analyse the case of covariance nonstationary variables.

The fractional cointegration can be tested as follows. Firstly, using Whittle estimators the long memory parameters are estimated, and then a test of their equality is performed (comp. Robinson and Yajima 2002).

#### Data Description and Estimation of Realized Volatility

We consider two original datasets. Firstly there are five-minute transaction prices and volumes of five stocks from the Warsaw Stock Exchange from 3 March 2008 to 28 January 2011 (732 daily observations). The selected stocks are BRE Bank SA (BRE), BZ WBK SA (BZW), KGHM Polska Miedź SA (KGH), Bank Polska Kasa Opieki SA (PEO), Polskie Górnictwo Naftowe i Gazownictwo SA (PGN). The second sample contains the tick-by-tick transaction prices and volumes of five stocks from the Vienna Stock Exchange from 2 January 2009 to 9 November 2011 (711 daily observations). The selected stocks are Andritz AG (ANDR), Erste

Group Bank AG (EBS), OMV AG (OMV), Telekom Austria AG (TKA) and Voestalpine AG (VOE). For these companies' descriptive statistics of the time series of returns, realized volatility and trading volume were computed. They are presented below.

#### DAILY STOCK RETURNS

We computed daily stock returns at close and multiplied them by 100. The descriptive statistics and tests conducted confirmed stylized facts about stock returns  $r_t$ . The departure from normality is reflected in kurtosis and skewness. The null hypothesis about normality is rejected for all companies under study (Jarque-Bera test). The Ljung-Box test indicates that in most cases there exists significant autocorrelation in stock returns.

#### REALIZED VOLATILITY

In empirical investigations daily squared returns or absolute returns are used as a proxy of volatility. For high frequency, realized volatility is the better alternative, because of improving the accuracy of risk computed with high frequency squared returns.

In this paper we use a Newey-West estimator based on a Bartlett kernel for daily-realized volatility (Hansen and Lunde, 2005):

$$RV_t^{NW} = \sum_{i=1}^m r_{i,t}^2 + 2 \sum_{k=1}^q \left(1 - \frac{k}{q+1}\right) \sum_{i=1}^{m-k} r_{i,t} r_{i+k,t}.$$

This estimator has many advantages. However, it does not take into account volatility in the time between closing the session and opening the session next day. Therefore, it is necessary to add to  $RV_t^{NW}$  a square of return computed for the price at close and price at open denoted by  $r_{COt}$ . We followed a procedure by Hansen and Lunde (2005). In addition, for companies listed on the Vienna Stock Exchange an optimal frequency parameter was estimated.

We applied a logarithmic transformation to the realized volatility series. We observe that in spite of this logarithmic transformation, almost all time series are not normally distributed (the exceptions being *BRE* and *PEO*). Significant autocorrelation is observed for all stocks under study. We observe that all of the series from the Vienna Stock Exchange are positively skewed. Next, we removed the deterministic trend from the time series. The series adjusted in this way are denoted as  $\ln RV_t$ . In all cases the null hypothesis of unit root is rejected, so the series  $\ln RV_t$  can be used in VAR models.

### TRADING VOLUME

Daily trading volume is computed as the sum of volumes corresponding to each transaction from a whole given day. We compute the descriptive statistics of the log-volume series. In the case of the Polish stock PGN and the Austrian stocks EBS, TKA and VOE the null hypothesis of normality is rejected. We filtered the log-volume from the deterministic trend and calendar effects.

In the next sections we consider two types of trading volume: expected and unexpected. Unexpected trading volume ( $\widetilde{\ln V}_t$ ) is that part of total volume that cannot be forecasted and is generated by the random process of new pieces of information coming to the market. Expected trading volume ( $\ln V_t$ ) can be forecasted and we used fitted values of ARMA models as a proxy. Unexpected trading volume is given by the residuals from ARMA models. Taking into consideration that in the next sections VAR models are used, we conducted an augmented Dickey-Fuller test for unit root for the variables under study. To summarize, the properties of the time series under study are in line with Conjecture 1.

### Empirical Results and Their Analysis

#### CAUSALITY

In this section we analyse pairwise by means of nonparametric Bernstein copulas nonlinear causality between prices, trading volume and realized volatility.

#### *Causal Price-Trading Volume Relations*

To test linear Granger causality we applied bivariate VAR( $k$ ). In order to test nonlinear causality we used the BRT statistics described in the previous section applied to residuals from VAR models. Using such a method we can be sure that we test only nonlinear relations. When estimating Bernstein copulas we took bandwidth  $k$  as integer part of  $2\sqrt{T}$ . We computed the  $p$ -values of the test with 200 bootstrap samples. Below we used the notations  $X \rightarrow Y$  in order to describe the null hypothesis: that  $X$  does not Granger cause  $Y$ .

#### *Stock Returns and Expected Trading Volume*

The hypotheses

$$H_0: r_t \not\rightarrow \ln V_t,$$

$$H_1: r_t \rightarrow \ln V_t$$

#### *Managing Global Transitions*

TABLE 1 Results of causality testing for stock returns and expected trading volume

WIG20					ATX20				
$H_0$	$r_t \rightarrow \ln V_t$		$\ln V_t \rightarrow r_t$		$H_0$	$r_t \rightarrow \ln V_t$		$\ln V_t \rightarrow r_t$	
Test	Linear	BRT	Linear	BRT	Test	Linear	BRT	Linear	BRT
BRE	0.116	0.000	0.588	0.225	ANDR	0.000	0.000	0.822	0.110
BZW	0.125	0.035	0.363	0.355	EBS	0.070	0.000	0.702	0.110
KGH	0.796	0.005	0.754	0.145	OMV	0.064	0.000	0.291	0.180
PEO	0.029	0.005	0.003	0.355	TKA	0.001	0.010	0.837	0.055
PGN	0.159	0.000	0.146	0.225	VOE	0.004	0.000	0.103	0.605

in terms of conditional densities can be formulated as follows:

$$H_0: f(\ln V_t | \ln V_{t-1}, r_{t-1}) = f(\ln V_t | \ln V_{t-1}),$$

$$H_1: f(\ln V_t | \ln V_{t-1}, r_{t-1}) \neq f(\ln V_t | \ln V_{t-1}).$$

The opposite direction of causal dependency has the form:

$$H_0: f(r_t | r_{t-1}, \ln V_{t-1}) = f(r_t | r_{t-1}),$$

$$H_1: f(r_t | r_{t-1}, \ln V_{t-1}) \neq f(r_t | r_{t-1}).$$

Table 1 presents the  $p$ -values of the tests conducted.

Bidirectional linear causality was detected only for one Polish stock (PEO). On the other hand there is linear causality from stock returns to trading volume for all stocks from ATX, but not in the opposite direction. The results concerning nonlinear dependencies showing that stock returns cause expected trading volume are the same for both sets of stocks under study. The null hypothesis of lack of causality is rejected. With one exception (TKA) causality in the opposite direction is not detected. The computation results mean that Conjecture 2 holds true.

### Stock Returns and Unexpected Trading Volume

Firstly, we estimated a bivariate VAR model for pair  $r_t - \widetilde{\ln V}_t$ . As in previous sections we used an empirical distribution function in order to transform the residuals from this model. The respective hypotheses are:

$$H_0: r_t \rightarrow \widetilde{\ln V}_t \text{ against } H_1: r_t \rightarrow \ln \widetilde{V}_t, \text{ and}$$

$$H_0: \widetilde{\ln V}_t \rightarrow r_t \text{ against } H_1: \ln \widetilde{V}_t \rightarrow r_t.$$

There is no nonlinear relationship in either direction. Linear causality from returns to unexpected trading volume was detected for BRE, PEO

TABLE 2 Results of causality testing for stock returns and unexpected trading volume

WIG20					ATX20				
$H_0$	$r_t \rightarrow \ln \bar{V}_t$		$\ln \bar{V}_t \rightarrow r_t$		$H_0$	$r_t \rightarrow \ln \bar{V}_t$		$\ln \bar{V}_t \rightarrow r_t$	
Test	Linear	BRT	Linear	BRT	Test	Linear	BRT	Linear	BRT
BRE	0.030	0.565	0.679	0.740	ANDR	0.031	0.100	0.042	0.540
BZW	0.331	0.930	0.076	0.680	EBS	0.107	0.155	0.508	0.800
KGH	0.753	0.690	0.200	1.000	OMV	0.411	0.705	0.051	0.415
PEO	0.057	0.415	0.006	0.765	TKA	0.227	0.880	0.669	0.965
PGN	0.425	1.000	0.974	0.505	VOE	0.114	0.980	0.869	0.750

TABLE 3 Results of testing for the pair realized volatility – expected trading volume

WIG20					ATX20				
$H_0$	$\ln RV_t \rightarrow \ln V_t$		$\ln V_t \rightarrow \ln RV_t$		$H_0$	$\ln RV_t \rightarrow \ln V_t$		$\ln V_t \rightarrow \ln RV_t$	
Test	Linear	BRT	Linear	BRT	Test	Linear	BRT	Linear	BRT
BRE	0.000	0.840	0.029	0.280	ANDR	0.000	0.675	0.823	0.690
BZW	0.001	0.230	0.457	0.785	EBS	0.000	0.155	0.002	0.110
KGH	0.000	0.200	0.159	0.820	OMV	0.000	0.365	0.766	0.380
PEO	0.000	0.045	0.781	0.675	TKA	0.000	0.005	0.005	0.190
PGN	0.000	0.225	0.022	0.450	VOE	0.000	0.225	0.022	0.690

and ANDR. When considering causality from unexpected trading volume to returns we reject the null hypothesis for two Polish stocks (BZW and PEO), and two Austrian ones (ANDR and OMV). In the light of these results Conjecture 3 is true only to some extent.

### *Realized Volatility and Expected Trading Volume*

The linear, causal relations between realized volatility and expected trading volume were tested with the VAR model described above. To test the presence of nonlinear relations we formulated the following null hypotheses

$$H_0: f(\ln RV_t | \ln RV_{t-1}, \ln V_{t-1}) = f(\ln RV_t | \ln RV_{t-1}) \quad \text{and}$$

$$H_0: f(\ln V_t | \ln V_{t-1}, \ln RV_{t-1}) = f(\ln V_t | \ln V_{t-1}).$$

The first of these hypotheses is equivalent to  $H_0: \ln V_t \rightarrow \ln RV_t$  and the second to  $H_0: \ln RV_t \rightarrow \ln V_t$ . Table 3 summarizes the results of testing ( $p$ -values).

In all cases there is linear causality running from realized volatility to

TABLE 4 Results of testing for the pair realized volatility – unexpected trading volume

WIG20					ATX20				
$H_0$	$\ln RV_t \rightarrow \widetilde{\ln V}_t$		$\widetilde{\ln V}_t \rightarrow \ln RV_t$		$H_0$	$\ln RV_t \rightarrow \widetilde{\ln V}_t$		$\widetilde{\ln V}_t \rightarrow \ln RV_t$	
Test	Linear	BRT	Linear	BRT	Test	Linear	BRT	Linear	BRT
BRE	0.897	0.705	0.207	0.680	ANDR	0.750	0.990	0.049	0.995
BZW	0.112	0.265	0.319	0.230	EBS	0.039	0.705	0.002	0.965
KGH	0.189	0.900	0.875	0.965	OMV	0.149	1.000	0.325	0.605
PEO	0.035	0.735	0.682	0.525	TKA	0.141	0.890	0.254	0.990
PGN	0.253	0.785	0.008	0.910	VOE	0.016	0.995	0.013	0.915

expected trading volume. Causality in the opposite direction is detected only in the case of BRE, PGN, EBS, TKA and VOE. In addition, there is nonlinear causality from  $\ln RV_t$  to  $\ln V_t$  for one Polish stock (PEO) and one Austrian company (TKA). Nonlinear dependencies in the opposite direction were not detected. The results of computations partly support Conjecture 4.

*Realized Volatility and Unexpected Trading Volume*

We now replace  $\ln V_t$  with  $\widetilde{\ln V}_t$  and estimate the VAR models and the required copulas again. The hypotheses under study are the following:

$$H_0: \ln RV_t \rightarrow \widetilde{\ln V}_t \text{ against } H_1: \ln RV_t \rightarrow \widetilde{\ln V}_t \text{ and}$$

$$H_0: \widetilde{\ln V}_t \rightarrow \ln RV_t \text{ against } H_1: \widetilde{\ln V}_t \mapsto \ln RV_t$$

In all cases there is no nonlinear causal relationship in either direction, which is in line with Conjecture 5. We observed linear causality from realized volatility to unexpected trading volume in three cases (PEO, EBS and VOE). Causality in the opposite direction is detected for one Polish stock PGN and three stocks from ATX (ANDR, EBS, VOE). These findings contradict Conjecture 5.

LONG MEMORY ESTIMATION RESULTS

We use the Whittle estimation method and perform a test for the equality of long memory parameters. The functions  $h(n)$  as in (Robinson and Yajima 2002) are:

$$h_1(n) = \frac{1}{\ln n},$$

$$h_2(n) = \frac{1}{\ln^2 n}.$$

TABLE 5 Results of long memory parameter estimation and equality testing

WIG20					ATX20				
Test	$d_{\ln RV_t}$	$d_{\ln V_t}$	$T_o(h_1)$	$T_o(h_2)$	Test	$d_{\ln RV_t}$	$d_{\ln V_t}$	$T_o(h_1)$	$T_o(h_2)$
BRE	0.271	0.393	1.274	1.616	ANDR	0.397	0.255	2.143	2.904
BZW	0.366	0.305	0.297	0.371	EBS	0.465	0.316	2.436	3.373
KGH	0.425	0.370	0.297	0.390	OMV	0.329	0.248	0.638	0.846
PEO	0.413	0.263	1.930	2.446	TKA	0.386	0.152	5.151	6.767
PGN	0.423	0.303	1.169	1.461	VOE	0.495	0.382	1.630	2.407

The parameter  $m = n^{0.6}$  is equal to 52 for Polish stocks and to 51 for Austrian stocks. The standard errors of the estimation of long memory parameters are 0.136 and 0.137, respectively. The table 5 presents the results of estimation and testing

The results presented above are in line with the results of unit root testing. All of the series are stationary and exhibit long memory. With one exception (TKA) all of the estimated parameters are significant at a 0.1 level (most of them are significant at a 0.05 level and below). Taking into account that the values of the chi-square distribution with one degree of freedom are equal to  $\chi_1^2 = 2.706$ ,  $\chi_1^2 = 3.841$ ,  $\chi_1^2 = 6.635$  for significance levels 0.1, 0.05 and 0.01 respectively, there is no reason to reject the null hypothesis for any Polish stock under consideration. In the case of the Austrian stocks we reject the null for the TKA stock (when using both  $h_1$  and  $h_2$  functions). When considering only the  $h_2$  function we also reject the null in the cases of ANDR and EBS. In table 5 the results of the estimated rank of cointegration are presented (we omit the TKA stock here). The parameter  $m_1 = n^{0.55}$  used in the estimation is equal to 37 for both sets of stocks and we multiply the eigenvalues by 10000. The estimation results (details of them are available from the authors upon request) indicate that in all cases of stocks traded on the Warsaw Stock Exchange the rank of cointegration is equal to 0. This means that despite the equality of the long memory parameters, a linear combination with a lower degree of integration doesn't exist. In the case of the EBS and VOE stocks there exists one cointegrating vector, but only for  $\nu(n) = m_1^{-0.25}$ . To summarize, the results reported here are in line with Conjecture 6.

### Conclusions

The main criterion for the maturity of a financial market are properties of the information flow process such as degree of asymmetry, the speed

at which new information is reflected in prices and trading volume, the strength and types of short-and long-term, linear and non-linear, contemporaneous and causal relationships between the different characteristics of shares (e. g. price, returns, return volatility, trading volume).

The main goal of this research was to check by using high frequency data the causal price-volume relationships for selected highly liquid stocks traded on the Warsaw and Vienna stock exchanges and compare by this means these stock markets. The knowledge of these relations allows getting an insight into the structure of both capital markets. The main question was: how is information disseminated among market participants?

The reply to this question is strictly connected with two central and contradictory research hypotheses: contemporaneous information arrival (the mixture of distributions hypothesis by Clark) or the sequential information arrival hypothesis (formulated by Copeland). The proper tool to check this research problem is modern causality analysis.

To detect linear causality classical vector autoregressive models were used. The nonlinear form of relationships was examined using a test based on nonparametric copulas.

In order to check the conditional dependence between two vector processes the authors applied a new test defined by Bouezmarni, Rombouts, and Taamouti (2012). This test is based on nonparametric estimation and Bernstein copulas. The common test statistics require an estimation of copula density functions. The nonparametric estimator of copula density is based on Bernstein polynomials. The Bernstein copula estimator is always non-negative and does not suffer from the boundary bias problem. This test is time consuming but easy to conduct. The main reason for this is that it does not involve a weighting function in the test statistic. In addition, it can be applied in general settings since there is no restriction on the dimension of the data. To apply this test, only a bandwidth for the nonparametric copula is needed.

The volatility of stock returns was computed using realized volatility estimators including changes in prices for non-trading hours. There are some clear patterns of causal relationships between stock returns, realized volatility and expected and unexpected trading volume.

The conjecture about stationarity was by and large supported by empirical results concerning returns, return volatility and trading volume for companies under study from both stock markets.

As regards the pair stock returns and trading volume, conclusions de-

pend on the part of trading volume used. There is strong linear and non-linear causality from stock returns to expected trading volume, and a lack of such a relationship in the opposite direction. So knowledge of past stock returns can improve forecasts of expected trading volume. When comes to unexpected trading volume, we conclude that there is only a linear, causal relationship from stock returns to unexpected trading volume. Neither linear nor nonlinear causal relations in the opposite direction (from trading volume to returns) are detected. The empirical results imply that, although there is a positive contemporaneous correlation between trading volume and returns, trading volume does not add significant predictive power in the forecast of future returns in the presence of current and past returns. This finding is consistent (for both markets under study) with the Clark (1973) mixture model, which predicts no causal relation from trading volume to stock returns. The empirical results also underlined the difficulty of improving the predictability of returns by adding public information about trading volume.

There is a linear causality running from realized volatility to expected trading volume, and a lack of nonlinear dependence in the opposite direction. When unexpected trading volume is used, we observe (with one exception) linear causality for the pair volatility and trading volume in both directions and a lack of nonlinear causality.

The results reported above mean that trading volume helps to predict return volatility and vice versa. Trading volume helps to predict return volatility. However, it is unable to forecast the level of returns. In other words, trading volume contains information about returns indirectly through its predictability of return volatility. This finding supports the Clark (1973) latent common-factor model. In this model trading volume is defined as a proxy for daily information flow in the stochastic process generating variance of stock returns.

The authors also investigated the properties of realized volatilities and trading volumes series with respect to long memory. The series under study (filtered realized volatilities and trading volumes) exhibit long memory and in most cases degrees of fractional integration are equal (especially for stocks listed on the Warsaw Stock Exchange), which means that they share common long-run dependence. This evidence supports a modified version of the mixture-of-distribution hypothesis of Bollerslev and Jubinski (1999), which posits the existence of a latent directing variable possessing long memory characteristics which account for the dynamics of volatility and trading volume. Our results reflecting the infor-

mation arrival process confirmed the existence of long memory. This may allow us to generalize models that are based only on short-run dynamics and can help to provide a better characterization of joint volatility-trading volume dependencies. In addition, the existence of fractional cointegration was examined. Despite the equality of the long memory parameters of realized volatilities and trading volumes, by and large linear combinations of these variables with a lower degree of fractional integration do not exist, so they do not move together in the long time horizon. In other words a mutual long-run dependence does not exist. These findings are in general not consistent with an MDH with long memory.

To summarize, the relationships returns-return volatility-trading volume are similar for samples of companies listed on both stock markets under study. The findings based on high frequency data are in favour of the MDH hypothesis. However the empirical results did not support MDH with long memory. The findings mean that it is hard to forecast returns based on past values of trading volume.

One of the main limitations of this analysis is the unavailability and high cost of high frequency data. Future analyses for comparing the actual degree of development of the WSE with the stock exchange in Vienna should be performed in subperiods of bear and bull markets on the basis of intraday data for all companies listed on both indices under study. In this way the stability and robustness of results and interdependencies could be checked. In addition, on the basis of high frequency data the basic characteristics of the microstructure of these stock markets should be examined and compared.

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# *The Monetary Integration of the New Member States before the Euro Area Debt Crisis*

Ivan Todorov

This paper analyzes the process of monetary integration of the New Member States in the European Union till the beginning of the Euro Area debt crisis. The focus of investigation is on the nominal convergence (the fulfillment of the Maastricht criteria) and on the satisfaction of the Optimum Currency Area criteria by the New Member States. More specifically, the trade integration, the financial integration, the output structure and the labor markets of the New Member States are explored from the standpoints of the Optimum Currency Area theory and in the context of the future membership of the New Member States in the Euro Area. The experience of the NMS, which have already adopted the Euro, is also reviewed.

*Key Words:* New Member States, monetary integration, nominal convergence, Optimum Currency Area theory, macroeconomic policy

*JEL Classification:* F15, F41

## **Introduction**

Economic integration can be defined as an elimination of economic borders between two or more economies (Pelkmans 2001). In a European context economic integration is the successful inclusion and operation of a national economy in the EU Single Market with free movements of goods, services, capital and workforce and with common regulations in certain areas such as trade, competition, some fields of finance etc. Integration is not equalization because each member country keeps its comparative advantages and economic specialization, which produce the benefits of integration. Monetary integration means waiving the use of monetary and exchange rate policies for achieving only national goals. By signing the Maastricht treaty the New Member States (NMS) bound themselves to observe the European prescriptions about these policies. In the long run monetary integration represents an adoption of the single European currency. The challenge for the NMS is to combine economic and monetary integration with their national goals.

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Although the separate NMS substantially differ from each other, they share important similarities:

- All NMS are relatively small compared to the EU and the Euro area (EA). This presumes that effects of integration will be much stronger for the NMS than for the old member countries (EU-15);
- All NMS are less economically and financially developed than the EU-15, which implies that the NMS will pursue certain common goals and share some common trends in their development.

The goal of this paper is to analyze the monetary integration of the NMS on the basis of the Maastricht criteria of nominal convergence and on the basis of the Optimum currency area criteria. In order to achieve these goals the investigation is structured as follows. Section 2 deals with the nominal convergence of the NMS related to the fulfillment of the Maastricht criteria. Section 3 investigates the monetary integration of the NMS from the standpoints of the OCA theory. Section 4 analyzes the experience of the NMS, which have already joined the EA. Section 5 makes concluding comments.

The analysis is complicated because some optimum currency area (OCA) criteria are endogenous, that is, they can arise from the very process of monetary integration. For instance, the higher degree of trade openness makes the successful participation in a currency union more probable but in the same time the degree of trade openness can also be influenced by a currency union membership. This argument can be equally applied to the transmission mechanism because the functioning of financial markets is likely to be affected by joining a currency area.

It is crucial whether in a currency area there are asymmetric shocks and how they are transmitted. The more similar the shocks in aggregate supply and aggregate demand and the closer the rates of adjustment of separate economies to these shocks, the less the need for autonomous monetary policy and the bigger the net benefits of sharing a common currency.

According to the OCA theory, suitable for participation in a monetary union are countries, which meet certain criteria for real convergence of their economies such as high degree of openness, mobility of factors of production and diversification of production and exports. If there is a clear convergence between economic cycles of the candidate countries for a monetary union and the economic cycles inside the union, the candidates can be considered ready to join the currency area.

### **The Nominal Convergence of the NMS**

Upon the enlargements in 2004 and 2007, twelve new states joined the EU. Based on their advancement on the way to EA membership, the NMS can be divided in three groups:

- EA members – Cyprus, Malta, Slovenia, Slovakia and Estonia;
- Countries participating in the Exchange Rate Mechanism 2 (ERM 2) – Latvia and Lithuania;
- Countries outside the ERM 2 – Bulgaria, Czech Republic, Hungary, Poland and Romania.

The NMS, which joined the EU in 2004, received an assessment of their progress to an EA membership by the EC and the ECB Convergence reports 2004. In August 2004 only Estonia and Lithuania covered all convergence criteria except for the 2-year ERM 2 participation requirement.

Indicative of the way the EC applies the Maastricht criteria, are the cases of Slovenia and Lithuania. In March 2006 Slovenia and Lithuania officially applied for an EA membership. In May 2006 the EC assessed the readiness of the two countries to join the EA in Convergence reports. Slovenia and Lithuania convincingly met all convergence criteria. The sole exception was the inflation criteria, where Lithuania was 0.1 percent above the reference value. Lithuania fulfilled all other convergence criteria better than Slovenia. Slovenia joined the EA in 2007 but Lithuania did not.

The cases of Slovenia and Lithuania imply that:

- European institutions are uncompromising when applying the convergence criteria – the good fulfillment of four criteria may not be enough to enter the EA, if there is even one criterion not covered.
- The satisfaction of criteria should be sustainable over the short and middle period.

In October 2006 no NMS from Central and Eastern Europe covered the Maastricht criteria.

In 2007 Cyprus and Malta applied for an EA membership and their readiness was assessed in convergence reports by the EC and the ECB. Over the reference period April 2006–March 2007 Cyprus and Malta covered all Maastricht criteria except for the one of the public debt. Since the public debt levels of the two countries were near the reference values and

were expected to decline in the future, Cyprus and Malta joined the EA in early 2008.

In March 2008 Bulgaria, Czech Republic, Estonia, Latvia and Lithuania met all convergence criteria except for the inflationary one. Hungary covered only the exchange rate requirement for fluctuations within the band of  $\pm 15\%$ , but had not participated for two years in *ERM 2*. Poland was the only country to meet all criteria, but, like Hungary, had not stayed for two years in *ERM 2*. Romania did not fulfill the requirements for price stability and for dynamics of the long-term interest rates. Slovakia covered all convergence criteria and entered the EA in early 2009.

The countries in a currency board arrangement (CBA) face difficulties in meeting the inflation criteria. The simultaneous fulfillment of the price stability and exchange rate requirements is impeded by the real appreciation of the national currency arising from structural changes in the transition to a market-oriented economy and from the real convergence of national price and income levels to the levels of developed EU economies. Under a CBA the nominal exchange rate is fixed, which guarantees the fulfillment of the exchange rate criterion. All real appreciation of the national currency results in rising inflation and hampers the fulfillment of price stability criteria.

The global crisis has favored the fulfillment of the price stability criterion because of the decrease in inflationary pressures, but has impeded the fulfillment of the requirements for budget deficit and long-term interest rates.

### **The Monetary Integration of the NMS from the Standpoint of the OCA Theory**

#### TRADE INTEGRATION

Trade openness is essential for estimating the degree of international integration of a national economy and for choosing an exchange rate regime or a monetary union membership. Trade openness is calculated by dividing the average of exports and imports by GDP. The higher the trade openness, the bigger the influence of international prices of tradables on domestic prices and cost of living and the less useful the autonomous exchange rate policy as a shock-absorbing tool is. Increased trade openness is likely to amplify business cycle similarity and decrease the necessity of national stabilization policies, as argued by Frankel and Rose (1998; 2000).

The New Member States are open economies and meet the trade openness criterion for monetary union membership. The trade openness of the New Member States in goods and in services is much above EU-average. The New Member States have higher trade openness in goods and lower trade openness in services than the Euro area.

The New Member States are highly integrated in the European Union in terms of trade – above 70 percent of their foreign trade (for both exports and imports) is within EU. These shares are comparable in size with the respective shares of the Euro area.

The Czech Republic, Hungary, Poland and Romania are among the Euro area twenty main trading partners for both exports and imports. The total percentage of the four states in the EA imports grew from 7 in 1999 to 12 in 2009, whereas the total percentage of the four states in the EA exports rose from 8.3 in 1999 to 12.6 in 2009. These numbers show increased trade activity between the NMS and the EA.

The impact of trade integration on business cycle synchronization has been broadly discussed in literature (Commission of the European Communities 1990; Fidrmuc 2004; Frankel and Rose 1998; Krugman 1993). The small open economies of the New Member States are highly integrated with each other and with the Euro area in terms of trade. A lot of investigations have been made in how synchronized the New Member States are with each other and with the Euro area as a result of increased trade. Synchronization caused by trade varies by countries (as shown by Kocenda 2001; De Haan, Inklaar, and Jong-a-Pin 2008; Fidrmuc and Korhonen 2003; Korhonen 2003) and depends on the type of shock, which hits the economy (as discussed by Babetskii 2005; Horvath and Ratfai 2004; Babetskii, Boone, and Maurel 2004). Fidrmuc and Korhonen (2004) summarize lots of publications on the business cycle similarity between the New Member States and the Euro area. Their findings are that the Central European countries are better correlated with the Euro area than Balkan and the Baltic states (except for Estonia).

#### FINANCIAL INTEGRATION

The process of globalization and the expected future membership in the European monetary union has intensified the financial integration of the New Member States. The influence of financial integration of the New Member States on their business similarity with the Euro area has not been fully investigated in economic literature. Real business cycle models predict that increased financial integration will lead to higher syn-

chronization in consumption and lower synchronization in investment and output (Backus, Keho, and Kydland 1992). Financial integration can cause industrial specialization and thus decrease synchronization.

Financial integration may contribute to business cycle convergence by demand-side effects. If consumers possess assets in foreign stock markets (indication of financial integration) then a decline in these markets lowers domestic wealth and demand. When there is a crisis abroad foreign banks' bonds decrease in value thus causing a fall in the domestic market too. Banks transfer these losses onto their clients by higher interest rates thus hampering economic growth and increasing business cycle similarity.

Empirical results refute the forecasts of real business cycle models. Empirical investigations find evidence of higher correlation in output than in consumption (Imbs 2004).

The contradiction between empirical results and theory expectations could be due to the type of financial integration. Financial market integration may be divided into stock market integration and debt market integration (Davis 2009). Stock market integration can cause negative output correlation because capital flows maximize marginal rate of return as predicted by real business cycle models. Debt market integration may raise synchronization because of the demand-side effects already described.

Estimating the effects of financial integration of the new member countries is important because of their eventual accession to the European monetary union. For a common monetary policy to be effective the New Member States must have similar business cycles. A monetary union amplifies financial integration of participating countries (De Grauwe and Mongelli 2005). If financial integration causes higher synchronization, this ought to help the New Member States meet the optimum currency area criteria. If financial integration brings about lower synchronization, this might decrease common monetary policy's effectiveness. Economic theory and empirical investigations disagree on the impact of financial integration on business cycle convergence.

In literature, there are two assumptions about the level of financial integration of the New Member States. The first assumption is that financial markets of the New Member States are less integrated than these in the Euro area but the integration process has sped up after their accession to the European Union (Baltzer et al. 2008). The second assumption is that the new member countries have reached a level of financial integration comparable to the level of the Euro area (García-Herrero and Wooldridge

2007). The first assumption is supported by the fast development of financial sector in the New Member States and the massive presence of other Member States' banks in this sector. Arguments in favor of the second assumption are the goal to join the Euro area and the common institutional and regulatory framework provided by the European Union (European Bank for Reconstruction and Developments 2006).

In a monetary union, the integration of financial markets is crucial to the effective transmission of the common monetary policy. The higher the financial integration is, the more effective the common monetary policy is. Joining the Euro area without a sufficient level of financial integration could intensify idiosyncratic shocks and lower the effectiveness of the common monetary policy (Cappiello and Manganeli 2007).

The relationship between financial structures and monetary policy transmission has been extensively discussed in literature. The differences in financial and bank markets of European monetary union's members can cause asymmetric effect of common monetary policy. These differences are legal and economic. National legislations change slowly, therefore legal differences are constant in the short run (Cecchetti 2001). Economic factors vary more rapidly. The responses to monetary shocks in the New Member States and the Euro area are quite different (Jarociński 2004). Short-term output and price responses are stronger in the Euro area, while midterm responses are comparable in size. Interest rate shocks are bigger and more resistant in the New Member States whereas exchange rate responses are identical. Financial markets in the New Member States have a slow response to strong and/or prolonged fluctuations in interest rates and exchange rates. This delayed reaction might be due to insufficient depth of financial markets, which in the short run impedes the effective transmission of monetary policy changes to financial markets.

Financial depth and the level of financial intermediation in the New Member States are low compared to European Union average (Anzuini and Aviram 2004). This could explain the longer lag of monetary transmission in the New Member States in comparison with the Euro area.

The integration of equity markets among the New Member States and with the Euro area has increased in the European Union accession process (Cappiello and Manganeli 2006).

Financial integration is related to certain costs and benefits (Agenor 2003). Benefits are considered to exceed costs if control mechanisms for financial stability are implemented. Joining the Euro area without suf-

TABLE 1 Gross value added at basic prices (percentage of total)

Country	Agriculture		Industry		Construction		Services	
	1997	2007	1997	2007	1997	2007	1997	2007
Euro area	2.8	1.9	22.7	20.4	5.7	6.5	68.7	71.1
New Member States	8.1	3.9	25.8	23.0	6.0	7.4	60.1	65.7
Difference	-5.3	-2.0	-3.1	-2.6	-0.3	-0.9	8.7	5.4

NOTES Adapted from Eurostat (2009).

ficient financial integration could cause problems with transmission of common monetary policy and common shocks.

### OUTPUT COMPOSITION

The composition of output (the structure of gross value added by sectors of economy) is important for assessing the degree of structural convergence. If this structure differs substantially by countries, sector disorders may grow into asymmetric country shocks. Kenen (1969) and Dedola and Lippi (2000) show that differences in the composition of output may create idiosyncratic national business cycle because sectors vary in cyclical properties and even in responses to monetary measures.

Structures of gross value added and employment are in a close relationship with the phase of economic development. The higher level of development is characterized by a bigger share of services and smaller share of agriculture in gross value added and employment, while the relationship between industry share and per capita output is U-shaped (Chenery and Taylor 1968).

Table 1 displays the shares of four sectors (agriculture, industry, construction and services) in gross value added of the New Member States and the Euro area for 1997 and 2007. In all sectors, the differences between the Euro area and the new member countries have shrunk for ten years. By a process of structural convergence, the New Member States have shortened the distance in economic development vis-à-vis the Euro area.

### LABOR MARKETS

From the viewpoint of the OCA theory, the functioning of labor markets is important for two reasons.

First, flexible labor markets (characterized by a competitive wage-setting mechanism, geographic and sectorial mobility of workforce, effective information, and transparent regulatory framework) diminish the

cost of shocks in demand and supply, measured in employment and output. A flexible labor market decreases the need to use active monetary and exchange rate policies to mitigate the effects of these shocks at national level and favors the participation of a country in a currency area.

Second, labor markets are important channels for transmission of economic disturbances to prices and real sector, thus influencing the cyclical properties of an economy. A currency union can operate smoothly if labor market structures of its member countries are relatively similar and adaptable. This diminishes the risks of domestic pressures when the currency area is hit by common shocks.

The review of literature implies that the labor markets of the NMS are at least as flexible as the labor markets in the EA member countries.

### **The Experience of the NMS, Which Have Already Adopted the Euro**

Slovenia was the first NMS to meet the Maastricht criteria and enter the EA. The process of nominal convergence of Slovenia to the EA occurred on the background of a stable economic growth, current account deficit and budget deficit. Slovenian deficits were moderate unlike those in other NMS and did not jeopardize the macroeconomic stability of the country.

Several months after the adoption of the Euro the inflation in Slovenia started rising and reached 5,5% in December 2008 due to domestic factors (lack of competition and speculative operations with the new currency) and international factors (increase in prices of energy resources). The lag inflation, the GDP gap and the insufficient flexibility of labor markets may have also contributed to increasing inflationary pressures in Slovenia.

The global crisis and the recession it caused diminished inflationary pressures in Slovenia but the inflation differential between Slovenia and the other EA member countries remain unchanged. The main structural problems for Slovenia are related to the insufficiently flexible labor markets, which adversely affect the cost of labor and economic growth.

For Slovakia the main challenges on the way to a EA membership were the impossibility to simultaneously control the exchange rate and inflation under free cross-border capital movements, the need to shorten as much as possible the stay in ERM 2 (because the reference value of price stability criterion is difficult to be prognosticated) and the Balasa-Samuelson effect (the higher increase in prices of non-tradables resulting in rising the general price level). The introduction of the Euro by Slovakia

under such heavy challenges is an undeniable achievement, which can be ascribed to the good cooperation and coordination between the central bank and the government of Slovakia. During its stay in *ERM 2* Slovakia pursued policy of moderate growth in wages being always lower than the growth in labor productivity. This policy helped Slovakia to harness inflation and to cover the convergence criterion of price stability.

The international economic situation and global inflation trends facilitated the process of accession of Slovakia to the *EA*. The period of assessing Slovakia's readiness for an *EA* membership coincided with a period of stability and even decline in international prices owing to cheap imports from Asia.

From the Slovak experience in adopting the Euro two important conclusions can be drawn. *First*, a broad national consensus is needed in the applicant countries on the time and way to introduce the Euro. A realistic strategy based on cooperation between the Ministry of Finance and the National Bank should be developed. *Second*, the stay in *ERM 2* is successful if it is accompanied with a steady inflow of capital from abroad. Under crisis conditions it is difficult to achieve, therefore it is advisable that the accession to the *EA* occur after the effects of the crisis are overcome.

Slovakia was the first country with a floating exchange rate to join the *EA*; therefore the Slovak experience is important to other *NMS* with a floating exchange rate, which apply for an *EA* membership.

In May 2010 the *EC* assessed positively the readiness of Estonia to enter the *EA* and in July 2011 the Council of *EU* approved Estonia's accession to the *EA* on 1 January 2011.

The main obstacle for Estonia to introducing the Euro was the fulfillment of price stability criteria because of the specificity of the Estonian exchange rate regime – a *CBA*. Under a global financial crisis the external and domestic pressures on Estonian price level diminished and the country managed to meet the inflation criteria in November 2009. The crisis complicated the fulfillment of the budget deficit criteria, therefore implemented fiscal austerity measures, which in 2009 solely accounted for 9% of *GDP*. The decline in prices and wages allowed the Estonian economy to increase its productivity even in crisis conditions. Relating wage growth to growth in labor productivity played a vital role in preserving the stability of Estonian economy during the crisis.

Some peculiarities of the Estonian business cycle favored the fulfillment of convergence criteria in crisis conditions. The first signs of economic slowdown in Estonia appeared in late 2006 and early 2007, and

at the beginning of 2008 Estonian economy started to shrink. In Estonia the economic crisis occurred earlier and had less detrimental effects compared to other small open economies. A possible explanation of this fact is that Estonia took early actions to harness the credit boom in the pre-crisis years and avoided overheating of the economy.

Estonia's success in meeting the Maastricht criteria can be attributed to several factors:

1. Good timing in applying for an EA membership. On one side, Estonia selected a reference period when international prices of food and energy sources declined in order to decrease external inflationary pressures. On the other side, the economic slowdown and the decrease in domestic consumption diminished the internal pressure on prices. The decrease in external and internal inflationary pressures helped Estonia cover the price stability criterion under crisis conditions;
2. Prudent macroeconomic policy: Before the crisis, Estonia took steps to restrain the credit boom in order to avoid an overheating of the economy. Under crisis condition, Estonia implemented fiscal consolidation to cover the budget deficit criteria and related growth in wages to growth in labor productivity. Estonia became the first country to meet all convergence criteria in crisis conditions.

### **Conclusions**

Five of the twelve NMS, which joined the EU in 2004 and 2007, have already adopted the Euro – Slovenia, Cyprus, Malta, Slovakia and Estonia. There is a considerable progress in the integration of the NMS but there is still much to do. At present a full monetary integration of all NMS together, as a group cannot be achieved. An individual approach considering the specificity of each country is needed for adopting the Euro.

The economic integration is not merely a convergence (a decrease in the differences in basic macroeconomic indicators of a group of countries) but a much more complex process of real inclusion of national economies in a single market. Integrating economies specialize, cooperate and complement each other; their business cycle similarity increases but national competitive advantages still play a vital role.

The integration does not mean just adopting the Euro but combining the sectors of a national economy in the sectorial structures of an integration community. The degree of integration is not determined by the

EA membership but by trade and sectorial structures and interactions. A country should not enter the EA before it is integrated in trade and sectorial structures of the Single market of the EU. The monetary integration is a culmination of the integration process and ought to be implemented after the national economy is structurally integrated in the EU. Proof of this are the PIIGS (Portugal, Italy, Ireland, Greece and Spain) which experience economic difficulties some of which may be attributed to their inability to withstand the pressures of sharing a common currency.

The NMS have achieved a high degree of nominal convergence with the EA. As to real convergence, the situation of the separate NMS is quite different. The trade integration of the NMS with the EA is very strong. The structural integration (for example measured as the composition of the gross value added) has progressed more slowly than the trade integration, which may slow the process of real convergence.

Some NMS have achieved a higher business cycle similarity with the EA than other. The labor markets of the NMS are as flexible at least as the labor markets of the EA member countries. In terms of financial integration, the NMS are far behind the EA.

Poland, Hungary and the Czech Republic still use the exchange rate to counteract external economic shocks. Though these countries cover the optimum currency area criteria, they face difficulties in meeting the Maastricht criteria.

The legal convergence of the NMS to the EA has advanced considerably. As to the legal independence of the Central banks, the convergence process is almost complete. In the area of monetary policy, the NMS still have work in setting their Central banks in operative and technical compliance with the European system of central banks.

In order to satisfy the convergence criteria in crisis condition, the NMS need to reformulate their macroeconomic policies in accordance with the macroeconomic specificity of each country.

The fulfillment of the Maastricht criteria requires deep structural reforms. A fiscal deficit of up to 3% of GDP presumes self-financing of the public pension system, while the exchange rate stability suggests maintaining the correlation between the growth of productivity and the growth of real wages. The process of meeting the nominal convergence criteria should be accompanied by actions to adjust the real economy by a process of real convergence.

The NMS should adapt their macroeconomic policies to crisis conditions. Transparent, consecutive and foreseeable macroeconomic policies

are needed to smoothly adjust the economy and regain the trust of foreign investors. Such policy ought to be directed at decreasing the external and internal macroeconomic imbalances (for instance, the budget deficits and the current account deficits).

The macroeconomic (fiscal and monetary) policies of the NMS under crisis conditions are characterized by heterogeneity and asymmetry of the measures taken. The macroeconomic imbalances vary by countries under the influence of different factors – size of excessive demand at the onset of the crisis, structure of foreign trade, size of foreign debt, share of separate economic sectors in gross value added etc.

The type of the exchange rate regime has specific impact on the macroeconomic policies of the NMS. In the countries with fixed exchange rates fiscal and monetary measures are restricted by the necessity to maintain the stability of national currencies. In the inflation-targeting NMS such as Hungary and Romania, the fall in interest rates during the crisis was limited by the liquidity problems in the inter-bank market and by the high inflation rates in these countries at the beginning of the crisis.

The adoption of the Euro should not become an end in itself for the NMS. The EA membership makes sense for the NMS only if they have quality state intuitions and good reputation among foreign investors and creditors. Poland, the Czech Republic and Hungary cleverly take advantage of the autonomous exchange rate policy and do not hurry to enter the ERM 2, but have the trust of international financial circles.

From the standpoint of the OCA theory Bulgaria is ready to enter the EA. Bulgaria meets the OCA criteria, therefore the benefits should outweigh the costs of adopting the Euro. The high degree of business cycle similarity between Bulgaria and the EAMS suggests the common monetary policy will not cause additional inflation or unemployment in Bulgaria. The Bulgarian lev is pegged to the Euro in a CBA; therefore, Bulgarian monetary policy is almost entirely dependent on the monetary policy of the ECB. To Bulgaria the adoption of the Euro would not mean a loss monetary sovereignty but only an elimination of transaction costs.

Although Bulgaria meets the OCA criteria, it is not very likely to achieve a sustainable fulfillment of the Maastricht criteria in the years to come. The price stability criterion should be met not only over the one-year reference period but also steadily over the medium term, which is difficult to achieve under a CBA. As to real convergence, Bulgaria lags behind and remains one the poorest states in the EU with low per-capita income and low labor productivity.

Under crisis conditions, it is advisable that the NMS concentrate their efforts on increasing the absorption of EU funds and on attracting foreign capital. This demands zero corruption tolerance policy, improving the work of state institutions and building quality infrastructure.

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# *How South African SMEs Can Become Better Candidates for Export Finance*

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SMEs are considered to be important drivers of economic growth and development throughout the world but to deliver true economic benefits, they need to grow into sustainable, profitable businesses. Expanding into foreign markets provides an excellent vehicle for growth but many hurdles stand in the way of SMEs making the transition from local to international. The difficulty associated with obtaining finance for export market development is a key stumbling block. Financial institutions regard SMEs as high risk because they have limited resources and capacity, and are more likely to default than larger concerns. This paper examines the various risks that financial institutions in South Africa assess when they receive applications for export finance from SMEs. What makes this study different is that it offers perspectives on export risks from the *lender's* point of view – a hitherto neglected area of research. The findings are packaged as a set of guidelines on how SMEs can mitigate these risks and improve their chances of securing the financial assistance that has often eluded them in the past.

*Key Words:* SME (small and medium enterprise); internationalisation; export finance; risk mitigation

*JEL Classification:* F10, F30

## **Introduction**

There is a general consensus in the literature that entrepreneurship is a driver of economic development and that SMEs (small and medium enterprises) are the natural spawning ground for entrepreneurial ventures. This is because most SMEs are privately owned and are therefore used to arriving at innovative solutions to the problem of competition (see <http://www.unece.org>). Furthermore, their size enables SMEs to react quickly to changing market conditions, thus improving their chances of survival (UN/ECE Secretariat 1997). The survival of SMEs is in fact essential for economic wellbeing throughout the world as they generate

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more than 60% of employment opportunities in developed countries, and more than 50% of such opportunities in middle and low income countries (International Trade Centre 2009). Moreover, these entities are regarded as offering the means through which poverty can be eradicated in the developing world. SMES also contribute to the diversification of economic activities in a country, thereby encouraging broad-based economic growth (see <http://www.unece.org>). However, in order for SMES to deliver jobs and other economic benefits, it is vitally important that they grow into sustainable, successful businesses (International Trade Centre 2009).

Venturing into international markets is one of the most important ways in which SMES can grow (Lu and Beamish 2001) as it affords them the opportunity of expanding their business operations, realising greater economies of scale, and generating higher profits at the end of the day. SMES would do well to focus initially on exporting when contemplating various internationalisation options (Lu and Beamish 2001). Interestingly, SMES in the OECD countries produce around 26% of the OECD countries' exports (UN/ECE Secretariat 1997; OECD 2002). Yet despite the obvious allure of foreign markets, the majority of SMES are unable to make the transition from local to international because of a myriad of barriers that stand in their way – from a lack of market information and the pervasive influence of buy-local campaigners to, critically, a lack of finance (Mtigwe 2005, 367).

The International Trade Centre (2009) singles out finance (or the lack of it) as the biggest constraint to SME growth. It is a well-known fact that many financial institutions are not keen to lend to SMES, preferring to deal with larger firms (Rhee 1989). Providing export finance to SMES is regarded as a particularly high risk (Zavotta 2008). Reasons given for banks' timidity in this regard include: the high transaction costs associated with SME deals; imperfect information on SMES' finances; SMES' limited collateral, and the high risk of default (International Trade Centre 2009). Admittedly, financial institutions have risk management policies and practices in place to minimise the risk of their borrowers defaulting. Yet many SMES do not exactly go out of their way to address the concerns of, or endear themselves to, lenders. As a result, lenders' scepticism is reinforced, which further restricts SMES' access to finance (International Trade Centre 2009).

The purpose of this exploratory paper is to identify the various risks that financial institutions in South Africa consider when they receive ap-

plications from SMEs for export finance. Flowing from this will be a set of guidelines, aimed at SMEs, for mitigating the identified risks and improving the likelihood of their securing financial assistance.

### **Barriers to Export**

Many authors have grappled with the problem of firms struggling to access and develop export markets in the face of persistent and formidable barriers (Leonidou 2004). Barriers to export can be defined as ‘all those factors – external or internal – that serve to dissuade a firm from exporting or that hinder its actual export activity’ (Suárez-Ortega 2003, 403).

Internal barriers to export relate to the firm’s capabilities, resources and capacity to operate internationally, while external barriers are those factors over which the firm has no control and are a product of the environment in which businesses operate (Fillis 2000; Leonidou 2004). Ramaswami and Yang (1990) break export barriers down into four categories – knowledge, procedural, resource, and exogenous barriers. Knowledge barriers broadly relate to a lack of information on what is involved in exporting. Procedural barriers relate to those elements that complicate and/or slow down the export process. Resource barriers are concerned with a lack of financial wherewithal and productive capacity. Finally, exogenous barriers include any obstacles arising due to uncertainty in the international market place or the actions of governments and competitors (Suárez-Ortega 2003; Arteaga-Ortiz and Fernández-Ortiz 2010). This paper focuses on resource barriers and, more specifically, the difficulties experienced by SMEs in obtaining finance for export purposes (Suárez-Ortega 2003).

Many empirical studies conducted over the years point to finance being a stumbling block in small and medium size firms’ internationalisation efforts. Bell (1997), for example, found that most of the barriers faced by small computer software exporters in Finland, Norway and Ireland, were financial in nature. Not only did these SMEs experience problems in obtaining export finance but they also had to contend with delayed payments and currency fluctuations, and had difficulty setting their prices at competitive levels. The biggest obstacle to these firms acquiring export finance was banks’ unwillingness to lend to them because of their high risk profile (due to SMEs’ modest size, small asset base, and generally high mortality rate). Bell (1997) further found that export barriers intensified as SME exporters became more active internationally. Frequent exporters, for example, found that delays in payment and difficulty in

obtaining export finance were the two most significant threats to their exporting activities, while aggressive exporters cited delays in payment and currency fluctuations as the greatest stumbling blocks to export success. In another study, Suárez-Ortega (2003) found that the SME wine exporters in Spain were hampered by insufficient funds for market research, and an inability to finance export sales due to banks' unwillingness to provide the necessary credit facilities.

The same types of export barriers have emerged in studies conducted in developing countries. In their analysis of the SME manufacturing sector in Nigeria, Okpara and Koumbiadis (2010) found the lack of export finance to be the second biggest barrier to foreign market expansion, after insufficient market knowledge. Somewhat surprisingly, poor infrastructure and corruption were not seen to be significant impediments to export success.

The above body of research only considered resource barriers from firms' perspective and did not take cognisance of lenders' views on the matter. To this end Griffith (2010) examined financial resource barriers from the standpoint of the lending community – evidently the first researcher to consider the subject from this angle. Griffith (2010) asserted that lenders of finance, in seeking to minimise their risks and maximise their returns, look for certain characteristics in their export clients. Those who fit the 'profile' are more likely to obtain finance than those who do not. For example, lenders prefer exporters that market a limited range of goods or services because a concentrated effort, in their view, improves the chances of strong sales performance and lowers the risk of non-payment. Lenders also look at exporters' past financial performance as this will offer strong clues about their ability to repay a loan or service their credit facility.

The various risks that lenders consider when approached for export finance are unpacked later in this paper. However, it is useful at this point to give a brief overview of export finance.

### **Export Finance in a Nutshell**

Export finance can be defined as 'the provision of credit and any form of financial assistance to meet the needs of an exporter in carrying out an export order' (Buatsi 2002, 503). There are four general payment methods used in international trade transactions: cash in advance, letter of credit (L/C), documentary collections and open account (Buatsi 2002). Cash in advance and open account are classified as direct payment methods

because they require internal funds to finance the transaction (Herger 2009). Letters of credit and documentary collections are known as indirect payment methods, since trade credit is provided by financial institutions. In other words, these institutions provide finance as a bridge between the time goods are produced and payment is received (Buatsi 2002). L/Cs and documentary collections are the most commonly used in international trade as few exporters and importers have enough liquidity to use direct methods of payment (Herger 2009).

To ensure that borrowers are able to meet their credit and loan obligations, financial institutions require borrowers to put up sufficient collateral. However, this requirement constitutes the biggest obstacle to SMEs accessing finance (Buatsi 2002, Zavotta 2008). A possible solution to the problem is for an export loan or credit facility to be structured in such a way that it is self-liquidating (Rhee 1989). Structured trade and commodity finance is a type of finance solution effectively tailored by a financial institution to meet the specific transactional requirements of the SME (Matthee and Finaughty 2010). As such, every transaction is judged according to its particular circumstances, and finance is structured in a manner that mitigates actual or perceived risks (UNESCAP 2005). The underlying product or stock traded becomes the security (or collateral) in this case (Gaffney 2009; Matthee and Finaughty 2010), and each advance is repaid from the proceeds arising from sales (Matthee and Finaughty 2010).

When considering an application for general export finance, a financial institution would consider the firm's balance sheet and creditworthiness. If the financial statements and historical performance of the firm are seen to be healthy (and they have collateral), a general banking facility of between 10% and 20% of the firm's equity may be granted. With structured trade finance, because emphasis is placed on the deal and the firm's experience and standing, a facility equating to five to seven times the value of the firm's equity may be extended (provided all the regular security and compliance requirements have been met) (Matthee and Finaughty 2010).

An example will highlight how this type of financing works. An SME has obtained a contract to sell iron ore (which they procured, for example, from a source in Africa) to a Chinese buyer. In order to complete the transaction, the SME requires trade finance. In a structured trade and commodity finance transaction, the financial institution provides the funds needed to complete the transaction. This is based on the amount it will sell for minus a percentage for the risks involved. A key feature is

that the iron ore becomes the collateral for the loan (and thus not the balance sheet of the SME). So, if the transaction fails, the financial institution takes possession of the iron ore and sells it to redeem the trade finance provided (arrangements for this is made in the structure of the deal). In this way each deal is structured according to the particular transaction whereby the performance of the deal (i. e. a successful conclusion of the transaction) is essential.

During the global financial crisis, the availability of export finance was severely curtailed – particularly in countries dependent on commodity exports. SMEs in those countries were very hard hit as their export operations were heavily financed by external lenders. Clearly, there is a strong argument for SMEs to be treated differently when it comes to export finance, i. e. with a stronger emphasis on deal-based structures in line with varying trade flows (Prusky and Klein 2010).

### **How Financial Institutions View Export Risks**

‘All forms of business contain elements of risk, but when it comes to international trade the risk profile enters a new dimension’ (Grath 2008, 9). Financial institutions that are in the business of providing export finance need to thoroughly assess the actual and potential risks associated with an applicant’s international transaction(s). As SMEs are perceived to pose a greater risk of default than larger firms, they are subjected to greater scrutiny by lenders. Even with structured trade and commodity financing, an SME’s eligibility for finance is determined according to the likelihood of it being able to conclude an international transaction successfully (Klaassens 2005). There is a common misperception among businesses that structured trade and commodity finance is ‘risk free.’ However, there is no financing facility that is risk free, and financial institutions operating in a specialist area are even more acutely aware of the risks (Matthee and Finaughty 2010, 15).

The most prominent risks taken into account by financial institutions when developing structured trade and commodity finance packages fall into three broad categories: market risks, performance risks, and SME-specific risk. These risks and risk mitigation techniques discussed in this paper were provided by three financial institutions, two of which specialise in structured trade and commodity finance.

All three financial institutions made use of a checklist to assess whether a particular SME should be financed or not. These checklists cover all of the risks as portrayed in table 1. Should the SME in question adhere to

all the requirements in terms of mitigating the various risks, the financial institution would start with the loan application process. Should the SME however fail to provide evidence that these risks are mitigated sufficiently, the financial institution will likely reject the loan application and inform the SME what they should do to apply successfully.

### **Methodology**

Three diverse financial institutions were approached during 2010. The first institution is a trade finance specialist firm that works with a foreign bank in South Africa, the second provides financing to SMEs and the third is one of the largest commercial banks in South Africa. They were each given a brief that asked them to provide key aspects that they take into account when they consider whether or not to proceed with a trade finance application of an SME. Thereafter, correspondence took place via email and two in-depth interviews were held with the specialists in structured trade and commodity finance. Documentation pertaining to the application process was also obtained during this process. These provided a more detailed description of the export finance risks considered by financial institutions.

### **Risk Categories**

#### **MARKET RISKS**

Market risk comprises the sub-elements of commodity price risk, exchange rate risk and sovereign risk. Commodity price risk refers to the possibility that the price of a commodity will move in a direction that negatively affects an SME. Even where an SME has no direct exposure to commodities, the prices of commodities such as oil, metals and/or other minerals will invariably affect an SME's operation.

Similarly, all SMEs have direct or indirect experience of exchange rate risk. Exporting firms, for example, run the risk of their domestic currency appreciating between the time the contract comes into force and the final payment falls due. In the South African context this is a very credible risk because of its pronounced volatility (Kulikova and Taylor 2013). The volatility in the South African rand increased over the 2008 financial crisis and remained volatile ever since (see <http://www.resbank.co.za>).

Sovereign risk is linked to the political stability (essentially referring to the quality of government) and economic stability of the importer's country (Grath 2008). For example, political upheavals may make it difficult for a contract to be fulfilled, while economic conditions in a coun-

try could prompt the government to impose foreign exchange controls, tamper with the convertibility of the domestic currency, and/or freeze funds transfers (Bilson, Brailsford, and Hooper 2002). As with foreign exchange risk, political stability and labour unrest is a considerable problem in the South African context. This was again confirmed by the tragedy of Marikana at Lonmin's mine in Rustenburg (Magaziner and Jacobs 2013).

#### PERFORMANCE RISKS

Unlike market risk, which is attributable to autonomous, external events, performance risk arises from performance-related shortcomings of one or more parties to the transaction. The following sub-components of performance risk are covered in this paper: operational risk, production and off-take risk, supplier risk, buyer risk, settlement risk, environmental risk, and quality risk. Operational risk is linked to an exporter's and importer's ability to successfully carry out their duties under the contract. In addition to gauging a firm's operational efficiency, a financial institution will be interested in the quality of the management, and whether the proprietor and management team (or key personnel) are sufficiently knowledgeable about the industry in which they are operating (Matthee and Finaughty 2010).

Broadly, production and off-take risk refers to the adequacy and maintenance of processing plants, the skills level and commitment of the labour force, and the continuity of supply of electricity and water. Environmental risk, in turn, and potential quality problems are usually associated with sub-optimal production. If a firm's quality control arrangements are deficient, an importer might reject a consignment (see <http://www.exporthelp.co.za/index.html>), thus eroding the value of the collateral supporting the deal.

Supplier risk refers to the possibility that suppliers do not manufacture or procure the goods or commodities that form part of an exporter's end product. Buyer risk (also known as commercial risk) refers to the importer's potential unwillingness or inability to pay. While willingness to pay is a reflection of business ethics, ability to pay is linked to the availability of funds (Grath 2008). Even when an importer is willing and able to pay, there is still a measure of settlement risk. This relates to the possibility that a bank pays over the funds due in settlement of a transaction but does not receive the funds it is owed from its counterparty.

Although these risks are also present in the South African context, they are not more pronounced. South African SMEs face the same issues as

SMEs in other countries. South African SMEs do however face additional challenges on the political and macroeconomic fronts, with a volatile currency, labour unrest and political instability.

#### **SME-SPECIFIC RISKS**

There are a number of other risks that although not unique to SMEs, are felt particularly acutely by these firms because of their limited resources and capacity. For example, the more competition an SME faces, the more difficult it becomes for the business to generate sales and honour its financial obligations. Similarly, the level of demand for an SME's product offerings has a direct impact on the business's cash flow and overall performance.

The industry in which an SME operates can be a source of risk as well. For example, whereas commodity producers are vulnerable to erratic global pricing trends, manufacturers are subject to varying technical specifications and standards in different export markets, sometimes making efficiency through standardisation an elusive goal. Whether an SME is a niche or more general player in the market also impacts on a lender's risk assessment. Adopting a niche approach may be sensible for a small business that might otherwise buckle under the weight of the competition in the more general goods market, yet it could call for aggressive marketing to generate viable returns. Market concentration is another factor that a lender would pay close attention to, particularly as SMEs more often than not trade in only one type of product. If a large order is cancelled, it could have a devastating effect on the business.

Another risk that is amplified for SMEs is inventory risk, which could manifest as cancellations of orders; delayed shipments and the need to offer discounts to mollify customers; and damage to or loss of consignments en route to their destinations, leading to protracted insurance claims or, worse, irrecoverable stock loss. Transit risk is an ever-present worry for exporters of tangible goods, but SMEs are invariably less well equipped than larger firms to deal with problems in the delivery chain.

#### **How Easy Is It for SMEs to Obtain Export Finance in South Africa?**

No studies have been conducted into firm-level trade (export) finance in South Africa, although a national study was conducted not so long ago on the impact of trade finance on South Africa's export flows (Kohler and Saville 2011). Data on trade finance for South Africa's SME community

has only become available through the 2010 World Bank Financial Crisis Survey on South Africa (see [www.enterprisesurveys.org](http://www.enterprisesurveys.org)). The survey was rather limited in scope but it did yield valuable insights into the experiences of SME exporters when seeking external financial assistance. Of the firms surveyed, 194 were SMEs. Of these, 42 were exporters and 152 non-exporters. Of the 42 active exporters, 8 (19%) had obtained an L/C since 2006, while 34 (81%) had not.

The survey set out to measure whether access to finance (including the availability and cost thereof, interest rates and fees, and collateral arrangements) was perceived to be a constraint to the firm's operation. Among the findings was that only 16% of those SME exporters that have obtained an L/C since 2006 perceive access to finance as being an obstacle to their operations. This suggests that firms that are 'export finance ready' are more attractive prospects to lenders. Another key finding was that the value of sales generated by those SMEs that have made use of an L/C has been 20% to 30% higher than that generated by those SMEs that have not had access to such finance. The former group also has more exporting experience than the latter group (an average of 20 years versus 12 years) and employs more full-time staff. SME exporters that have not had the benefit of finance facilities have generated 25% more in national sales than SMEs with finance facilities, and have a greater proportion of production staff. However, the former group also has fewer non-production employees (such as managers and administrators). It is this category of staff (because of their familiarity with administrative processes) that plays a key role in helping a firm to become 'export finance ready.' When it comes to sources of finance, SME exporters that have obtained an L/C rely more on banks, while those that have not, rely on retained earnings and credit from suppliers.

What also emerged from the survey was that more SMEs in commodity-type industries use export finance than those in the manufacturing sector. This points to the importance of SMEs operating in the commodity sector, in particular, to take steps to become 'export finance ready.' How this is done will be explored in the next section.

### **How South African SMEs Can Mitigate Export Finance Risks**

Financial institutions conduct thorough investigations into the risk profile of potential candidates for structured trade and commodity finance. The various risks are conveniently summarised in table 1.

What follows are some general guidelines that SMEs can follow to mit-

TABLE 1 Risks assessed by financial institutions when considering export finance applications

Market risks	Performance risks	SME-specific risks
Commodity price risk	Operational risk	Competition risk
Exchange rate risk	Production and off-take risk	Demand risk
Sovereign risk	Supplier risk	Industry risk
	Buyer risk	Concentration risk
	Settlement risk	Inventory risk
	Environmental risk	Transit risk
	Quality risk	

igate the above risks and improve their chances of securing structured finance facilities.

**MITIGATING MARKET RISKS**

There are various ways in which SMEs with direct exposure to commodity price risk can hedge against adverse price movements. For example, the exporter of a commodity could short-sell futures contracts of that commodity, or buy put options on commodity futures contracts.

Exchange rate risk can be mitigated by taking out forward cover or entering into a currency futures position. With forward cover, the exchange rate is fixed when the cover is purchased, thus ensuring that the exporter is protected against adverse exchange rate movements that could erode the profitability of a transaction.

Taking out export credit insurance is a useful way to hedge against sovereign risk which could manifest as, inter alia: trading licences being revoked; the subject matter of the sale being confiscated or expropriated; wars, acts of terrorism or strikes making it impossible to deliver or pay for a consignment; and currency inconvertibility (Grath 2008). An alternative to taking out export credit insurance would be for the SME to make use of a confirmed L/C where the SME’s bank underwrites the credit risk of the foreign bank that issued the L/C (Mathee and Finaughty 2010).

**MITIGATING PERFORMANCE RISKS**

To mitigate operational risk, an SME first needs to be solvent. If the SME has a negative cash flow, it should emphasise to the lender that this is attributable to a volatile trade cycle and not to a weakness for elaborate office furnishings or inflated expense accounts! Financial ratios and the quality of working capital (inventory and debtors) will also be the subject of scrutiny. If an SME is able to keep assets current, has debtors that pay

timeously, and maintains appropriately low levels of inventory, it is more likely to be able to borrow considerably more than the value of its capital base. Secondly, an SME should not be a start-up or new business. It needs to have a sound reputation and track record in its particular industry, and be able to demonstrate its competence in doing business at an international level. Thirdly, an SME needs to have a detailed business plan that reflects its commitment to strong corporate governance and incorporates a realistic strategy for growing the business (International Trade Centre 2009).

Some financial institutions, for example, might not be prepared to offer a structured finance facility to a close corporation but would to a proprietary limited company (Pty Ltd) or formal partnership. (The close corporation structure is, however, being phased out in line with new legislation affecting business incorporation in South Africa.) A lender might also specify that an SME client is audited every year and keeps three or more years' worth of audited financial statements, which can be evaluated from time to time.

An integral part of export financing is the provision of security by the applicant. Three types of security can be provided. The first type involves the pledging of stocks and the provision of notarial bonds. With the former, the financial institution is always in possession of the underlying goods, which serve as the primary security. For example, a consignment of goods could be held and only released for loading on board a vessel when the financial institution gives its authorisation for this to happen (Matthee and Finaughty 2010). Another option is for the financial institution to take out a notarial bond over a consignment. Thus, if the financial institution is not paid, it has the right to sell the subject matter of the sale in order to recoup its losses (Faber and Schuijling 2010). The second type of security is provided through the cession of debts and invoices to the financial institution, enabling the latter to take over from the SME should problems arise, and complete the deal (Matthee and Finaughty 2010). The third type of security involves the SME owner (or shareholders) providing personal sureties and inter-company guarantees. If the SME's owner and/or shareholders are not prepared to support the financial risk that they are expecting the bank to assume, it would signal their lack of faith in the strength and sustainability of the business operation. Consequently, the chances of finance being forthcoming would be extremely small (Matthee and Finaughty 2010).

To mitigate supplier risk, an SME should establish solid and enduring

relationships with its suppliers so that erratic deliveries and delays are kept to a minimum. An SME should describe its relationship with its suppliers in its application for export finance, covering aspects such as the history of the working relationship, the interpersonal style that characterises their dealings with one another, and so on.

Mitigating buyer risk starts by establishing whether or not the importer is willing and able to pay. Business associates and other suppliers are often good sources of information in this regard (ITRISA 2012). Formal credit checks can reveal if the importer has a clear or blemished payment record (see <http://www.exporthelp.co.za/index.html>). However, to tackle buyer risk head on, it is advisable for the exporter to take out export credit insurance or negotiate a payment method (such as a confirmed L/C) that guarantees payment. As certain events or risks are excluded from cover under an export credit insurance policy, an SME should have back-up strategies in place, e. g. refrain from doing business with companies that have recently been established and lack trade references, are operating at a loss, have radically downsized their business operation, or have been liquidated in the past (Grath 2008).

Settlement risk can be addressed by negotiating a tenor (credit period) that is suited to the product in question. For example, agricultural products, such as grains and oil seed, typically call for 360 day facilities, whereas vegetable oil lends itself to 60 day facilities (Matthee and Fin-aughtly 2010).

Drawing up and sticking to a maintenance schedule for all plant machinery and equipment will go a long way towards reducing production risk, as evidenced in technical breakdowns and a loss in productivity. Quality lapses can be curtailed if SMEs have their goods or commodities inspected by an independent and reputable quality assessor (see <http://www.exporthelp.co.za/index.html>).

Finally, SMEs need to ensure that their management team and key personnel have sufficient industry-related experience, and are au fait with the many dimensions of international trade and, importantly, export finance.

#### MITIGATING SME-SPECIFIC RISKS

Several of the risks that are a particular burden for SMEs cannot easily be side-stepped, e. g. competitive threats and fluctuating demand – both of which interfere with a firm's earning potential. These risks are best tackled by engaging in regular business planning sessions to show lenders that the risks are being taken seriously, and that the SME's management

team is prepared to take corrective action if their business is under threat.

The risks associated with heavy market concentration can be reduced if an SME diversifies its product base or at least introduces some differentiating features into its product range. Inventory risk, in turn, can be addressed by taking out insurance against the possibility of cargo-related loss or damage, and stock loss.

Transit risk can be controlled to some extent – even if an SME has a modest business operation. Practical steps that a firm could take are: choosing the mode(s) of transport very carefully; forging strong relationships with actual carriers and contractual carriers (i. e. forwarding agents); and ensuring that each transaction is covered by cargo insurance.

This section set out to highlight the risks that financial institutions assess when they receive application(s) for export finance, with SMEs being the subject of particularly diligent scrutiny. Yet the process of risk assessment remains subjective, with each case being judged on its particular merits. It can happen that all the boxes are ticked but an application is still rejected. This illustrates that risk assessors are, after all, human. And herein lies an opportunity – for SMEs to appeal to financial institutions' highly discretionary nature with a winning business plan, a clear grasp of the ups and downs of being an international player, and an expressed commitment to keep a rigorous risk mitigation strategy in place in order to safeguard the lender's investment (International Trade Centre 2009; Matthee and Finaughty 2010).

### **Concluding Remarks**

The international trading arena provides innumerable opportunities to SMEs to grow their businesses and deliver value to shareholders and customers. But the road to international success inevitably consumes large chunks of cash and time, and requires a steely resolve to negotiate the many twists, turns and blind alleys along the way. As the subject of export financing for SMEs and what motivates or constrains financial institutions in their decision-making, is relatively uncharted territory in South Africa, it holds rich potential for more in-depth research.

This exploratory paper examined export finance as an important link in the market development chain as well as the difficulties that South African SMEs, in particular, face in securing such finance from banks and other financial institutions. In a departure from the norm, the authors elicited the views of selected financial institutions on export financing for SMEs, and identified the key risks that are typically assessed – from the

lender's perspective. The result is a valuable set of guidelines, arranged into different categories, that SMEs can follow when preparing their case for financial assistance. This largely boils down to mitigating the risks that would otherwise disqualify an applicant from funding – from taking out forward cover as a shield against unwelcome exchange rate movements, to running a tight ship and presenting pleasing trading results, while being ever alert to changes in market sentiment that might call for a fresh take on production and sales strategies. Herein may be policy recommendations for export promotion agencies to help SMEs overcome the limitations on their know-how of these processes.

SMEs will always be viewed with more circumspection by financial institutions than larger entities – it goes with the territory. But engaging in solid risk mitigation strategies and opting for the structured trade and commodity finance approach can go a long way towards giving SMEs a leg up in their quest to become serious international players.

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# *Usage of Business Simulation Games in Croatia: Perceived Obstacles*

Jovana Zoroja

Business simulation games (BSGs) enhance learning, since they actively involve students in the educational process through game playing. They began to play important role in business education in many universities in Croatia. However, quantitative information on their usage in higher educational institutions (HEIs) in Croatia is still scarce. Goals of the paper are to explore: (1) differences among BSGs users and non-users according to demographic characteristics, (2) differences among BSGs users and non-users according to perceived obstacles of BSGs usage, and (3) impact of both demographic characteristics and perceived obstacles on the decision on usage or not-usage of BSGs. A survey was taken in business and economics departments of HEIs in Croatia. A regression model has been used to test the impact of demographic characteristics of educators and the perceived obstacles to the usage of BSGs in educational practice. Results indicate that BSGs usage is currently at a low level, mainly due to the lack of funds and management support. Academic rank, gender, and attitude toward new technologies also impact BSGs usage.

*Key Words:* business economics education; business simulation games; perceived obstacles

*JEL Classification:* O32, O33, P46

## **Introduction**

The information and technology era makes technology an inevitable factor, both in the private and professional life (Zoroja 2011). New generations of students grew up with computer games and are much more interested in dynamic and active way of learning than in traditional teaching style (Prensky 2008). Students prefer active, visual and interactive learning, especially focused on problem solving and on real business situations (Whiteley and Faria 1989). However, it is important to highlight that traditional teaching methods should not be replaced with innovative methods of learning, but it is important to combine them with BSGs, simulations, multimedia instruction and interactive activities in order to make

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studying easier, interesting, and more effective (Tan 2007; Tal 2010; Lin and Tu 2012). Ex-cathedra lectures should be combined with BSGs in order to motivate students and to enable them to learn by virtual, direct and concrete experience (Proctor and Marks 2013).

BSGs are widely used in developed countries, like United States, where Faria and Wellington (2004) found out that 30.6% of the professors surveyed used BSGs in their teaching. On the other side, surveys done in other countries are scarce, and indicate much lower levels of usage. Chang (2003) found that only 7.4% professors are using BSGs in their teaching at the time of the survey, while number of professors tried to use them and later quit on their usage. In order to fulfill the gap in knowledge on the usage of BSGs in transition countries, the survey on the usage of BSGs in business and economics departments of HEIs in Croatia was conducted, with the following goals: (1) differences among BSGs users and non-users according to demographic characteristics, (2) differences among BSGs users and non-users according to perceived obstacles of BSGs usage, and (3) impact of both demographic characteristics and perceived obstacles on the decision on usage or not-usage of BSGs.

This paper consists of five sections. After the introduction there is a literature review of BSGs, their history and usage. Research methodology is explained in the next section, including a sample description and the research method. Results are presented in the fourth section. The last section, Conclusion and Discussion, outlines educational implications of BSGs, research limitations of this paper and comparison with other research.

### **Literature Review**

BSGs can be defined as a representation of the reality through simplified simulation model which imitate some business situation or process (Pasin and Giroux 2011; Blazic et al. 2012). They request active business decision making, or rather they request reaching the best results in given conditions and circumstances (Zapalska and Brozik 2008; Zantow, Knowlton, and Sharp 2005). Simulation games were first used in the United States army in the 50' (e. g. war strategies, operational researches and information technology). After their positive effects in the army, they were used by multinational companies in educating their own employees and employing new working force (Cook and Swift 2003). Also, at that time several BSGs were developed for the consulting firm of McKinsey & Company (Gonen, Brill, and Frank 2009). Having proved themselves valuable

tool of integration of theoretical knowledge and management practice their usage in the education started to increase significantly in the 70' and 80' of the last century (Neville and Adam 2003).

Today, many corporations, managers, professors, consulting firms and business programs use BSGs in the educational process (Gonen, Brill, and Frank, 2009). Simulation games are also useful for the employees in knowledge based industries (Roblek et al. 2013). Faria and Wellington (2004) found out that 30.6% of the HEIs' professors used BSGs in their classes. Even larger level of usage has been found in Primary and Secondary education level in United States. Proctor and Marks (2013) found out that 40.5% of the professors in Primary and Secondary educational level are using BSGs. However, research on the usage of BSGs in other countries indicate that the usage of BSGs is much lower, with 7.4% professors using BSGs in their teaching in Hong Kong (Chang 2003).

The main advantage of BSGs is that they allow students to be an active participant in the educational process, in which students are learning-by-doing (Aldrich 2005). Participants make the decisions without serious consequences or assumptions of personal risk, because BSGs represent reality through simplified simulation model (Summers 2007; Pejic Bach and Ceric 2007; Pasin and Giroux 2011). Therefore, they allow managers to improve their decision-making skills by formulating and confirming a detailed analysis of their decision, which have positive effects on their future business work and decisions (Gonen, Brill, and Frank 2009). In addition, during the BSGs, students learn how to work in a team with different types of people and how to solve the conflict situation (Kim, Park, and Baek 2009). Also, business simulation games (BSGs) have positive influence on motivation and learning performances (Tao, Cheng, and Sun 2009; Yasarcan 2010).

There are also shortcomings of using BSGs in class. Professors or educators need more time to prepare for the usage of BSGs in the class compared to the ex-cathedra teaching (Lunce 2006). Lack of adequate BSGs which deal with theory of the course and simplification of reality are also important obstacles in usage of BSGs (Blazic et al. 2012). Most simulations (from the US or the UK) do not replicate the conditions found in other cultures/economies. Simplified BSGs may give wrong ideas of real problems that happen in the business world and which managers have to deal with. That is why a development of a qualitative simulation game demands significant planning and investment in terms of time, experts and financial resources.

Besides the large number of advantages, major obstacles are also present to the usage of BSGs in educational process: financial investment, time and organizational constraints and lack of management support (Lunce 2006). Lack of funds and management support is also stated by Gilgeous and D'Cruz (1996). Lean et al. (2006) state that some professors consider BSGs as necessary and some even never heard of NSGs. Faria and Wellington (2004) stress the role of tradition and technology, as difficulty in changing classical teaching methods, and difficulty in adopting to new technologies. Surveys on the obstacles to the BSGs' usage in business and economics HEIs in transition countries are scarce, and with this paper we shall try to fill in the gap in this area.

## Methodology

### SAMPLE DESCRIPTION

Professors, assistant professors and assistants that teach at the business and economics departments of Croatian HEIs are defined as the target population. According to the information provided by the Croatian Agency for Science and Higher Education (ASHE), business and economics departments of Croatian HEIs employed 1349 professors, assistant professors and assistants in academic year 2011/2012, when the survey research was conducted. List of potential participants was developed based on the web-sites of the business and economics departments of Croatian HEIs, where also their e-mail addresses were gathered. The e-mail, sent to the professors, assistant professors and assistants enterprises, was an invitation to take part in the survey. In the invitation mail, hyperlink to the web survey (Google Site tool) was provided. The survey was conducted in the period March–May, 2012, during which potential participants were contacted three times. That approach revealed a response of 152 participants in the research, with the response rate of 11.27%. Such response rate is comparable with the one of Faria and Wellington (2004), who reported 8.39% response rate in their survey.

Sample data on professors, assistant professors and assistants examined (see table 1) indicate the predominance of male participants (57.89%). Besides, assistants prevail in the sample (56.58%), while there is much smaller number of assistant professors (20.39%) and professors (23.03%). In comparison with the characteristics of population, our sample is to some extent biased towards male respondents and assistants. However, chi-square test revealed that these differences are not statistically significant.

TABLE 1 Comparative profile of responding professors and population characteristics

Respondents' characteristics	(1)	(2)	(3)	$\chi^2$	<i>p</i>
<i>Gender</i>					
Male	95	62.50%	57.89%	0.445	0.504
Female	57	37.50%	42.11%		
<i>Academic rank</i>					
Assistants	86	56.58%	44.74%	3.523	0.171
Assistant professors	31	20.39%	30.26%		
Professors	35	23.03%	25.00%		

NOTES Column headings are as follows: (1) number of respondents, (2) percentage of firms, (3) percentage of population.

Professors, assistant professors and assistants participating in the survey are employed on three departments: Computer Science Department (23.68%), Marketing Department (30.26%), Management Department (15.13%), and Trading Department (30.92%). Data on the distribution of the total sample according to the departments is not available to the public.

#### RESEARCH INSTRUMENT

This research tries to investigate: (1) actual use of BSGs in business and economics departments of HEIs in Croatia, (2) demographic characteristics of BSG users and non-users, and (3) perceived obstacles to BSGs usage. Research was conducted with the usage of the research instrument developed based on the research of Gilgeous and D'Cruz (1996), Lean et al. (2006), and Faria and Wellington (2004). Table 1 presents items used for measuring what obstacles professors perceive regarding BSGs.

#### STATISTICAL METHODS

Several statistical methods were used in order to attain the goals of the survey. First, chi-square test was deployed in order to test the difference among BSGs users and non-users according to demographic characteristics. Second, chi-square test was deployed in order to test the differences among BSGs users and non-users according to perceived obstacles of BSGs usage. Finally, logistic regression was used in order to examine to what extent both demographic characteristics and perceived obstacles influence the decision on usage or not-usage of BSGs. Logistic regression was used for this purpose due to the reason that dependent variable was

TABLE 2 Research instrument description

Construct	Code	Item
Obstacles to BSGs usage	BSG_OBST1	Lack of funds
	BSG_OBST2	Lack of understanding from the administration
	BSG_OBST3	Considered as not necessary in education
	BSG_OBST4	Insufficient knowledge on the BSGs' usage
	BSG_OBST5	Difficulty in adaption of new technologies
	BSG_OBST6	Difficulty in changing teaching methods

NOTES Adapted from Gilgeous and D'Cruz (1996), Lean et al. (2006), and Faria and Wellington (2004).

defined as categorical binary variable with two outcomes (1-participant in the survey used and/or is using BSGs in their classes; 0-participant in the survey did not use BSGs in their classes).

## Results

Aim of the paper was to examine: (1) differences among BSGs users and non-users according to demographic characteristics, (2) differences among BSGs users and non-users according to perceived obstacles of BSGs usage, and (3) impact of both demographic characteristics and perceived obstacles on the decision on usage or not-usage of BSGs.

### DIFFERENCES AMONG BSGS USERS AND NON-USERS ACCORDING TO DEMOGRAPHIC CHARACTERISTICS

From the overall number of respondents, 40 respondents (26.32%) have used or are still using BSGs in their classes.

The analysis of the respondents that use the BSGs further indicates that statistically significant difference is present only according to the department, at 1% ( $\chi^2 = 78.589$ ;  $p = 0.000$ ). Computer Science Department have the highest ratio of participants that are using BSGs (75%), and Management Department is close with the 64% of participants that are using BSGs. The analysis of the respondents that use the BSGs further indicates that statistically significant difference is not present according to gender ( $\chi^2 = 0.439$ ;  $p = 0.507$ ) and academic rank ( $\chi^2 = 3.792$ ;  $p = 0.155$ ).

### DIFFERENCES AMONG BSGS USERS AND NON-USERS ACCORDING TO PERCEIVED OBSTACLES OF BSGS USAGE

Table 4 shows perceived obstacles to using BSGs as perceived by the respondents according to the usage of BSGs in class. According to usage

TABLE 3 Characteristics of respondents according to usage of BSGs

(1)	(2)	(3)	(4)
<i>Gender</i>			
Male	27 (28%)	68 (72%)	$\chi^2 = 0.439; p = 0.507$
Female	13 (23%)	44 (77%)	Yates' $\chi^2 = 0.247; p = 0.619$
<i>Academic rank</i>			
Assistants	17 (20%)	69 (80%)	$\chi^2 = 3.792; p = 0.155$
Assistant Professors	7 (22%)	24 (78%)	Yates' $\chi^2 = 3.046; p = 0.218$
Professors	11 (31%)	24 (69%)	
<i>Department</i>			
Computer Science	27 (75%)	9 (25%)	$\chi^2 = 78.589; p = 0.000^{***}$
Marketing	13 (28%)	33 (72%)	Yates' $\chi^2 = 75.142; p = 0.000^{***}$
Management	15 (64%)	8 (36%)	
Trade	11 (24%)	36 (76%)	

NOTES Column headings are as follows: (1) characteristics of respondents, (2) using BSGs, (3) not using BSGs, (4) chi-square statistics. \*\*\* Statistically significant at 1% level.

TABLE 4 Perceived obstacles to using BSGs as perceived by the respondents according to the usage of BSGs

(1)	(2)	(3)	(4)	(5)
<i>Lack of funds</i>				
(a)	116 (76.32%)	30 (25.86%)	86 (74.14%)	$\chi^2 = 0.094; p = 0.759$
(b)	36 (23.68%)	10 (27.78%)	26 (72.22%)	Yates' $\chi^2 = 0.022; p = 0.882$
<i>Lack of understanding from the administration</i>				
(a)	111 (73.03%)	25 (22.52%)	86 (77.48%)	$\chi^2 = 4.754; p = 0.029^{**}$
(b)	41 (26.97%)	15 (36.59%)	26 (63.41%)	Yates' $\chi^2 = 4.102; p = 0.043^{**}$

*Continued on the next page*

of BSGs, the respondents were supposed to state if they perceive possible obstacle to using BSGs as important.

Obstacles that most respondents perceive as important are: lack of funds (76.32% perceive as important) and lack of understanding from the administration (73.03% perceive as important). On the other side, obstacles that most respondents do not perceive as important are: considered as (not) necessary in education (68.42%), insufficient knowledge on the BSGs' usage (78.95%), difficulty in adaption of new technologies (81.58%), and difficulty in changing teaching methods (89.47%).

TABLE 4 *Continued from the previous page*

	(1)	(2)	(3)	(4)	(5)
<i>Considered as not necessary in education</i>					
(a)	48 (31.58%)	8 (16.67%)	40 (83.33%)		$\chi^2 = 5.494; p = 0.019^{**}$
(b)	104 (68.42%)	32 (30.77%)	72 (69.23%)		Yates' $\chi^2 = 4.742; p = 0.024^{**}$
<i>Insufficient knowledge on the BSGs' usage</i>					
(a)	32 (21.05%)	0 (0%)	32 (100%)		$\chi^2 = 39.995; p = 0.000^{***}$
(b)	120 (78.95%)	40 (33.33%)	80 (66.67%)		Yates' $\chi^2 = 37.631; p = 0.000^{***}$
<i>Difficulty in adaption of new technologies</i>					
(a)	28 (18.42%)	10 (35.71%)	18 (64.29%)		$\chi^2 = 3.163; p = 0.075^*$
(b)	124 (81.58%)	30 (24.19%)	94 (75.81%)		Yates' $\chi^2 = 2.638; p = 0.104$
<i>Difficulty in changing teaching methods</i>					
(a)	16 (10.53%)	4 (25%)	12 (75%)		$\chi^2 = 0.057; p = 0.811$
(b)	136 (89.47%)	36 (26.47%)	100 (73.53%)		Yates' $\chi^2 = 0.006; p = 0.938$

NOTES Column headings are as follows: (1) Perceived obstacles to using BSGs, (2) *n* (%), (3) using BSGs, (4) not using BSGs, (5) chi-square statistics. \*\*\* Statistically significant at 1% level. \*\* Statistically significant at 5% level. \* Statistically significant at 10% level.

Differences among BSGs users and non-users are also presented in table 4. Chi-square indicated that following differences are statistically significant. Non-users of the BSGs perceive following obstacles as more important to the smaller extent compared to users: lack of understanding from the administration at 5% ( $\chi^2 = 4.754; p = 0.029$ ), considered as not necessary in education at 5% ( $\chi^2 = 5.494; p = 0.019$ ), insufficient knowledge on the BSGs' usage at 1% ( $\chi^2 = 39.995; p = 0.000$ ), and difficulty in adaption of new technologies at 10% ( $\chi^2 = 3.163; p = 0.075$ ).

#### IMPACT OF BOTH DEMOGRAPHIC CHARACTERISTICS AND PERCEIVED OBSTACLES ON THE DECISION ON USAGE OR NOT-USAGE OF BSGS

In order to further clarify the listed perceived obstacles in using BSGs, the logistic regression model was designed with the usage of BSGs as a dependent variable. Results are presented in the table 5, where estimated values for logistic regression parameters are presented.

The data fit the model rather well with  $R^2$  explaining 46% of the variations in usage of BSGs with demographic characteristics and perceptions of perceived obstacles for their usage. Model revealed that gender (male)

TABLE 5 Results of logistic regression model (usage of BSGs – binomial dependent variable)

Model	(1)	(2)	(3)
Academic rank (assistants)	2.146	1.295	0.098*
Academic rank (assistant professors)	2.348	1.116	0.035**
Academic rank (professors)	2.247	1.389	0.086*
Gender (male)	-1.783	1.013	0.078*
Lack of funds	0.921	1.235	0.456
Lack of understanding from the administration	2.156	1.114	0.038**
Considered necessary in education	24.609	24607.120	0.999
Instructions on ways of usage	23.736	14253.950	0.997
Difficulty in adapting to new technologies	2.600	1.261	0.039**
Difficulty in changing classical teaching methods	-0.097	0.993	0.922
Constant	-2.587	1.643	0.115

NOTES Column headings are as follows: (1) regression coefficients, (2) standard errors, (3) significance. \*\* Statistically significant at 5% level. \* Statistically significant at 10% level.

and academic rank (assistants and assistant professors) are significant at 5% and 10% respectively. Perceived obstacles that significantly influence the usage of BSGs are: lack of understanding from the administration at 10% and difficulty in adoption of new technologies at 5%.

## Discussions and Conclusions

### SUMMARY AND COMPARISON WITH SIMILAR RESEARCH

BSGs improve learning while users are actively involved in educational process using the learning-by-example strategy (Faria 2001). After the BSGs participants analyse all steps and decisions made during the game, they gain increased understanding and additional experience, which is a great help for them in the real business world. Research conducted on the usage of BSGs were primarily oriented towards developed countries (e. g. Faria and Wellington 2004), and this research stems to shed some light on BSGs' usage in developing countries, using Croatia as the example. The results from the survey indicate that BSGs are used 26.32% of interviewed professors from economics and business departments at HEIs in Croatia. This result is comparable with the results with Faria and Wellington (2004) who found out that 30.6% of the USA professors surveyed used BSGs in their teaching. However, one should take into account that our

research was conducted in 2012, while research in USA was conducted in 2003.

Paper attained following goals. First, results revealed that among BSGs' users and non-users there are no statistical differences according to the department. These results confirm other authors' results that also did not found any differences according to gender (Chang 2003). Second, results revealed that BSGs' non-users perceive following obstacles as more important: lack of understanding from the administration, necessity of BSGs in education, insufficient knowledge on the BSGs' usage, and difficulty in adaption of new technologies.

Similar results were obtained by Lean et al. (2006) and Chang (2003), who found out following perceived obstacles as the most important: (i) the time necessary for professors or educators to prepare for a simulation game, (ii) a wrong choice of a simulation game which is not connected with the issue of the course, (iii) lack of knowledge about possibilities to use BSGs, (iv) financial and technical problems. Third, results of the paper revealed that decision on use or not to use BSGs is highly influenced by the gender, academic rank and following perceived obstacles: lack of understanding from the administration and difficulty in adoption of new technologies.

#### RESEARCH LIMITATIONS AND FURTHER RESEARCH

Since the innovation has become an imperative in achieving competitiveness at all levels it is important to involve BSGs in educational process in business and education in HEIs in Croatia. Therefore, BSGs could improve and modernize teaching methods, which could have a significant impact on improving and enhancing educational system, which would result with satisfied and well educated students.

Results of this research should be evaluated while taking into account relatively small sample of respondents. Therefore, some future work should include other business and economics institutions (e. g. business and economics departments of HEIs in Slovenia, Serbia, Montenegro, Austria, Italy, Czech Republic, and Slovakia). Such research should include in-depth interviews to find out more detailed information from professors who are using or have been using BSGs with their students. Future work should include research with students to understand what they think about BSGs and their usage in learning. Hence, it would be interesting to present selected BSGs in more lectures groups in order to compare and analyse learning results of each group of students.

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### Scenariji za območje evra in njihove ekonomske posledice za Slovenijo in Hrvaško

*Klaus Weyerstrass in Daniela Grozea-Helmenstein*

Razlike v mednarodni konkurenčnosti posameznih držav, ki so nastajale od leta 1999, so pripeljale do kopičenja proračunskih primanjkljajev na jugu in presežkov na severu območja evra. V pričujočem članku skušamo s pomočjo makroekonometričnih modelov oceniti posledice izstopa Grčije oziroma vseh držav skupine G11PS (Grčija, Italija, Irska, Portugalska in Španija) na slovensko in srbsko gospodarstvo. Izstop ene ali več držav bi namreč vplival na ostala gospodarstva prek trgovinskih kanalov in kreditnih omejitev. V državah z evrom bi se zaradi zapadlih posojil iz evropskega mehanizma stabilnosti in rezvrednotenja državnih obveznic, ki jih kupuje Evropska centralna banka, povečal tudi javni dolg. Samo izstop Grčije bi le malo vplival na slovensko in srbsko gospodarstvo; izstop vseh držav skupine G11PS ali celo razpad območja evra pa bi imel hude negativne posledice za družbeni proizvod, nezaposlenost in javne finance.

*Ključne besede:* plačilna nesposobnost; razpad območja evra

*Klasifikacija JEL:* C54; F41

*Managing Global Transitions* 11 (4): 323–351

### Preizkušanje odvisnosti med donosnostjo delnic in obsegom trgovanja z uporabo hitrih podatkov

*Piotr Gurgul in Robert Syrek*

Članek obravnava analizo odvisnosti med donosnostjo, nihajnostjo in obsegom trgovanja z delnicami petih podjetij, ki kotirajo na dunajski borzi, in petih podjetij, ki kotirajo na varšavski borzi. Na podlagi hitrih podatkov za ta podjetja so bili narejeni preizkusi, ki temeljijo na primerjavi Bernsteinovih kopul gostot z uporabo Hellingerjeve distance. Članek predstavlja nekaj vzorcev vzročnih in ostalih povezav med donosnostjo delnic, realizirano nihajnostjo ter pričakovanim in nepričakovanim obsegom trgovanja. Obstaja linearna povezava med realizirano nihajnostjo in pričakovanim obsegom trgovanja, ni pa nelinearne povezave v nasprotni smeri. Avtorja sta ugotovila močno linearno in nelinearno povezavo med donosnostjo obveznic in pričakovanim obsegom trgovanja. Nista pa opazila povezave v nasprotni smeri. Preverila

sta tudi, ali obstaja frakcijska kointegracija. Kljub enakovrednosti parametrov realizirane nihajnosti in obsega trgovanja v daljšem obdobju se ti parametri v daljših časovnih obdobjih ne gibljejo enako.

*Ključne besede:* realizirana nihajnost; obseg trgovanja; dinamične medsebojne povezave; kopule; frakcijska kointegracija

*Klasifikacija JEL:* G15; C32

*Managing Global Transitions* 11 (4): 353–373

### **Monetarna integracija novih držav članic pred krizo v območju z evrom**

*Ivan Todorov*

Članek preučuje proces monetarne integracije novih držav članic Evropske unije pred začetkom dolžniške krize v območju z evrom. Raziskava se osredotoča na nominalna konvergenčna merila (izpolnjevanje maastrichtskih meril) in izpolnjevanje meril optimalnega valutnega območja. Še posebej so obravnavani trgovinska in finančna integracija, struktura izvoza ter trg delovne sile v novih državah članicah, in sicer z vidika teorije optimalnega valutnega območja in v kontekstu povečevanja števila članic območja z evrom. Obravnavane so tudi izkušnje novih držav članic, ki so že vpeljale evro.

*Ključne besede:* nove države članice; monetarna integracija; nominalna konvergenčna merila; teorija optimalnega valutnega območja; makroekonomska politika

*Klasifikacija JEL:* F15; F41

*Managing Global Transitions* 11 (4): 375–390

### **Kako lahko južnoafriška mala in srednja podjetja postanejo boljši kandidati za financiranje izvoza**

*Marianne Matthee in André Heymans*

Mala in srednja podjetja povsod po svetu za veljajo pomembne gonilnike gospodarske rasti in razvoja, vendar pa se morajo, da bi lahko prinesla prave gospodarske koristi, najprej razviti v trajnostna, donosna podjetja. Širitev na tuja tržišča je odličen način rasti, vendar je na poti, ki jo morajo mala in srednja podjetja prehoditi v razvoju od lokalnih do mednarodnih, mnogo ovir. Največkrat jim spodleti pri zagotavljanju financiranja širitve na tuje trge. Finančne inštitucije imajo mala in srednja podjetja za zelo tvegana, saj imajo omejene vire in zmožnosti, verjetnost stečaja pa je večja kot pri večjih podjetjih. Članek obravnava različna tveganja, ki jih južnoafriške finančne inštitucije ocenjujejo, ko

jih mala in srednja podjetja prosijo za financiranje izvoza. Pričujoča študija se od ostalih razlikuje po tem, da ponuja pogled na izvozna tveganja z zornega kota posojilodajalca – to področje raziskovanja je bilo doslej zapostavljeno. Izsledki so predstavljeni kot zbirka napotkov, kako naj mala in srednja podjetja ublažijo ta tveganja in izboljšajo svoje možnosti pri zagotavljanju finančne pomoči, ki se jim je v preteklosti pogosto izmikala.

*Ključne besede:* mala in srednja podjetja; internacionalizacija; financiranje izvoza; blažitev tveganj

*Klasifikacija JEL:* F10; F30

*Managing Global Transitions* 11 (4): 391–407

### **Uporaba poslovnih simulacijskih iger na Hrvaškem: zaznane ovire**

*Jovana Zoroja*

Poslovne simulacijske igre izboljšujejo učenje, saj študente aktivno vključujejo v izobraževalni proces. V poslovnem izobraževanju na hrvaških univerzah začenjajo igrati pomembno vlogo, vendar pa je še vedno le malo kvantitativnih podatkov o njihovi uporabi. Cilji članka so raziskati: (1) razlike med uporabniki in neuporabniki poslovnih simulacijskih iger glede na njihove demografske značilnosti, (2) razlike med njimi glede na zaznane ovire pri uporabi poslovnih simulacijskih iger ter (3) vpliv demografskih značilnosti in zaznanih ovir na odločitve za uporabo poslovnih simulacijskih iger. Raziskava je bila narejena na oddelkih za poslovne vede in ekonomijo na hrvaških visokošolskih zavodih. Vpliv demografskih značilnosti učiteljev in zaznanih ovir na uporabo poslovnih simulacijskih iger v izobraževanju je bil raziskan s pomočjo regresijskega modela. Izsledki kažejo, da je uporaba poslovnih simulacijskih iger trenutno na nizki ravni, predvsem zaradi pomanjkanja sredstev in podpore vodstev inštitucij. Na uporabo poslovnih simulacijskih iger vplivajo tudi znanstveni naziv, spol in odnos do uporabe novih tehnologij.

*Ključne besede:* poslovno izobraževanje; poslovne simulacijske igre; zaznane ovire

*Klasifikacija JEL:* O31; O33; P46

*Managing Global Transitions* 11 (4): 409–420



# Managing Global Transitions

## International Research Journal

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