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Regional economic growth in the European Union: Appying the QML estimator
Florin Teodor Boldeanu, Lenuta Boldeanu

Firm-specific determinants of capital structure - case of firms in Bosnia and Herzegovina
Azra Bajramović

Method VaR in the case of real estates
Ajda Fošner, Darja Kobe Govekar

From scattered to coherent – strategizing processes of a multinational corporation
Elisa Kallio, Peter Zettinig

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REGIONAL ECONOMIC GROWTH IN THE EUROPEAN UNION: APPLYING THE QML ESTIMATOR

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Abstract

Regions have different characteristics and level of development starting from infrastructure, industry, tourism, services or taxations. This is why this investigation aims to find the most important determinants of regional economic growth in the European Union. The sample date was collected for 98 NUTS 1 and 271 NUTS 2 regions with a time frame of 14 years (2000-2013). To obtain the results for the two models used, the paper utilized the QML estimation. The results showed that labour productivity, employment, energy consumption, life expectancy are positively influencing growth, and that government debt and early leavers from education hinder growth.

Key Words

Regional economic growth; QML estimator; NUTS 1; NUTS 2.

INTRODUCTION

The empirical research in the field of regional economic growth has tried to determine what variables have an influence on growth and to come to a consensus on the relevant sign of the variation. There are a number of articles that determined a significant link between innovation (R&D expenditures, patent application, population employed in research), transportation (airport infrastructure, roads, highways), population growth, capital formation, energy consumption, public investments and economic growth at EU regional level (Parent & LeSage, 2012; Rodriguez-Pose et al., 2012, 2015).

Like in the case of economic growth at country level, there is still not a consensus on the effects of some variable. Contradictions in results may appear from studies made for different regions like South America, China, Indonesia, North America or Russia (Golubchikov, 2007; Spiezia & Weiler, 2007; Hartono et al., 2007).

The aim of this study is to contribute to the regional growth literature by testing and measuring the importance of several determinants (variables). The growth analysis will be employed for two different territorial levels in the EU 28. Firstly, the investigation will test an econometric model for the 98 NUTS 1 regions between 2000 and 2013. According to the Nomenclature of Territorial Units for Statistic (NUTS), a geocode standard made by Eurostat for reference the subdivisions of a country for statistical purposes, NUTS 1 areas represent the major socioeconomic regions in the European Union with administrative functions. After that, the study will go in depth and analyse a growth model for 273 NUTS 2 regions in the EU also between 2000 and 2013. NUTS 2 regions represent medium-sized regions for the application of regional policies, with a population that varies from 100 000 to 10 million inhabitants.

In order to achieve the results of the empirical investigation the rest of this paper is structured around six chapters. First, this short introduction is followed by the literature review on regional economic growth. Section 3 highlights the methodology used and the data sources. Section 4 presents the findings of the empirical methods applied in this case study. The study ends with the conclusion and references.

LITERATURE OVERVIEW

Economic growth analysis at territorial/regional level is starting to be more and more important for many researchers. This type of study can shed new light on what kind of influences can facilitate economic development at regional level. Different territories have certain characteristics and levels of development starting from infrastructure, industry, the spread of services, tourist facilities or regional taxes. Better understanding how certain regions are influenced by social, cultural and economic determinants will facilitate us in creating specific policies for fostering regional economic growth.

There are contradicting views regarding the impact of public investment at regional level. Some view public investment (especially infrastructure investment) as an important factor for growth and productivity (Aschauer, 1990; Munnell, 1992) and others are sceptic on the exact returns and the implications of public investment on economic growth (Crescenzi & Rodríguez-Pose, 2012; Rodriguez-Pose & Tselios, 2012).

Rodriguez-Pose, Psycharis and Tselios (2012) showed that public investment has a significant impact on the economy. This link is stronger in the long-run than in the short-run. Their results also indicate that growth is affected differently by different types of per capita public investment expenditure and that the spillovers of some types of public investment (especially investments in transport infrastructure) are essential for Greek regional economic growth.

Many authors demonstrated the importance of public investment spillovers in the diffusion of externalities across regions (Ottaviano, 2008). Their analysis of 51 regions (NUTS 3 level) in Greece also showed that both in the short-run and in the long-run, research and education, infrastructure investment and housing are the most important public investments that the Greek state has made.

There are many views in the literature that consider political factors to be very important in allocating public investment at regional level. Usually politicians can be biased and allocate resources to already developed regions, because they want to please their voters. Building roads, ports or bridges is also a very public and visible statement for politicians in showing that they are implicated in regional development.

Infrastructure investment can bring significant external benefits. It can generate an investment multiplier effect (job creation, increase in productivity) creating an increase in personal wealth and shaping the environment (Kessides, 1993). Investment in infrastructure can decrease transportation costs and lower the waiting time in production. These effects have a beneficiary outcome on trade and lower the prices of goods (Pol, 2003).

Crescenzi and Rodríguez-Pose (2012) also analysed the importance of public investment, particularly transport infrastructure (kilometres of motorways) in determining economic growth at European territorial level (NUTS regions) between 1990 and 2004. The correlation between infrastructure and economic growth was put in relation also with innovation, a social filter and migration. Contrary to the established thought that infrastructure is positively related to growth, their results showed that infrastructure endowment is poorly linked with economic growth. Also the regions that were surrounded by those with good infrastructure were not significantly influenced. Innovation and the social filter were more important for regional growth in the EU and also the regions that attracted migrants were influenced positively.

The positive link between innovation (investment in science and technology and R&D) and territorial growth has been demonstrated also by recent scientific works (Crescenzi et al., 2007; Usai, 2011; Rodríguez-Pose & Villarreal Peralta, 2015).

Population density can play an important role in regional economic development. High agglomeration in capital cities and large urban areas can have an influence on growth, increasing labour specialization and productivity (Puga, 2002). van Oort, de Geus and Dogaru (2015) showed that agglomeration plays an important role for 15 EU countries at regional level, specifically for 205 EU NUTS2 regions. Regional heterogeneity is influencing employment growth and that different levels of specialization are related to productivity growth.

At a country level, there are comprehensive and well established papers that investigated the role of tourism on economic growth, but not too many studies focused on analysing the regional component. Paci and Marrocu (2014) investigated the impact of tourism (domestic and international) on economic growth for 179 regions (Western European regions) between 1999 and 2009. Their results showed that regional economic growth is positively influenced by domestic and international growth and that domestic tourism plays a more important role than international tourism at regional level. The study will continue by presenting the methodology used and the data selected for this investigation.

METHODOLOGY

The primary objective of this study is to evaluate the most important determinants of regional economic growth for NUTS 1 and NUTS 2 regions in the European Union between 2000 and 2013. For each level of territorial division in the EU (NUTS 1 or NUTS 2) the investigation will employ a separate growth equation and it will use as dependent variable the regional real GDP per capita and regional real GDP in purchasing power standard per inhabitant.

The determinants that will be measured by the growth equations are population, fertility rate, population density (the agglomeration factor), life expectancy, employment, R&D expenditure, tertiary education, infrastructure, tourism, migration, employment rate among other. All the values are expressed at constant market prices and denominated in euros for the monetary variables. Nominal GDP is deflated using the Eurostat country deflator, with the base year being 2010. The models will be applied on dynamic panel data for a number of 98 NUTS 1 regions and 273 NUTS 2 regions..

All the variables that are used will be transformed using the neglog transformation. This is because there are also negative values for some variables. The neglog transformation behaves like $Ln(z)$, when z is positive and like $-Ln(z)$, when z is negative (Whittaker et al. 2005). Therefore the study will use a logarithm called $L = sign(z)ln(|z|)n(z) + 1|)$, where z is the value of the variable. Because the case study will want to investigate two different territorial levels, it will have to employ two separate growth equations.

The regional economic growth equation for the NUTS 1 level has the following formula:

$$LY_{it} = \beta_0 + \beta_1 Ly_{i,t-1} + \beta_2\, LPOP_{it} + \beta_3\, LFERT_{it} + \beta_4\, LLIFE_{it} + \beta_5\, LELET_{it} + \beta_6\, LTERT_{it} + \beta_7\, LWHOURm_{it} + \beta_8\, LWHOURf_{it} + \beta_9\, LEMPL_{it} + \beta_{10}\, LR\&Dexp_{it} + \beta_{11} LMOTORWAY_{it} + \beta_{12} LROADS_{it} + \beta_{13} LTOURISMint_{it} + \beta_{14} LTOURISMext_{it} + \beta_{15} LVEHICLES_{it} + \eta_i + \varepsilon_{it}.$$

The regional economic growth equation for the NUTS 2 level has the following formula:

$$LY_{it} = \beta_0 + \beta_1 Ly_{i,t-1} + \beta_2\, LPOP_{it} + \beta_3\, LFERT_{it} + \beta_4\, LLIFE_{it} + \beta_5\, LELET_{it} + \beta_6\, LTERT_{it} + \beta_7\, LWHOURm_{it} + \beta_8\, LWHOURf_{it} + \beta_9\, LEMPL_{it} + \beta_{10}\, LR\&Dexp_{it} + \beta_{11} LMOTORWAY_{it} + \beta_{12} LROADS_{it} + \beta_{13} LTOURISMint_{it} + \beta_{14} LTOURISMext_{it} + \beta_{15} LVEHICLES_{it} + \beta_{16} LDENSITY_{it} + \beta_{17} LMIGRATION_{it} + \eta_i + \varepsilon_{it},$$

where:
LY: the neglog of regional real GDP per capita (his variable will be expressed also as the regional real GDP in PPS standard per inhabitant to see it there are differences between the two indicators of growth);
Lyi,t-1: represents the neglog of one lag regional real GDP per capita or one lag regional real GDP in PPS standard per inhabitant;
LPOP: the neglog of regional population (inhabitants);
LFERT: the neglog of regional fertility rate (it is the average number of children that would be born to a woman over her lifetime);
LLIFE: the neglog of regional life expectancy measured in years (in the research literature, it is an important indicator and proxy for measuring the health of the inhabitants);
LELET: the neglog of early leavers from education and training. It is a proxy of the size of the group of individuals most at risk on the labour market;
LTERT: the neglog of regional persons with tertiary education (percentage of total, it is a measure for human capital and for skilled labour);
LWHOURf: the neglog of regional average number of usual weekly hours of work in main job for female;
LEMPL: the neglog of regional employment rate (this indicator will be also divided into male and female employment to investigate if there are differences between genders);
LR&Dexp: the neglog of regional total intramural research and expenditure for all sectors (% of GDP);
LMOTORWAY and LROADS: the neglog of regional motorway and roads (other roads besides highways) measured in kilometres;
LTOURISMint and LTOURISMext: the neglog of regional total nights spent by residents and non-residents in tourist accommodations (% of total);
LVEHICLES: the neglog of regional vehicles (except trailers and motorcycles). It is a proxy for stock of vehicles;
LDENSITY: the neglog of regional population density (persons per km2). It is a proxy for regional agglomeration;
LMIGRATION: the neglog of regional net migration (%);
η: the unobserved regional-specific effect;

ε: the disturbance term;
i: the individual regional dimension and t is the time period dimension.

The study will use the cross-section time-series dynamic panel data estimation by quasi-maximum likelihood, referred as the QML estimator, with a small time horizon and large number of cross-sectional units. The QML methodology has a higher efficiency compared with OLS or GLS estimator how yield biased results because of the possible correlation between the lagged dependent variable with the error term for short time samples. It has been developed by Kripfganz (2016). The ML (maximum likelihood) approach was pioneered by Bhargava and Sargan (1983), further developed by Hsiao, Pesaran and Tahmiscioglu (2002) and is suited also for panel data with missing values. Missingness can be solved by implementing a ML estimation or a multiple imputation technique.

RESULTS

Before implementing the QML estimation, the Hausman test has to be computed to see if fixed effects or random effects are needed. Almost all of the estimations will be with fixed effects and only one with random effects, namely that which has the Hausman probability higher that 5% (Prob>chi2 = 0.0124). A QML-RE estimation will be applied for the model with real GDP/capita with the employment rate split into male and female rates.

Table 1: Hausman test for the QML estimation

NUTS1		**NUTS 2**	
Real GDP/Capita	Real GDP in PPS/inhab	Real GDP/capita	Real GDP in PPS/inhab
Employment total (female+male)		Employment total (female+male)	
chi(15) = 48.87 Prob>chi2 = 0.00	chi(15) = 82.46 Prob>chi2 = 0.00	chi(17) = 37.13 Prob>chi2 = 0.0032	chi(17) = 78.40 Prob>chi2 = 0.00
Employment male and female		Employment male and female	
chi(16) = 55.55 Prob>chi2 = 0.00	chi(16) = 66.45 Prob>chi2 = 0.00	chi(18) = 34.04 Prob>chi2 = 0.0124	chi(18) = 54.59 Prob>chi2 = 0.00

Source: Own calculations.

To eliminate the most common sources of cross-sectional dependence, the panel estimation techniques will include time dummies. The Parm test was utilized to see if time fixed effects are needed and it confirmed the null hypothesis of the importance of time dummy inclusion. The next step is to compute the QML estimation for the NUTS 1 and NUTS 2, taking into consideration the results provided by the Hausman and Parm tests. Table 2 provides the results for the QML for the NUTS 1 regions. Column (1) and (2) is for the real GDP/capita estimations and columns (3) and (4) for the real GDP in PPS/inhabit.

Table 2: The results of the QML estimation for the NUTS 1 regions

	(1)	(2)	(3)	(4)
L.real GDP/capita	0.721***	0.710***		
	(10.64)	(10.85)		
L.real GDP PPS/inhab			0.830***	0.802***
			(17.74)	(21.25)
Population	0.00617	0.0163	-0.114	-0.107
	(0.03)	(0.08)	(-0.90)	(-0.98)
Fertility rates	0.232*	0.141	-0.0710	-0.0788
	(1.75)	(1.13)	(-0.88)	(-0.96)
Life expectancy	3.233**	3.258**	0.836**	0.743*
	(2.23)	(2.23)	(1.99)	(1.76)
Early leavers from edu.&tr.	-0.0726**	-0.0711**	-0.0489***	-0.0462***
	(-2.08)	(-2.13)	(-2.83)	(-2.80)
Persons with tertiary edu.	0.0721	0.0608	0.0471	0.0503
	(0.76)	(0.77)	(0.90)	(1.09)
Weekly hours of work-males	-1.500**	-1.511*	0.469	0.335
	(-1.96)	(-1.93)	(1.45)	(1.16)
Weekly hours of work-females	0.257	-0.0280	-0.174	-0.245
	(0.74)	(-0.07)	(-0.71)	(-0.97)
Employment rates - total	0.454***		0.220***	
	(4.85)		(3.23)	
Employment rates - male		0.552***		0.214***
		(4.80)		(3.48)
Employment rates - female		-0.0690		0.0122
		(-0.65)		(0.26)
R&D expenditure % GDP	-0.0290	-0.0393	-0.00555	-0.00217
	(-0.50)	(-0.62)	(-0.23)	(-0.09)
Motorways	0.00780	-0.0000137	-0.00570	-0.00443
	(1.15)	(-0.00)	(-0.96)	(-1.00)
Other roads	-0.0252**	-0.00385	-0.0154	-0.0223**
	(-2.47)	(-0.25)	(-1.45)	(-1.98)
Nights spent residents	0.0864	0.107	-0.00502	-0.0254
	(1.26)	(1.64)	(-0.19)	(-0.99)
Nights spent non-residents	0.0800*	0.122***	-0.0554**	-0.0596**
	(1.79)	(2.66)	(-2.11)	(-2.26)
Vehicles	0.0336	0.00547	0.0238	0.0187
	(0.42)	(0.06)	(0.60)	(0.51)
Constant	-9.816	-8.973	-2.115	-0.607
	(-1.47)	(-1.40)	(-0.62)	(-0.22)
Observations	424	424	424	424

Notes: *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include time dummies. *Source:* Own calculations.

The lagged dependent variable is positive, confirming the presence of regional divergence in the EU. Only in column (1) fertility rate has a weak statistically positive effect on regional growth. Life expectancy has an

important outcome on growth. This means that healthier citizens contribute to a prosperous society.

From the results it appears that early leavers from education and training have a negative impact on regional economic growth. Furthermore, average weekly hours worked by male are an important negative determinant of regional growth in the EU.

From Table 2, total employment rate and male employment rate contribute to regional economic growth. Female employment rate was not statistically significant. In regards to infrastructure development, the conclusion is that motorways measured by km do not have a statistical significance on economic growth. Other road development appears to have a small but statistically significant coefficient. The impact of other roads is negatively related to economic growth.

Regarding the variables for tourism, total nights spent by residents do not have a significant coefficient. Total nights spent by non-residents are positively correlated with regional economic growth in the real GDP/capita equation and are negative in the real GDP in PPS/inhab estimation.

Population, tertiary education, average weekly hours worked by female and the stock of vehicles were not statistically significant in determining regional economic growth in any of the QML estimations. The same can be said for research and development expenditure, even if the coefficients are negative in every column.

The following table provides the outcomes of the QML test for the NUTS 2 regions. Columns (1) and (2) present the results for the real GDP/capita estimations and columns (3) and (4) for the real GDP in PPS/inhab. Column (2) is a random effect estimation and the rest of the columns being fixed effect methods.

Table 3: The results of the QML estimation for the NUTS 2 regions

	(1)	(2)	(3)	(4)
L.real GDP/capita	0.660***	0.737***		
	(34.43)	(24.55)		
L. real GDP PPS/inhab			0.780***	0.784***
			(38.81)	(36.93)
Population	0.757**	-0.000280	0.647***	0.445**
	(1.99)	(-0.03)	(2.88)	(2.09)
Fertility rates	0.167**	-0.0644	-0.210***	-0.219***
	(2.31)	(-1.11)	(-5.03)	(-5.11)
Life expectancy	0.860*	1.670***	-0.0903	-0.0472
	(1.77)	(4.03)	(-0.37)	(-0.19)
Early leavers from edu.&tr.	-0.0661***	-0.0406***	-0.0227***	-0.0222***
	(-5.93)	(-3.28)	(-3.73)	(-3.75)
Persons with tertiary edu.	-0.0326	0.0562*	0.0271	0.0313**
	(-1.08)	(1.73)	(1.54)	(2.02)
Weekly hours of	-0.0230	0.422***	-0.173*	-0.134

work-males				
	(-0.13)	(3.28)	(-1.80)	(-1.35)
Weekly hours of work-females	0.111	-0.486***	0.0741	-0.00982
	(0.72)	(-5.26)	(0.90)	(-0.12)
Employment rates - total	0.353***		0.231***	
	(6.03)		(6.25)	
Employment rates - male		0.455***		0.234***
		(7.56)		(7.37)
Employment rates - female		-0.0765*		-0.0280
		(-1.92)		(-0.99)
R&D expenditure % GDP	-0.0303*	0.0186	0.00539	0.00800
	(-1.84)	(1.13)	(0.57)	(0.90)
Motorways	0.000505	0.00208	-0.000561	-0.0000803
	(0.18)	(0.71)	(-0.38)	(-0.05)
Other roads	-0.0554	-0.00683	-0.00548	-0.0175
	(-1.36)	(-0.68)	(-0.23)	(-0.79)
Nights spent residents	0.0221	-0.0114	-0.0319	-0.0323
	(0.82)	(-0.42)	(-1.39)	(-1.37)
Nights spent non-residents	0.0110	0.0423***	-0.0152*	-0.0127
	(0.89)	(2.90)	(-1.70)	(-1.44)
Vehicles	0.167***	0.000542	0.0741***	0.0526*
	(4.42)	(0.07)	(2.78)	(1.90)
Population density	-0.960**	-0.00176	-0.985***	-0.724***
	(-2.39)	(-0.14)	(-4.20)	(-3.21)
Net migration	0.00422**	0.00812***	0.00120	-0.000491
	(2.07)	(3.17)	(0.81)	(-0.33)
Constant	-9.986***	-6.219***	-2.925	-0.954
	(-2.61)	(-3.40)	(-1.20)	(-0.41)
Observations	940	1034	940	940

Notes: *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include time dummies. *Source:* Own calculations.

The Quasi-maximum likelihood estimation still provides conclusive results for the divergence hypothesis between EU regions. The coefficients are positive and statistically significant. Population appears to be influencing regional growth. Fertility rate increases economic growth when the dependent variable is real GDP/capita and has a negative influence when real GDP in PPS/inhab is used.

For this new estimation, life expectancy has a concrete outcome on regional growth. Life expectancy is used as a proxy for the health level of the population. It makes sense that a healthier and longer life positively impacts the economy.

Like it was stated before in the other regression, early leavers from education and training have a negative influence on growth. This social category is at risk economically and socially. Persons with tertiary education help in fostering regional economic growth, but the coefficients in Table 3 are small.

Average weekly hours worked by male appear to be negative in the QML estimations with fixed effects and positive in the QML estimation with random effects. In the same QML estimation average weekly hours worked by female is statistically significant and negative.

The analysis of employment rates offers the same conclusion as before: total employments and male employment are beneficiary for the economy and female employment decreases economic growth.

Research and development had a weak statistically significance on economic growth only in the QML-FE for real GDP/capita. This can mean that innovation is not contributing too much to EU regional growth as it was believed to do. Also infrastructure development appears to have small coefficients and none of them are statistically smaller than 10%.

Regarding total nights spent by residents and non-residents in tourist accommodations the results are not conclusive to say that these indicators have a major impact on regional growth. In Table 3 nights spend by residents were not significant to be validated and nights spent by non-residents contributed to growth in the QML-RE estimation and are negatively correlated with growth in the QML-FE estimation for real GDP in PPS/inhab (column 3).

The stock of vehicles at regional level is a variable that is useful for economic growth. From the results obtained for population density it seems that agglomeration is not an important factor at regional level. Finally, net migration is statistically significant in the estimation with real GDP/capita as dependent variable, but the coefficients were very small, implying that migration is not contributing very much to regional development.

CONCLUSIONS

The purpose of this study was to determine what factors influence economic growth at NUTS 1 and NUTS 2 level in the European Union between 2000 and 2013. To find the impact of each determinant on regional economic growth the study used two separate growth equations and as dependent variable the regional real GDP per capita and regional real GDP in purchasing power standard per inhabitant.

The models were applied on dynamic panel data for a number of 98 NUTS 1 regions and 273 NUTS 2 regions for all the EU country states (EU 28). The QML panel data estimation technique was utilised.

It was found that EU regions are not converging. From the results of the QML estimation for NUTS 2 regions, population appears to be influencing regional growth. The ones for NUTS 1 were not significant at 10%. The outcome for fertility rate offered mixed results. It increases economic growth

when the dependent variable is real GDP/capita and has a negative influence when real GDP in PPS/inhab is used.

The results confirm that life expectancy has a concrete impact on regional growth. Life expectancy is used as a proxy for the health level of the population. It makes sense that a healthier and longer life positively impacts the economy.

Early leavers from education and training are a negative influence on regional economic growth. This social category is at risk and policy makers have to adopt measures for the better integration of this group in the society and on the labour market.

Persons with tertiary education appear to contribute to regional economic growth, but the coefficients were small and not statistically significant in most of the results.

Regarding the average weekly hours worked by male this chapter comes to the conclusion that it hinders economic development. Also, the variable for average weekly hours worked by female is negative, but mostly not statistically significant.

The investigation into the effects of employment rates offers the following conclusion: total employments and male employment are beneficiary for the economy and female employment decreases economic growth.

Research and development had a negative impact on regional development in almost all of the regressions, even if some of the coefficients were not significant. Also infrastructure development appears to not have a defining role in shaping regional economic growth. Infrastructure endowment is poorly linked to economic growth and the exact returns and implications of this type of investment is not so clear (Crescenzi and Rodríguez-Pose, 2012; Rodriguez-Pose, Psycharis and Tselios, 2012).

Concerning total nights spent by residents and non-residents in tourist accommodations the results are not conclusive to say that these indicators have a major impact on regional growth.

In general, from this case study's regressions, the stock of vehicles at regional level is a variable that was positively correlated with growth. Furthermore the results obtained for population density contradict the agglomeration economies theory. It seems that regional agglomeration is not an important factor. This outcome can be attributed to Europe's high number of small and medium size cities and the negative externalities of living in a big city like congestion cost, labour competitiveness, pollution and high rental costs (Dijkstra et al., 2013).

Finally, net migration is statistically significant only for the model with real GDP/capita as the dependent variable. The coefficients were very small, implying that migration is not contributing very much to regional development.

Furthermore the claims of this chapter require further analysis to empirically test the assumptions made. As the QML estimation technique is being improved further analyses have to be conducted. This investigation has considerable policy implications for policymakers. Furthermore, certain economic and political shocks could have had significant implication for this empirical framework, like for example the 2008 economic crisis. Further

investigation of these inherent shocks could affect the estimated coefficients and might offer different results.

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FIRM-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE - CASE OF FIRMS IN BOSNIA AND HERZEGOVINA

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Abstract

This paper explores relative importance of some firm-specific determinants of leverage for the firms in Bosnia and Herzegovina. In order to explore which determinants are important and what is the nature of their influence, data on firms listed in two stock exchanges in Bosnia and Herzegovina for 5 years period were taken. The effect of tangibility, profitability, firm's size, non-debt tax shield and growth on leverage was tested. The results show statistically significant positive influence of tangibility and non-debt tax shield on firms' leverage and negative effect of size which is opposite to results for other transition economies. The results of regression models also show that significance of some factors and nature of their influence differs for firms listed in different stock exchanges.

Key Words

Capital structure; leverage; firm-specific determinants; transition economies.

INTRODUCTION

The issue of capital structure may be considered, to some extent, as a controversial issue in corporate finance because almost sixty years have passed since Modigliani and Miller (1958) claimed that capital structure does not affect the value of firms in perfect markets and there is still no unique theory on capital structure nor consensus on determinants of capital structure and direction of their influence. The statement about irrelevance of capital structure under perfect market assumptions has led to studying of conditions under which capital structure matters and influences firm's value.

Several theories have been developed in an attempt to explain how firms choose their capital structure and at the same time many studies were conducted in order to prove those theories and their assumptions. The most tested theories in empirical research are trade-off and pecking order theory. According to trade-off theory firms choose their mix of debt and equity by weighing potential tax benefits of debts and costs of financial distress. On the other hand, Myers and Majluf (1984) claimed that firms do not have optimal capital structure and that the choice on sources of financing is brought by following a pecking order of financing that says that firms should finance from internally generated sources, then debt and finally equity. Most of the empirical work has been focused on testing potential determinants of firms' capital structure and proving in that way the validity of different theories. However, those determinants were well explored in developed economies but the work on determinants of capital structure in developing and emerging economies is far from finished. In past ten years there were some studies on capital structure of European transitional economies, mostly focused on Central and/or Eastern European countries (Nivorozhkin, 2005; DeHaas & Peeters, 2006; Delcoure, 2007; Joeveer, 2013). There are also a few studies on capital structure in some Western Balkan countries and former Yugoslav federation countries (Črnigoj & Mramor, 2009; Pepur et al. 2016; Šarlija & Harc 2014; Stančić et al., 2016; Malinić et al., 2013).

The goal of this paper is to offer insight into capital structure of firms in Bosnia and Herzegovina and give a modest contribution to empirical research in this field for transition economies. Relevance of determinants of capital structure that have been identified as significant in other studies for transition economies will be tested for the firms in Bosnia and Herzegovina, economy in transition with a lot of specific features of economic but also historic nature. The goal is to see if firms in Bosnia and Herzegovina are influenced by the same determinants as firms in other transition economies especially Western Balkans.

The rest of the paper is organized in the following way: The second part of this paper gives insight into results of studies for effects of different firm specific determinants on capital structure for firms in developed economies and for transition economies. The third part of the paper explains how research for the firms in Bosnia and Herzegovina was done, namely describes the methodology used and the way the data were collected. In the fourth part results of regression models, used to test the effect of some firm

specific determinants leverage are presented and later on results are discussed and compared to studies for other transition economies.

LITERATURE REVIEW

Firm-specific determinants of capital structure in developed economies

Very extensive research on capital structure determinants of firms in developed economies exists. Harris and Raviv (1991) gave an overview of capital structure theories and results of empirical research at the time. Their analysis had shown that industry type, volatility, fixed assets, non-debt tax shield and profitability are significant determinants of capital structure but without joint conclusion in studies on the direction of their influence on leverage. Since then many other studies were done for firms in specific countries but there are also studies on the capital structure that included firms in a number of different countries. For instance, Cheng and Shiu (2007) studied capital structure of firms in 45 countries, deYong et al. (2002) for 42 countries and Öztekin (2015) for 37 countries. These studies included also analysis of macro determinants and their effect on capital structure. Results of mentioned studies indicate significance of the following determinants: type of assets, profitability, size of a firm, growth and industry type with positive influence confirmed for type of assets and size of a firm and negative influence for profitability and growth opportunities.

Positive and significant influence of tangibility of assets on leverage is confirmed in studies of De Jong et al. (2006), Öztekin (2015), Frank and Goyal (2009) for USA, Acharya et al. (2005) for firms in GB and USA, Gaud et al. (2005) for Switzerland. Cheng and Shiu (2007) show negative effect of tangibility on total debt but positive for long term debt meaning that firms who have more tangible assets will use long term debt to finance its assets. Negative relationship between profitability and leverage is suggested by the studies of Öztekin (2015), Cheng and Shiu (2007), DeJong et al. (2006), and for firms in USA by Graham et al. (2015), Frank and Goyal (2009), Harrington (2006) for USA, and Brailsford et al. (2002) for Australia. In most of the studies the size of the company is statistically significant and has positive effect on the leverage. That was shown for 25 countries out of 42 in the study of deJong et al. (2006) for book value of leverage. Also studies done by Öztekin (2015), Graham et al. (2015), Frank and Goyal (2009), Cheng and Shiu (2007), Akhtar (2005) for Australia, Gaud et al. (2005) and many others confirm that bigger firms will have more leverage. Studies of Cheng and Shiu (2007), DeJong et al. (2006), Ghosh et al. (2000) and Wald for France, Germany, United Kingdom and United States (1999) indicate that firms with greater opportunities for growth mostly have lower leverage. On the other hand Wald's study for Japan shows positive effect of firm's growth on its leverage as well as the study of Titman and Wessels (1988). Some studies have also shown that the effect of growth is not significant.

So the effect of tangibility and size in above mentioned studies confirms the trade-off theory but the profitability effect is in line with predictions of pecking order theory.

Firm-specific determinants of capital structure in transition economies

There are much less studies that analyse effects of different determinants on leverage for firms in transition economies. De Haas and Peeters (2006) have analysed firms in Central and Eastern Europe, Mateus and Terra (2006) focused on seven EE countries, Nivorozhkin (2005) analysed data for Bulgaria, Czech Republic, Estonia, Poland and Romania, Delcoure (2007) for Czech Republic, Poland, Russia and Slovak Republic and Joeveer (2013) for Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia. Most of those studies covered period of five to seven years. Results show significance of profitability, tangibility, size, non-debt tax shield and growth for firms' leverage.

All of the above mentioned studies have reached the same conclusion about profitability – it is negatively related to the leverage. In other words more profitable firms in transition economies will have less leverage. Tangibility is the next important factor of capital structure that has shown negative effect on leverage in the studies of Joeveer (2013), De Haas and Peeters (2006) for Romania, Bulgaria and Hungary and Nivorozhkin (2005) for Bulgaria and Romania, but Delcoure (2007) results show positive influence of tangibility on leverage and also the study of Nivorozhkin (2005) for Czech Republic and Estonia. Size of a firm has positive influence on the leverage as indicated Delcoure (2007) except in case of long-term leverage and Nivorozhkin (2004) for the firms in Bulgaria, Czech Republic and Romania. Study of Delcoure (2007) has also shown very strong positive influence of non-debt tax shield on firms' leverage in all countries and for all measures of leverage used in the study. Many of mentioned studies included growth or growth opportunities as a model variable but De Haas and Peeters (2006) confirmed positive effect of firms' growth on leverage for the firms in Latvia and Lithuania.

Besides the studies that focused on the countries of Central and Eastern Europe there is a small number of studies that focused on some Western Balkan countries and also countries that were together with some of those a member of a same state known as Yugoslav federation. Črnigoj and Mramor (2009) explored capital structure of firms in Slovenia, Pepur et al. (2016) and Šarlija and Harc (2014) of Croatia, Stančić et al. (2016) and Malinić et al. (2013) of Serbia.

In all of those studies profitability is statistically significant with negative influence on leverage. Tangibility is in negative relation with leverage (Črnigoj & Mramor, 2009; Stančić et al., 2016; Malinić at al., 2013). Size of a firm has been proven to have significant positive effect on leverage too (Črnigoj & Mramor, 2009; Stančić et al., 2016; Šarlija & Harc, 2014). On the other hand Pepur et al. (2016) who researched large firms in Croatia concluded that size has negative effect on leverage. Also growth is relevant factor with positive relation to leverage for the firms in Slovenia (Črnigoj &

Mramor, 2009) but negative for large Croatian firms (Pepur et al., 2016). Besides these non-debt tax shield has proven to be important determinant with negative influence on leverage in the study of Pepur et al. (2016).

Arsov and Naumoski (2016) studied capital structure of firms in Croatia, Macedonia, Serbia and Slovenia. Their results show that bigger firms will have higher leverage while more profitable firms as well as firms with more tangible assets will have lower leverage. The results also show positive influence of growth on leverage.

So, results of studies for transition economies are a bit different compared to those in developed economies. Unlike firms in developed economies tangibility in transition economies exhibits negative influence on leverage and growth has positive effect. Profitability as in developed economies has negative effect on leverage of firms in transition economies. So for transition economies more determinants than for developed economies confirm assumptions of pecking order theory.

DATA AND METHODS

Bosnia and Herzegovina (BiH) is a Western Balkan country that was a part of Yugoslav federation for almost half of century. It shares some features with other countries from Western Balkan but also has its own unique characteristics. Capital structure determinants of firms in BiH were not included in above mentioned studies so this study aims to investigate relative importance of capital structure determinants that were proven to be significant for firms in transition economies, especially Western Balkan, for firms in BiH.

The source of information for this study were two stock exchanges in Bosnia and Herzegovina, one in the entity of Federation of BiH called Sarajevo Stock Exchange (SASE) and another one in entity of Republic of Srpska called Banja Luka Stock Exchange (BLSE). The firms taken into the sample are the ones whose shares are listed in Sub segment 1 that contains most liquid shares from SASE and firms whose shares are listed in so called segment Official market-Shares from BLSE. Only non-financial firms were taken into consideration and those that had all the financial statements for the period of 2011-2015. So the sample in total represents 62.9% of the firms listed in both stock exchanges or 33% of those listed in SASE and 90 % of those listed in BLSE. From the financial statements of the selected firms (that are available on web pages of stock exchanges) information on values of some positions in balance sheets were obtained and variables were calculated.

In available studies the effects of different determinants on firm's capital structure are presented through their effect on the leverage. That approach will be used here too and investigated through the model of multiple regression. Leverage is dependent variable in the model while chosen determinants are independent variables. All regression models were tested for the level of significance of 0.05.

In available studies for transition economies in most of the cases a few measures of leverage were used. One of those is the ratio of total debt to total assets that shows relative importance of debt financing (Joeveer 2013; Delcoure, 2007). Still, there are firms in Bosnia and Herzegovina who do not have any long term debt and there are also many who rely on short term liabilities to finance their business. In that case total liabilities could represent total debt of firms and be used as a measure for leverage. That measure was used in the studies of Arsov and Naumoski (2016), Pepur et al. (2016), Črnigoj and Mramor (2009), Šarlija and Harc (2014), Malinić et al. (2013). Šarlija and Harc (2014) and Stancic at al. (2016) also used relation of long term debt to total assets of a firm. For the comparability of results the main measure of leverage in this study is ratio of total liabilities to total assets. Another regression model will also include the ratio of total debt / total assets for checking the validity of results in the first model. To check if the firms are influenced by some specific factors in the long term another measure of leverage will be used - long term debt to total assets. So the effect of different factors on the leverage will be tested through three different models.

Taking into account availability of the data from the financial statements and theoretical and empirical importance of the determinants for transition economies for the purpose of this study the following factors will be analysed: tangibility, profitability, size, effect of the tax and growth.

Tangibility of firms' assets is considered to indicate liquidation value of a firm. According to trade off theory firms that have more tangible assets have more assets that could serve as collateral and are expected to have more leverage. According to pecking order theory firms that have more tangible assets are exposed to less information asymmetry and therefore will have less debt. Tangibility is calculated as the ratio of tangible assets of the firm to its total assets. That is the measure most often used in most of the available studies and it was used as a measure in all above mentioned studies for transition economies.

Profitability according to trade off theory will have positive effect on leverage. More profitable firms need to protect their profit from taxation so they will have higher leverage. Pecking order theory on the other hand suggests that more profitable firms will have less debt since they have more internal sources of finance. Profitability in available studies is measured in different ways. When financial costs are significant the profitability may be miscalculated so for the purpose of this study profitability will be expressed as EBIT to total assets. That kind of approach was used in a number of studies (for instance, Brailsford et al., 2002; MacKay & Phillips 2005; Graham et al., 2015).

Big firms, according to trade off theory, are less likely to experience financial distress, their cash flows are more stable and they show less earnings volatility. They can also get lower interest rates thanks to their size. All of that could lead to greater leverage of those firms. For those firms according to the assumptions of pecking order there is less information asymmetry so they are expected to have less debt. Size of the firm in most of the studies is expressed through the ln of total assets or total sales. For the purpose of this analysis ln of total assets is used to express the size of

the firm as in Arsov and Naumoski (2016), Joeveer (2013), Delcoure (2007), Nivorozhkin (2005).

High tax rate, according to trade-off theory should motivate firms to have more leverage in order to use so called tax shield, or in other words to protect their earnings from taxation. Studies that analysed firms in many different countries have mostly used tax rate comparisons or calculations of average or marginal tax rate. The firms in the sample are form the same country with the same tax rate. One of the options to measure the effect of tax was to calculate the marginal tax rate, but there are firms that experienced losses, carried forward tax gains and losses so that information is not very useful. Instead another approach is used in this study. Non-debt tax shield is expressed as the ratio of amortization to total assets. That measure was used also in Pepur et al. (2016), Sarlija and Harc (2014), Delcoure (2007). Higher values of this ratio mean that the firm will have less necessity for the debt as means of protecting its profits from taxation.

According to pecking order theory effect of growth on leverage will depend on the size of internal sources of firm. Firms whose investment opportunities are greater than internally generated funds will borrow more. Growth of the firm is very difficult to measure because the potential growth of the firm is influenced by many different factors such as consumer behaviour, macroeconomic conditions, level of firm's investment etc. In different studies it is measured in different ways and still there are no joint conclusions on its effects on capital structure. BLSE offers data on P/B ratio for its firms but those data are missing for some years for firms listed in SASE so that ratio cannot be used for the purpose of this study. That is why simply a rate of growth of firms is being used without exploring what caused the growth. Namely average rate of growth of total assets for each of the firms for the selected period is used as a proxy for growth.

FINDINGS

Information on the mean of leverage and all analysed determinants for the period of 2011-2015 for the firms in the sample (total and by stock exchanges) are given below.

Table 1: Mean of leverage and potential leverage determinants

Leverage / Determinant	All firms	Firms listed in SASE	Firms listed in BLSE
Total liabilities / Total assets	0.1914	0.1690	0.1991
Total debt / Total assets	0.1048	0.1098	0.1030
Long-term debt / Total assets	0.0588	0.0464	0.0630
Tangibility	0.6432	0.5935	0.6604
Profitability	0.0092	0.0177	0.0062
Size	18.4019	18.1519	18.4881

Non-debt tax shield	0.04	0.0361	0.0414
Average growth	0.2789	0.0031	0.3740

Source: Author's calculations based on the data from financial statements of the firms.

The average leverage of firms in Bosnia and Herzegovina expressed as ratio of total liabilities to assets is 19,14% with leverage of firms listed in SASE being a bit lower compared to firms listed in BLSE and overall results. About 64% of total assets of firms consist of tangible assets and firms on average had a very low profitability in this period of 0.92% while still on average experiencing average growth rates of 27.89% but the growth was uneven for the firms listed in SASE and BLSE.

Three regression models were used to explore the effect of different determinants on leverage where dependant variable, the leverage, was expressed in three different ways. The results of the models are presented in Table 2. Along each of the determinants beta coefficient was shown and in the brackets bellow significance of factor at 0.05 level.

Table 2: Results of regression models for all the firms in the sample

Factor	**Model 1** (Leverage = total liabilities / total assets)	**Model 2** (Leverage = total debt / total assets)	**Model 3** (Leverage = long-term debt/ total assets)
Tangibility	0.179* (0.007)	0.236* (0.000)	0.235* (0.001)
Profitability	-0.081 (0.272)	-0.074 (0.325)	-0.072 (0.344)
Size	-0.372* (0.000)	-0.314* (0.000)	-0.080 (0.253)
NDTS	0.296* (0.000)	0.269* (0.000)	0.327* (0.000)
Growth	-0.026 (0.688)	0.000 (0.995)	-0.081 (0.235)
Adjusted R^2	**R^2=0.199**	**R^2 = 0.174**	**R^2 = 0.145**

Source: Author's calculations based on the data from financial statements of the firms.

The highest explanatory power is in Model 1 where 19.9% of variation in leverage is caused by given factors.

If the leverage is measured as the ratio of total liabilities to total assets than looking at statistically significant influence of tangibility, size and non- debt tax shield we can conclude that firms with more tangible assets, smaller firms and firms with higher ratios of amortisation to total assets will have higher leverage. The second model serves to check the validity of the first model and significance of determinants and direction on their influence on leverage is confirmed. In case of long term leverage size does not show significant influence on leverage.

Statistically significant positive influence of tangibility and non-debt tax shield on leverage can be explained by the fact that tangible assets are most

often financed through debt and that firms with more tangible assets usually have higher amounts of amortization.

These results are not completely in line with previous research in Western Balkan countries where tangibility shows negative influence on leverage while positive is shown only in Delcoure (2007) and Nivorozhkin (2005) for Czech Republic and Estonia. Results for size are in line with results of Pepur et al. (2016) for large firms in Croatia and for non-debt tax shield with Delcoure (2007).

Since data for the analysis were taken from firms listed in two stock exchanges, the next step in the analysis was to see if there are maybe some differences in terms of determinants' relevance for the firms listed in two stock exchanges. The data on regression model for the firms listed in SASE is presented in Table 3.

Table 3: Results of regression models for the firms listed in SASE

Factor	**Model 1** (Leverage = total liabilities / total assets)	**Model 2** (Leverage = total debt / total assets)	**Model 3** (Leverage = long-term debt/ total assets)
Tangibility	0.290* (0.003)	0.268* (0.028)	0.406* (0.017)
Profitability	0.108 (0.184)	0.078 (0.445)	-0.124 (0.378)
Size	-0.370* (0.000)	-0.309* (0.006)	-0.348* (0.022)
NDTS	-0.098 (0.298)	-0.102 (0.391)	0.460* (0.007)
Growth	0.574* (0.000)	0.556* (0.000)	0.120 (0.441)
Adjusted R^2	**R^2 = 0.810**	**R^2 = 0.697**	**R^2 = 0.421**

Source: Author's calculations based on the data from financial statements of the firms.

These models show very high level of adjusted R2. For instance in the first model 81% of variations in the leverage, expressed as the ratio of total liabilities to total assets, can be explained by given factors. Significance of determinants in the first model is also confirmed in Model 2. Tangibility and size are statistically significant in all three models and show the same direction of the influence as for the entire sample of firms. Still, the fact that this sample is consisted of smaller number of firms compared to firms listed in BLSE should be taken into consideration.

For the firms listed in SASE that, on average, have shown very low average growth rates (0.31%) that factor is statistically significant for the leverage in models 1 and 2 and leads to conclusion that the greater the rate of growth, the greater the leverage of firms as in Črnigoj and Mramor (2009) and Šarlija and Harc (2014).

In Table 4 results of regression model for the firms listed in BLSE are presented.

Table 4: Results of regression model for the firms listed in BLSE

Factor	Model 1 (Leverage = total liabilities / total assets)	Model 2 (Leverage = total debt / total assets)	Model 3 (Leverage = long-term debt/ total assets)
Tangibility	-0.181* (0.016)	-0.101 (0.184)	0.057 (0.493)
Profitability	-0.193* (0.017)	-0.220* (0.007)	-0.051 (0.566)
Size	-0.224* (0.003)	-0.126 (0.095)	0.613 (0.829)
NDTS	0.454* (0.000)	0.518* (0.000)	0.315* (0.000)
Growth	-0.114 (0.130)	-0.054 (0.481)	-0.118 (0.160)
Adjusted R^2	**R^2 = 0.265**	**R^2 = 0.245**	**R^2 = 0.086**

Source: Author's calculations based on the data from financial statements of the firms.

Profitability and non-debt tax shield are relevant capital structure determinants if we take into consideration Models 1 and 2. Non-debt tax shield is the only factor that has shown statistical significance in all three models. In case when leverage is expressed as the ratio of total liabilities to total assets tangibility, profitability and size also show statistically significant influence. Looking at the signs of beta coefficients it can be concluded that firms with greater levels of tangible assets, more profitable firms and bigger firms will have lower leverage.

The results in this case are different from the results for the whole sample in the direction of influence of tangibility and relevance of profitability. Profitability shows significant negative influence in Models 1 and 2 (confirmed by all studies for Western Balkan countries) and it is not statistically significant for the firms listed in SASE or overall sample of the firms. It should also be noted here that on average firms listed in BLSE have had low profitability and most of the firms in this sample have experienced losses for some years during the observed period so relative importance of this determinant should be taken with precaution.

DISCUSSION AND CONCLUSIONS

The main goal of this paper was to explore relative importance of some firm-specific determinants of capital structure for firms in Bosnia and Herzegovina. The results of the regression models show statistically significant influence of tangibility of firm's assets, size of a firm and non-debt tax shield. Firms with more tangible assets, higher levels of non-debt tax shields and smaller firms are expected to have higher leverage. The results for tangibility are opposite to results of other studies for transition economies but in line of those for firms in developed economies. Negative influence of firms' size and positive of non-debt tax shield on firms' for each of these determinants is confirmed by one study in transition economies. Due to that

a conclusion on prevalence or applicability of prevailing capital structure theories can still not be made.

However if only firms listed in BLSE are observed the results are mostly in line with other transition economies in terms of statistically significant negative influence of tangibility of firm's assets, profitability and size. The reasons for somewhat different results may lie in the fact that the sample did not consist of equal number of firms from both stock exchanges. Also among firms in the total sample listed in SASE 50% of them belong to manufacturing industry while from firms listed in BLSE almost 70% of the sample is consisted of firms equally belonging to manufacturing and firms that offer utilities services such as electric energy production, gas, water utilities etc. Those are all firms with great amounts of tangible assets. Previous studies have shown significant influence of type of industry a firm belongs to on capital structure so that factor probably had the effect here.

For the purpose of this study data for period of five years on firms listed in stock exchanges were taken into consideration. For more conclusive results more firms, not just listed in stock exchange should be brought into the sample. Also this study included five determinants that were proven to be significant in studies for transition economies. More determinants should be included in the future, especially the effect of industry and some macroeconomic indicators. Future studies should also investigate the difference in results for firms in different stock exchanges in more details to reach conclusive results on the relevance and direction of influence of some firm-specific determinants on capital structure of firms in Bosnia and Herzegovina.

This study is a modest contribution to studying of capital structure determinants that can serve as a starting point for future research for firms in BiH. Its results could also serve for comparative analysis of determinants of capital structure of firms in transition economies. Some light has been shed on capital structure determination of firms in Bosnia and Herzegovina and future research that could include the points mentioned above could lead to more definite conclusion on relevance of capital structure theories and complement the existing research on capital structure in transition economies.

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METHOD VaR IN THE CASE OF REAL ESTATES

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Abstract

The aim of this article is to present the mathematical – statistical method VaR (Value at Risk) on the case of real estates. With the method VaR we predicted movements of the prices of real estates in Slovenia, France, Greece, Poland, and Norway. According to the results provided with the method VaR, the volatility of residential properties is different in each observed environment, but it is everywhere negative. In the short term (six months), we can expect minimum reduction of the prices of real estates in Greece (in Athens and other major cities) and the maximum reduction in Poland (in Warsaw and other major cities). Even in the long term (3 years), we can expect the smallest drop of prices in Greece and the largest in Poland.

Key Words

Mathematical – statistical research methods; VaR; real estate.

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INTRODUCTION

Real estates have a set of characteristics that influence their price. These characteristics that determine the price of real estate cannot be directly observed. Thus, we use a variety of statistical and mathematical methods (Sirmans et al., 2006). In the literature, the authors use different methods and models to evaluate real estates: the hedonic model, vector model, multiple regression and other models. The purpose of this paper is to present the mathematical – statistical method VaR (Value at Risk) on the case of real estates.

One of the characteristics of the real estates is market volatility. The method VaR is the world's most recognized method for measuring the market risk. Value at Risk or VaR represents the rate for measuring financial risk (Belles-Samper et al., 2014). It estimates how much a set of investments might lose, given normal market conditions, in a set time period such as a day. VaR (as a distinct concept) did not stand up till the late eighties of the last century. The ground-breaking event was a market meltdown in 1987, which was actually the first important financial crisis. The base of the method VaR was represented in a technical paper entitled Risk metric-technical document. This article contains the basic tools which allowed the institutional investors to assess their exposure to the market risk (Morgan, 1996). Nowadays, the method VaR is most commonly used in the financial field, namely to determine the maximum possible loss of certain investments or assets. With the method VaR we can calculate the maximum loss to be suffered by investors in the certain financial investment at a given confidence level over a specified period.

In the case of buying real estates as an investment for the purpose of trading, the method VaR allows us to determine the maximum potential loss for such investment. The result of the method VaR can be expressed as the maximum expected loss of the property within a specified period of time at a given confidence level (Rogachev, 2006). Leš (2007, p. 14) used method VaR for the simplest properties such as shares and bonds, for assets of derivative financial instruments as well as for assets invested in real estates. When measuring the market risk, the method VaR is also used by non-financial organizations. The method VaR is currently the most popular method for measuring market risk and it complements the standard deviation.

In the following, we use the method Var to determine the volatility of real estate prices in the major cities across selected economic, social, and cultural environments. Moreover, with the method VaR we predict the movement of prices in the future.

THEORETICAL FRAMEWORK

With the method VaR we can predict and manage the financial risk of investments in real estate (Amédée-Manesme & Barthelemy, 2015). In 2009, Gaston showed the usefulness of the method VaR in the case of real

estates. Namely, with this method we can get information about the volatility of the real estate market and values of the real estates, which are useful for investors. Moreover, in 2008 Liow studied real estate market with the method VaR and proved that the Asian real estate market is more risky than the other developed markets. Asian real estate market has greater volatility than the European and North American real estate markets, which also implies a higher risk for investors.

Furthermore, Okunev et al. (2000) and Nawawi et al. (2010) concluded that the real estate market and stock market are connected. With the information and knowledge about developments in the stock market we can predict developments in the real estate market, and vice versa (Nawawi et al., 2010).

Let us also mention the following authors: Jin and Ziobrowski (2011), Crocker and Jianping (1994), and Campbell (1991). They all showed that the method VaR is also applicable to real estate markets and not just to stock markets. In the case of buying real estate as an investment for the purpose of trading, the method VaR allows us to determine the maximum potential loss.

METHOD VaR

Risk measure VaR is a mathematical - statistical method based on the standard deviation (Allen et al., 2009). Standard deviation (denoted by σ)is a measure that is used to quantify the average deviation from the mean. If we take the change of real estate price as a measure for profitability of investment and if we take the standard deviation as a measure for risk, we get a measure that shows us what is the return on investment per unit of risk. The standard deviation allows us to compare the risk of individual investments. Moreover, the advantage of the standard deviation is to assess maximum potential losses that may be expected in given periods, e.g., in months, years (Hardy, 2006).

To calculate VaR, there are three basic approaches (Pienza and Bansal, 2001):

- the variance-covariance method,
- the approach based on historical data,
- Monte Carlo simulation.

In our study we used the approach based on historical data (we calculated covariance with historical data for real estate prices) and the variance-covariance method which requires that we estimate an expected (or average) return and a standard deviation (which allow us to plot a normal distribution curve). We calculate VaR as

$$VaR = \sigma \cdot \sqrt{N},$$

where σ is the standard deviation of the return on investment and N is a number of days (in the observed time).

All the following calculations were performed with the program Microsoft Excel. We used an acceptable level of risk α, which is equal to or less than 0,05. This is the standard rate of risk, which is most commonly used in statistical studies.

For the purposes of the method VaR we covered various economic, social, and cultural environments: Slovenia, France, Greece, Poland, and Norway. We used the information on prices of real estates in major cities in the period from June 1995 to September 2012 for Slovenia, from March 1999 to June 2012 for France, from March 1997 to June 2012 for Greece, from December 2002 to June 2012 for Poland, and from March 1992 to September 2012 for Norway. The observed periods cover the period of economic growth, when real estate prices were rising, and the period of recession, when real estate prices were falling. The information about the prices of real estates in major cities across selected countries were obtained for Slovenia from the website http://www.slonep.net/info/cene-nepremicnin/preglednica-cetrtletnih-cen-housing-in-jubljana (SLONEP, 2012), for France, Greece, and Poland from the website http://www.tradingecononomics.com (Trading Economics, 2012), and for Norway the data were obtained from the website http: // statline .cbs.nl / StatWeb / publication /? = ees DM & PA = 71533ENG & D1 = 0 & D2 = 0-1 (Stalin, 2012).

RESULTS

For each selected country/city and for different type of real estate we calculated values of VaR taking into account different time period and with respect to the 5% risk level. Tables 1 to 5 present results for each observed country. Here, N is the number of individual type of all real estates included in the analysis. The average is the arithmetic mean. The variance is the expectation of the squared deviation of a random variable from its mean. In particular, the variance is the average squared deviation of the prices (of selected types of real estates) from the arithmetic mean. *Standard deviation* describes the *volatility.* More precisely, standard deviation measures price dispersion of selected types of real estates around the arithmetic mean. VaR values represent the maximum rate of change of prices of selected types of properties in different time periods (half-year, 1 year, 2 years, 3 years).

Table 1: Results for Slovenia

	Studios	***1 bedroom apartments***	***2 bedroom apartments***	***3 bedroom apartments***	***4 bedroom apartments***	***5 or more bedroom apartments***
N	66	66	66	66	36	36
Average	0,016	0,017	0,013	0,013	0,010	0,005
Variance	0,004	0,003	0,000	0,001	0,001	0,003
Volatility	0,063	0,052	0,029	0,035	0,033	0,053
VaR (half-year)	-14,62%	-12,09%	-6,83%	-8,04%	-7,72%	-12,29%
VaR	-0,68%	-17,10%	-9,66%	-11,37%	-10,92%	-17,39%

(1 year)						
VaR (2 years)	-29,25%	-24,18%	-13,67%	-16,08%	-15,44%	-24,59%
VaR (3 years)	-35,82%	-29,61%	-16,74%	-19,69%	-18,91%	-30,11%

Source: Own calculations.

Table 1 shows the results for the case of Slovenia. According to the results, the highest volatility have the prices of studios and five or more bedroom apartments. They are followed by 1 bedroom apartments. On the other hand, 2, 3, and 4 bedroom apartments have the lowest volatility. We found out that the prices of these apartments are much more stable comparing to the prices of other dwellings in Slovenia. Moreover, these apartments have little respond to the developments in the real estate market. By the above calculations, we can say that in the next six months the prices of studios in Slovenia will change for not more than 14,62%, single bedroom apartments for not more than 12,09%, 3 bedroom apartments for not more than 8,04%, 4 bedroom apartments for not more than 7,72%, and 5 or more bedroom apartments for not more than 12,29%. We can predict that, in the short term, the prices of 2 bedroom apartments will be at least changed and the prices for the studios the most. In the long term, the prices of the studios will not change by more than 35,82%, 1 bedroom apartments by more than 29,61%, 2 bedroom apartments by more than 16,74%, 3 bedroom apartments by more than 19,69%, 4 bedroom apartments by more than 18,91%, and 5 or more bedroom apartments by more than 30,11%.

Table 2: Results for France

	Apartments in Paris	***Apartments in Paris and suburb***	***New apartments in Paris***	***New houses in Paris***
N	53	65	53	53
Average	0,023	0,014	0,012	0,011
Variance	0,0003	0,000	0,001	0,003
Volatility	0,019	0,021	0,035	0,061
VaR (half-year)	-4,45%	-4,99%	-8,10%	-14,13%
VaR (1 year)	-6,29%	-7,05%	-11,45%	-19,99%
VaR (2 years)	-8,90%	-9,97%	-16,20%	-28,7%
VaR (3 years)	-10,9%	-12,21%	-19,84%	-34,62%

Source: Own calculations.

Table 2 shows the results for the case of France. Here, we studied the prices of existing apartments in Paris, apartments in Paris and suburb, new apartments in Paris and new houses in Paris. According to our calculations, the prices of existing flats in Paris will change in the short term (half-year) at

a rate not higher than 4,45%. On the other hand, the prices for new houses in Paris can be changed for 14,13%. In the long run (3 years), the change of prices of existing flats in Paris will be not more than 10,9%, but the prices of new houses in Paris can be changed for 34,62%.

Table 3: Results for Poland

	Apartments in Warsaw	*New apartments in Warsaw*	*Apartments in other cities*	*New apartments in other cities*
N	28	28	28	28
Average	0,019	0,017	0,019	0,017
Variance	0,005	0,003	0,006	0,003
Volatility	0,069	0,050	0,075	0,055
VaR (half-year)	-16,21%	- 11,74%	-17,54 %	-12,80%
VaR (1 year)	-22,92%	-16,61%	-24,80%	-18,11%
VaR (2 years)	-32,42%	-23,49%	- 35,07%	-25,61%
VaR (3 years)	-39,71%	-28,76%	-42,95%	-31,36%

Source: Own calculations.

In the case of Poland, we observed the prices of existing and new apartments in Warsaw and in other major cities of Poland. Numbers in Table 3 show that we can expect in the period of six months the smallest change of the prices of new dwellings in Warsaw (VaR = -11,74%) and the biggest change of the prices of existing dwellings in other major cities of Poland (VaR = -17,54%). Similar, looking at the long term, the prices of existing apartments in major cities of Poland can be changed the most (max 42,95%) and the least the prices of new apartments in Warsaw (max 28,76%).

Table 4: Results for Greece

	Apartments in Athens	*New apartments in Athens*	*Apartments in other cities*	*New apartments in other cities*
N	24	24	24	24
Average	-0,005	-0,005	-0,002	-0,003
Variance	0,000	0,001	0,001	0,001
Volatility	0,019	0,026	0,026	0,024
VaR (half-year)	-4,61%	-6,13%	-5,96 %	-5,53%
VaR (1 year)	-6,53%	-8,67%	- 8,42%	-7,82%
VaR (2 years)	-9,23%	-12,26%	-11,91%	-11,06%
VaR (3 years)	-11,30%	-15,02%	-14,59%	-13,54%

Source: Own calculations.

Table 4 shows the results for the case of Greece. Here, we studied the prices of existing and new apartments in Athens and other major cities of Greece. According to our results, in the short run, the prices of existing apartments in Athens will change not more than 4,61%. On the other hand, the prices of new flats in Athens can be changed for 6,13% in a half-year term. In the long run, the prices of existing apartments will change not more than 11,30% and the prices of new flats not more than 15,02%.

Table 5: Results for Norway

	Apartments in Oslo	***Independent houses in Oslo***	***Terraced houses in Oslo***
N	82	82	82
Average	0,019	0,017	0,019
Variance	0,000	0,001	0,001
Volatility	0,028	0,030	0,029
VaR (half-year)	-6,42%	-7,00%	-6,68%
VaR (1 year)	-9,08%	-9,90%	-9,44%
VaR (2 years)	-12,84%	-14,01%	-13,35%
VaR (3 years)	-15,72%	-17,15%	-16,35%

Source: Own calculations.

The last observed city was Oslo, the capital city of Norway. According to the accessible data, we have done calculations for the prices of apartments, independent houses and terraced houses in Oslo. By the results in Table 5, we can predict that in the short term the prices of apartments in Oslo will be changed not more than 6,42%, the prices of independent houses not more than 7,00%, and the prices of terraced houses not more than 6,68%. In the long run, the prices of apartments in Oslo will be the least affected (Var = -15,72%). On the other hand, the most affected will be the prices for independent houses (Var = -17,15%).

CONCLUSION

The purpose of the research was to analyse residential real estates in various economic, social, and cultural environments: in the main cities of Slovenia, France, Greece, Poland, and Norway. Selected environments have different economic characteristics, different real estate market, and different legislation which regulates the real estate market. On the basis of analysing the results of scientific findings in the field of real estates and we conducted a survey with the mathematical - statistical method VaR. We have detected a trend in the movement of prices of real estates in the capital cities of the selected countries and forecasted price developments in the future. The statistical analysis was related to the time period from 1996 to 2012.

The method VaR measures the potential loss over a fixed period for a given confidence interval. For example, if the one month VaR on an asset is 1 million EUR (with the level of risk $\alpha \leq 0{,}05$), then there is a 5% chance that the value of the asset will drop more than 1 million EUR over any given month. This method is commonly used for investments to determine the extent and occurrence ratio of potential losses in the portfolios.

According to the results provided with the method VaR we can expect minimum reduction of the prices of real estates in Greece (in Athens and other cities) and the maximum reduction in Poland (in Warsaw and major cities). Even in the long term, we can expect the smallest drop of prices in Greece and the largest in Poland. Moreover, the highest volatility of the residential properties have: in the case of Slovenia studios, in the case of France new family houses in Paris, in the case of Greece new apartments in Athens, in the case of Norway family houses, and in the case of Poland existing apartments in big cities. On the basis of these results we confirmed that the prices of real estates are not stable and, thus, the change of prices is greater.

At the end, let us point out that the predicted volatility of prices of residential real estate varies between the observed environments. Thus, each research environment should be considered separately, regardless of the current globalization and universal mathematical - statistical method. On the other hand, the methodology which we used in the survey is reproducible in any other economic, social, and cultural environment and on any group of respondents. Moreover, the used method is a proven way of obtaining representative and credible data.

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FROM SCATTERED TO COHERENT – STRATEGIZING PROCESSES OF A MULTINATIONAL CORPORATION

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Abstract

Developing a dynamic-strategy perspective, which considers strategizing as practice rather than an outcome, we are able, applying case studies, to capture processes that explain how common cognitive frames are constructed, altered, tested through actions and re-constructed. Capturing several iterations of these processes allow us to understand how new strategy emerges from actors' strategizing scattered across the organization and how it eventually becomes part of the formal strategy of a multinational corporation. These findings add to the understanding of strategizing as bottom-up social processes that form new meaning, structures and actions.

Key Words

Strategy-as-practice; collaborative action research; strategizing; sensemaking.

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INTRODUCTION

This study uses theory as a starting point for strategizing (Lewin, 1945) by constructing a theoretical framework that serves to build abstract common frames of reference to organizational practitioners. These form the basis within which inductive learning takes collectively place, so that new theorizing emerges. The outputs of these theorizing processes are expected to form the inputs to practical propositions on strategic actions, which are tested by managers in the field, producing new certainties, which question assumptions of formal strategies while providing new alternatives. These alternative strategic actions are expected to gradually spread through the organization to become a formal part of strategy. Taking a strategy-as-practice view on these processes, we are not only interested in the contents of new strategy, but we pay specific attention to the practices that detail what people do to create such changes and how these changes become enacted on a wider organizational level (cf. Kobernyuk et al., 2014). The study makes important contributions in understanding how organizational capabilities (e.g. Winter, 2003) are more than a top management activity but deliver empirical accounts and theoretical thoughts on the agency in the web of practice (Vaara & Whittington, 2012). Furthermore, this research also contributes to existing knowledge on strategy-as-practice by focusing on the Sensemaking and sensegiving practices of middle-managers, whose positions are beyond formal strategy ranks (McCabe, 2010; Vaara & Whittington, 2012) in MNCs. The findings of this research suggest that first, strategizing and theorizing are similar processes. That is, deductive thinking (exploiting given knowledge) and collective reflection are shaping organizational commitments, shared capacity and identity, and form expectations (Weick, 1988; Maitlis & Sonenshein, 2010; Maitlis & Christianson, 2014) that become inputs in new actions. We also found that new actions lead to retrospective Sensemaking as a social process in which collective evaluations of previously shared cognitive frames are negotiated in the light of newly explored information (inductive thinking). These lead to the enactment of new cognitive frames which give sense to organizational members and set in motion deductive thinking in new contexts that shape commitments, capacity/identity and expectations. Furthermore, we found that strategizing as a bottom-up process is an organizational learning process, in which implementation is part of strategizing. Thus, strategy formation can be a transparent process that is inseparably intertwined with operational action.

THEORETICAL FOUNDATIONS

To understand the sources and dynamics of organizational strategizing from a practice perspective, we build on two streams of literature, strategy as practice view and theories on shared cognitive frames which enable us to understand how ordinary actions, which are not ex-ante classified as strategic actions, redefine organizational structures.

Practice view on strategy

The perception of what strategy is and how it is formulated has considerably changed in previous decades. Traditional approaches on business strategy consider strategy as something created by top management, which is transformed into an organizational artefact; a somewhat abstract idea of where the organization is heading in the future, paved by more concrete action steps forming the yellow brick road to the imagined future (e.g. Chandler, 1962; Porter, 1985). In comparison to this, strategy process research has emphasized context and roles of various actors in creation of emergent business strategy (e.g. Mintzberg, 1978; Regnér, 2003). That is, strategies are constructed hierarchically top-down but also in the "peripheries" of organizations by middle managers or engineers, usually through the actions they perform, or by any other organizational members (Regnér, 2003; Vaara & Whittington, 2012). However, the question of how strategizing on the organizational level occurs when initiated from organizational periphery is treated as a black box (c.f. Parmigiani & Howard-Grenville, 2011) and explained merely being the result of interaction and recognition between top management and strategy initiators (Regnér, 2003) and not elaborating on the more fine-grained actions of individuals and their interaction, contributing to organizational action. Strategy-as-practice view is specifically interested in these actions; what organizational members creating strategy do in practice to create strategic outcomes (Johnson et al., 2007), and how they interact with each other (Balogun & Johnson, 2004). Therefore, strategy in this research is defined as "a situated, socially accomplished activity, while strategizing comprises those actions, interactions and negotiations of multiple actors and the situated practices that they draw upon in accomplishing that activity" (Jarzabkowski et al., 2007, p. 7-8). More specifically, those activities are considered strategic which are "consequential for the strategic outcomes, directions, survival and competitive advantage of the firm" (Jarzabkowski et al., 2007). By developing a dynamic strategy perspective (e.g. Johnson et al., 2007; Regnér, 2008), which considers strategizing as a string of practices that together enable strategy formation (Vaara & Whittington, 2012), this paper theorizes on the strategizing processes that explain how common cognitive frames are constructed, altered, tested through actions and re-constructed.

Constructing common cognitive frames: the Sensemaking perspective

Actions create an understanding of an environment, which has not prior existed (Weick, 1988). In our context of an MNC in the merchant shipping industry, we utilize the concept of Sensemaking as a process of social construction that retrospectively gives plausible meanings when people rationalize their own actions by connecting cues and frames that the environment provides (Maitlis & Sonenshein, 2010). This approach to understand how actions and ideas interact has been developed in the context of high-reliability organizations and catastrophic events (Weick, 1988; Weick & Roberts, 1993). It has been argued (Maitlis & Sonenshein,

2010) that this approach can be extended to turbulent organizational contexts such as strategic and organizational changes. It can shed new light on the question of how common cognitive frames are constructed, altered, tested through actions; as outcomes of collective enactments. The underlining assumption in this view is that the behaviour of organizations is often created by human beings who through their actions generate events and structures. Common cognitive frames serve as interpretive schemes, which are embedded in organizational structures (Bartunek, 1984; Balogun & Johnson, 2004). Strategic decisions cannot be separated from individuals' actions and their retrospective shared sensemaking because that constitutes the source of enablers, constraints and opportunities that did not exist before and independently of these actors. Weick's (1988) Sensemaking theory, which later has been extended (see: Maitlis & Christianson, 2014), encompasses at its core three constructs important to understanding the sensemaking processes: commitment, capacity and expectations. *Commitment* serves as a foundation for sensemaking by justifying retrospectively through the participation of others that actions taken are in line with the vision they are committed to. This is a critical factor for strategic change because it enables actions and serves participants to get retrospective approval, which is aligned with the underpinning assumptions about the environment. *Capacity* defines the response repertoire for actions as it rests on perceptions about the distribution of competence and control within the organizational context (Weick, 1988). Capacity determines which actions will be taken, based on the action in question being consistent with the organization's perception of having the need for competence or control in a given situation. Maitlis and Sonenshein (2010) relate capacity to shared identity, which can act as an enabler or a barrier for strategic change. That implies that a group can develop a shared identity about their own capacities to change the status quo. The third central construct of Weick's (1988) theory is *expectations.* It defines how organizational members act optimistically or pessimistically on cues they discover in their environment. Individuals might update their expectations in situ (Maitlis & Sonenshein, 2010) leading to variations across an organization which can lead to both; actions that drive organizational renewal, or disable change due to a lack of shared understanding on what is happening. As these three components of meaning in collective sensemaking are important in understanding how actions are enabled or limited. It is important to consider the roles of updating and hesitation in the process of enactment, acknowledging that sensemaking is provisional and commitment, capacity and expectations are '*just as contingent and fragile as the environments in which we construct them*' (Maitlis & Sonenshein, 2010). Considering this allows to develop alternative courses of action, experiment with them and to adopt, alter or abandon them (Locke et al., 2009). Existing research has provided us contradictory evidence on how shared cognitive frames of reference develop (e.g. Labianca et al., 2000). Bartunek (1984) found that existing shared cognitive frames are replaced by new shared cognitive frames of reference which are a synthesis of the old and new, while Newhouse and Chapman (1996) and Labianca et al. (2000) described the process as a new frame

replacing an old one. Whereas the existing theorizing on changing shared cognitive frames views the change being driven by structural changes (Bartunek, 1984; Ambos & Birkinshaw, 2010), understanding construction of shared cognitive frames as a Sensemaking effort stemming from action, Weick's (1988) theory of enacted Sensemaking is a viable mean to develop further our understanding on how shared cognitive frames of reference that guide the actions of organizational members develop.

METHODOLOGY

This study examines how strategic change befalls in organizations through the practice lens, using a constructivist research approach. Conducting collaborative research, which we define as scholarship in inter-action between scholars and management practitioners, we build on creative tensions (Schiele & Krummaker, 2011) which can enhance the quality and reciprocal creation of new knowledge emerging between cognition and action (Feldman & Orlikowski, 2011), and between theorizing and implementation. This study was conducted as a case study (Eisenhardt, 1989) in two parts, the first part begun as an intensive collaborative effort between practitioners and researchers. Phase 1 of the study begun in 2013 and lasted until the end of autumn 2015 after which the strategizing made in the focal unit was purposefully spread to other divisions of the MNC. Phase 2 of the study consists of the processes related to spreading the strategizing, which originated from the focal unit to four other business divisions, which took place in late 2015 and early 2016. The five cases this research reports on are different divisions of the same MNC. Three of the divisions are in three different Nordic countries (Alpha, Beta, Gamma) and two of the business divisions are located in Asia (Delta and Epsilon). All of the subsidiaries operate in the same industry, however, in different markets and thus their product and service portfolios differ largely, not to mention their customers and other stakeholders. The strategic change that spread through all of the five divisions originated from division Alpha (the focal division). Based on the inductive theorizing made in the first phase of the study using data from division Alpha, theoretical propositions are drawn (Eisenhardt, 1989) which are further tested in the four remaining cases (Beta, Gamma, Delta and Epsilon).

The context of the case study is the global merchant shipping industry. Over the past two decades, the global shipbuilding activity in the focal firm's markets has steadily been relocating from Europe and concentrating in East Asia, with currently South Korea being the largest producer country, followed by Japan, and China, which over the past years has been increasing its share continuously at the expense of others. In the first phase of the study, data was collected during management meetings between 2013 and 2015 in which on average five practitioners and five researchers were present. The data on these sessions consists of field notes of the five researchers based on their notes on discussions and deep observations made on real life practices. Also, eight interviews of the practitioners in the focal organization

were conducted which were recorded and transcribed; one focus group interview in the focal organization's subsidiary; and two customer interviews which were not recorded due to sensitive nature and cultural considerations. However, extensive field notes were taken by two researchers conducting these three interviews, which were compared for coherence. In addition to the interviews and management meetings, archival data of the company was gathered in order to support the collected primary data (e.g. Eisenhardt, 1989). In the second phase of the study, one of the researchers accompanied one of the managers of the focal division in "spreading the strategy seed" visits made to four different organizational divisions. In all of the five meetings, five to ten people were present of which the researcher took ethnographic field notes of. The manager of the focal division was interviewed after all the visits to the four divisions had been completed. The interview was recorded and transcribed. The analysis of the data was a cyclical and iterative process during which a narrative describing the strategizing process was built retrospectively based on the data (e.g. Halinen & Törnroos, 2005). The approach used bares resemblance to the narrative approach in that sensemaking of organizational events is considered to require retrospective and prospective thinking while attempting to depict organizational realities as accurately as possible (Weick, 1995). Furthermore, analyzing the data using a narrative was considered appropriate as explaining organizational actions and events through a narrative is a "legitimate form of explanation" (Van Maanen, 1988).

RESULTS

Strategizing bottom-up through construction of common cognitive frames

Development of a new business model which became part of Formaco's (a pseudonym) corporate strategy started as an initiative to package certain products and services together to create added value for an end-customer. The initiative, which originated from one of the managers (Thomas from this point onwards) at division Alpha, was first discussed with another manager and an engineer who together cultivated the idea further. However, at this point the idea of what they wanted to accomplish was not yet refined to the level of a new business model or new business approach. Thomas explained this by stating:

"*Actually, when we started, we started because we wanted to optimize one of the processes and the decision-making of that process. Then we noticed it also had a huge impact on the earning potential of the product. That's how it [the idea of the new business approach] came about*".

That is, at this stage through sharing ideas in a small team, the process of enactment started (Weick, 1988) with the members of the team negotiating what it was that they were doing, what was the purpose of their doings and

how they could move further to develop it into something that could be monetized. Also, at this stage the two managers and one engineer were not consciously creating strategy, or strategizing but post-rationalization shows this point in time was very important to the development of the new business approach which subsequently turned into corporate strategy at a later stage.

While the idea started shaping, there was no clear goal of what would come out of it. Thomas stated that at division Alpha they started developing the idea further nevertheless and that they were sure something positive would emerge from their efforts:

"*I would say, in 2008 [when it all started] we didn't do so much yet because we thought that there was something, but we decided that hey let's build up one competence center and collect all the understanding in one place. So most probably that [missing] piece will be found after that when the people understand better the, really the system, from a technology point of view*".

From this stage, the self-organizing team grew with more managers and engineers joining the development team. Also, at this stage Thomas's superior had legitimized the work of the self-organizing team and their official goal became to develop a new business model based on the ideas created by the original team, to pilot it in practice and if succeeding, thinking of how it could be utilized in other parts of the organization as well. Once the team had grown, the idea of what the new business approach would look like became more and more clear. One of the managers (Nathan from this point onwards) commented on how information about the new business approach was first shared only within the self-organizing team after which the information was shared wider within the organization:

"*Yes at first the only ones who knew about it [the new business approach] were the ones who were directly involved with it and the management [of the division]. When it started to look likely for new deals to be closed [using the new business approach], other parts of the organization had to become involved*" (Nathan).

The discursive practices related to sharing knowledge of the new business model were developing alongside the business approach itself was constructed. Nathan highlighted this by explaining simply that: "me and [Thomas] were making these PowerPoints at first" which were creating and sharing the new vocabulary related to the new business approach which would enable development of shared frames of reference inside division Alpha.

The processes of sharing information across the organization and creating new discursive practices on the newly established business approach enabled spreading of the new cognitive frame (sensegiving) and for the cognitive frame to become shared within the organization (Sensemaking). The construction of the common cognitive frames was completed little by little expanding the group of people who knew about the new business approach and whose work was related to turning the new business approach

into an organizational reality. Through the processes of sharing knowledge, enacting on the shared knowledge and communicating, the cognitive frame of what the new business model was had developed; as a result of the iterative process. Organizational practices such as legitimization coming from higher levels of organizational hierarchy, discursive practices of organizational communication and practices of business development were turning the seed of an idea into a blossoming plant that was the new business approach. The development of new discourses was crucial as the new business approach was miles apart from the usual way of working at Alpha. While before, the discourses related to e.g. sales had been surrounded by concepts such as cost-cutting and minimizing capital expenditure, the new approach was centered around concepts such as value-in-use and operating profits (negative vs. positive connotations). At the stage when the new business model was first taken to market, it was still quite unclear how it would happen in practice; how all the parties involved in the transactions would react to the changed business approach Alpha was now offering. After the first sale had been completed using the new business approach, it seemed that in division Alpha, it was considered a major win for the company while in one of the Asian business divisions of Formaco, Epsilon, the perception of the same business case was quite contrary. “It was a complete failure”, stated one of the managers in the Asian division of the MNC when he was interviewed regarding the first sales case. The disparity in the perceptions of the two business divisions’ managers originated from two completely different cognitive frames on what the new business approach is versus how business is done at Formaco and what are the organizational practices related to it. This was an important finding as the conflict between the cognitive frames on how business is done at Formaco could easily be seen in how Alpha and how Epsilon perceived the same situation; two competing cognitive frames of the same thing existed.

While in division Alpha, it was clear that while closing the business deal using the new unconventional business approach, there might be some resistance from the manufacturer of the end-product. However, this would not matter to the extent that the sale should not be completed. If the sale would go through using the new business approach, this would be an extremely important milestone for the self-organized team to build legitimacy within Formaco but also to reshape the industry’s thinking on how business is done. As for Epsilon, the division had not been involved in the process of developing the new business model, and subsequently their understanding of how Formaco did business was still consistent with the older cognitive framework, which was shared commonly across Formaco’s divisions. Therefore, the employees at Epsilon could not comprehend how the first sale was a success as they were receiving negative feedback from the manufacturer related to the newly changes practices of Formaco. At division Alpha, while the first business case using the new business approach was perceived successful, it was clear that after the first transaction, the processes related to it would need to be refined further and the discursive practices related to made more coherent. While at this stage, it was evident that a common cognitive frame on the new business model had been

developed inside Alpha, for it to spread across Formaco's other divisions, there was more to do. On the higher hierarchical level of Formaco, piloting of the new business model had been redeemed as a successful pursuit and it was promoted from being a business approach of division Alpha into being a core part of the corporate strategy of Formaco. By giving the new business approach the status of a strategic goal, according to which all Formaco's divisions should try to adapt and attain, the bottom-up built strategy had become an organizational reality.

Based on our analysis on the development of shared cognitive frames and on how the strategizing efforts made by the self-organized team at division Alpha became a major part of Formaco corporation's strategy, we inductively theorize the following propositions:

Proposition 1: Bottom-up strategizing requires construction of shared cognitive frames, which support legitimization of strategizing efforts.

Proposition 2: Bottom-up strategizing is enabled by reconstructing and integrating discursive practices related to the new strategy across the whole organization; sensegiving and sensemaking.

Proposition 3: The processes of strategizing and theorizing are intertwined as the organizational processes of sensemaking and sensegiving, and are closely related to explaining change in an organizational setting.

The first proposition linking construction of shared cognitive frames with legitimization coming from higher in the organizational hierarchy, closely reflects on the temporal dimension of shared cognitive frames; shared cognitive frames change over time through the processes of sharing knowledge and negotiating and renegotiating the meanings of different aspects of organizational reality. The second proposition highlights discursive practices as a key element of creating cognitive frames that are shared inside an organization which, if coherent, enable creation and modification of other organizational practices that subsequently can lead to bottom-up strategizing. The third proposition reflects on the processes of theorizing about organizational reality and strategizing as being intertwined and constructed of loops iterating between action and abstract concepts in the process of developing. The propositions created in the first phase of our study are further analyzed in four other divisions of Formaco corporation; divisions Beta, Gamma, Delta and Epsilon.

Closing the strategizing loop top-down

After the new, more value-centric business approach had been validated by the top management of Formaco and placed as one of the strategic goals in the corporate strategy, what was needed was someone to visit all the different divisions to disclose the contents of the new corporate strategy. It was clear for Thomas, one of the originators of the idea that had turned into strategy that it would not be enough for different managers to read about the new strategic goal in the company newsletter but it was necessary to visit

the different divisions, talk about the new strategy with the same vocabulary used in division Alpha and thus give sense about the strategy in order to spur the sensemaking process in each of the division. "*The purpose of visiting the different divisions was really to open their eyes*" explained Thomas. The expectation was that in the first stage, sensemaking would occur in the divisions about the new strategy and after a short period of time the divisions would start to develop means to implement the strategy to their business practices.

Interestingly, in the two divisions located in Asia, the new strategy was received quite differently. At Epsilon, some of the employees had been involved in the sales process related to Alpha's first business case utilizing the new business approach and therefore had first-hand experience about it. They were more enthusiastic about the idea, or the business concept, than the actual implementation of it, as they had to deal with the aftermath of some of the practicalities, which did not work out during the execution process of the first business case. It was evident that in Epsilon's case, as they had been closely involved with Alpha, they understood clearly what the new business approach was about, but they had problems with how to articulate it forward to the customers. At Delta, the other business division located in Asia, the new strategy was received with open arms. "*They are going full-on with the new business approach as he's [an expat manager] driving it heavily forward*", had noted the researcher who had been present in the meeting where the new business approach had been discussed by Thomas and representatives of division Delta. The expat manager had been one of the originators of the whole concept of the new business approach, together with Thomas and one of the engineers at Formaco, which would explain further why the process of strategic implementation had been so rapid at division Delta. Furthermore, as the expat manager had been following so closely the development of the new business approach, it was easier for her to first fully understand the concept and secondly to help others in the division to make sense of the ideas originating from division Alpha.

At division Beta, located in one of the Nordic countries, the first impression on how they could implement the new strategy in their business was negative. The reason for the negativity was that they failed to understand how such a "simple" product that they were selling could be sold using a value-centric argument related to the new business approach. "They thought that their product is just a compulsory part that the customer needs to buy", asserted Thomas. After giving the employees of Beta some illustrative examples on how their business could be repackaged using the new business approach, they changed their minds and saw the opportunities the new strategy could provide them. Beta's case was a good example of how important it was for Thomas to visit them in person and "sell" the new strategy to them.

Alike at division Beta, at division Gamma, the discussion about the new strategy moved from initial misunderstanding about the potential use of the new business approach to excitement about the possible opportunities it could create. Division Gamma was in a Nordic country, as were divisions

Alpha and Beta. Thomas explained that the top management of the division was enthusiastic about the new strategy, yet the middle management was sceptical.

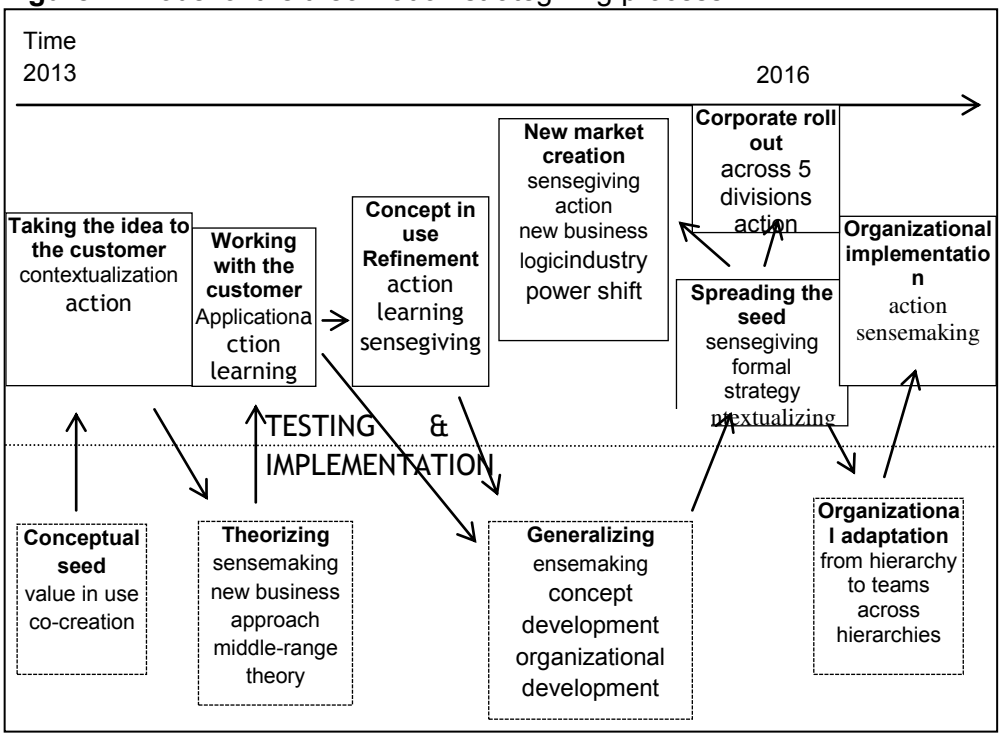
"*They saw it as a trade-off if you focus on the value perspective rather than on the technical drawings etcetera which would not be delivered on time because of it…however, after a bit of bickering with them, they seemed to have a great motivation to get started with this thing*" (Thomas).

Very much akin to Beta's case, in Gamma's case, it was crucial for spreading the new strategy across the MNC to visit the location and make sense together with key personnel about it; what this strategy means in general, what it means for us and our business and how can we implement it in practice.

DISCUSSION AND CONCLUSION

Our research shows that peripheral strategizing (Regnér, 2003) is a retrospective process of social sensemaking in which individuals in small groups gradually share views on organizational commitments, capacities and expectations (Weick, 1988). Figure 1 below visualizes the model of peripheral strategizing at Formaco.

Figure 1: Model of the theorization/strategizing process



Source: Figure 1 is derived from the data of the case study.

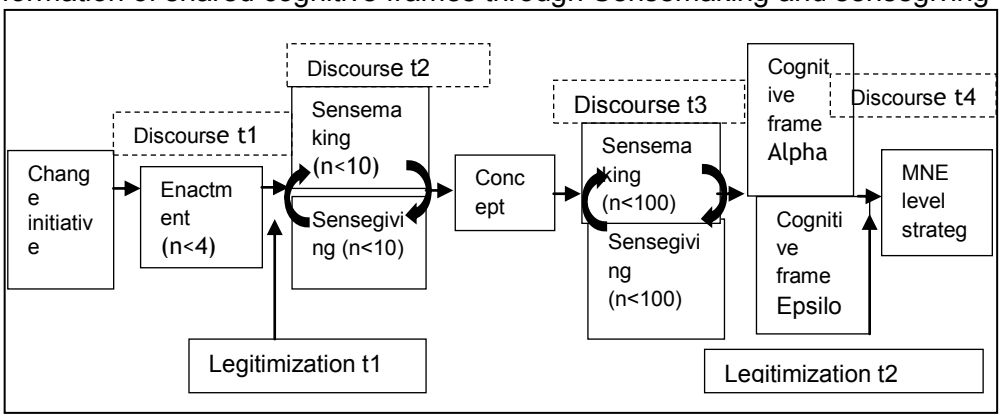
The process begun from development of the "conceptual seed" of what the goal of the company was; to start doing something in which value would be co-created with the customer. From that point, the conceptual idea was tested in practice by introducing it to a customer (action) which also gave context to the conceptualization of the initial idea (seed). That is, the small groups of organizational members were acting on their preconceptions (Weick, 1988) and their actions produced new cognitive frames while conscious strategizing produced new meanings through sensemaking. Testing the initial idea (concept) by introducing it to a customer (action) was the first loop in the concept-practice cycle. After the initial concept was discussed with a customer, it was further developed on a conceptual level through sensemaking. The further development, or theorizing through collective sensemaking, formed a new business approach from the more abstract and vague initial idea. Reformed shared cognitive frames and subsequently an enacted environment were the results of the strategizing and sensemaking processes.

Once a middle-range theory of the new business approach was enacted at Formaco, the process was again taken from the conceptual level to the practice level by working together with the customer to refine the business approach further. In practice, this meant learning more about the customer's problems while thinking of practical applications for the new business concept. The new business concept was then tested in use, after which it was further refined as learning in the organization evolved. Through discursive practices sensegiving occured extra- and intra-organizationally which took the process back to the conceptual level in which generalizations from the tested new business concept could be drawn. Generalization about the business concept could be developed through collective sensemaking, which again further refined the concept itself and lead to a need for organizational structures to be changed to fit the new business approach; actions changing structures. Successful testing of these frames provides inputs to new actions, which spread within the unit and across divisions and firm boundaries. That is, sensegiving occurs which consequently leads to formation of formal strategy. At this stage, the business case was solid; it had been tested with the customers successfully and had thus gained attention and legitimacy from the top management of Formaco. It was embraced as part of the corporate strategy and subsequently from top-down in the organizational hierarchy; it was declared that the new strategy should be implemented in different parts of the organization. Hence, it was necessary to "spread the seed" or the message of the new business approach to other divisions which was completed through the process of sensegiving. Being part of the formal strategy of the organization gave context to the ideas the new business approach was based on. Spreading the seed through discursive practices developed earlier in the process and by renegotiating the common understanding of what building commercial vessels is about with other industry players' lead to new market creation, which subsequently modified the existing industry logic and shifted the power set-up among the players in the industry. Inside Formaco, this meant the organization adapting to the new way strategizing was accomplished; not

anymore hierarchically top-down but across teams within the organizational hierarchy. Through the change in the theory of the organization of what strategizing is, the implementation of the strategy could be completed in practice via sensemaking and taking action.

Our study shows that theory is a useful starting point for strategizing, constructing the frameworks that serve to build abstract common frames of references (cf. Lewin, 1940) which form the basis within which inductive learning takes collectively place, enabling new theorizing. The outputs of such theorizing processes form the inputs to practical propositions, which are tested by managers in the field, producing new certainties, which question assumptions of formal strategies while providing new alternatives. These gradually spread through an organization and become a formal part of strategy. By taking a strategy-as-practice view on these processes, specific attention on the practices that detail what people do to create such changes and how these changes become enacted on a wider organizational level (cf. Kobernyuk et al., 2014) can be paid and hence not solely focusing on contents of the newly formed strategy. Therefore, important contributions in understanding how organizational capabilities (e.g. Winter, 2003) are more than top management activities but deliver empirical accounts and theoretical thoughts on the agency in the web of practice (Vaara & Whittington, 2012). This research contributed to existing knowledge on strategy-as-practice by focusing on the sensemaking and sensegiving practices of middle-managers whose positions are beyond formal strategy ranks (Vaara & Whittington, 2012) in MNCs. Furthermore, legitimization and constant development of discursive practices related to change initiative were identified as mechanisms enabling bottom-up strategizing. As figure 2 below illustrates, legitimization in time point 1 enabled increasing the amount of resources allocated for the building up the strategy initiative; the number of people involved grew steadily, making the sensemaking-sensegiving loop more intricate, simultaneously gradually refining the discourse related to the strategy initiative.

Figure 2: Legitimization and discursive practices as mechanisms enabling formation of shared cognitive frames through Sensemaking and sensegiving



Source: Figure 2 is derived from the data of the case study.

Disparity in the cognitive frames of division Alpha and Epsilon created an identity crisis in a sense within the organization, which was solved by legitimizing the strategy initiative as part of corporate strategy, subsequently further developing discourse related. That is, in our research, we could capture several iterations of processes related to construction and change of cognitive frames through these processes which allow us to understand how new strategy emerges from actors' strategizing scattered across the organization and how it eventually becomes part of the formal strategy of the MNC. Interaction and recognition between top management and strategy initiators have been found in previous research as key aspects of bottom-up strategizing (Regnér, 2003). In comparison to Regnér's study (2003), external actors did not play a significant role in the strategy formation, but the strategy initiative came from inside the studied MNC.

The theoretical implications of this research suggest that first, strategizing and theorizing are similar processes. That is, deductive thinking (exploiting given knowledge) and collective reflection are shaping organizational commitments, shared capacity and identity, and form expectations (Weick, 1988; Maitlis & Sonenshein, 2010; Maitlis & Christianson, 2014) that become inputs in new actions. In line with our first and second theoretical propositions (bottom-up strategizing requires construction of shared cognitive frames which support legitimization of strategizing efforts; bottom-up strategizing is enabled by reconstructing and integrating discursive practices related to the new strategy across the whole organization; sensegiving and sensemaking), we found that new actions lead to retrospective sensemaking as a social process in which collective evaluations of previous shared cognitive frames are negotiated in the light of newly explored information (inductive thinking). These lead to the enactment of new cognitive frames, which give sense to organizational members and set in motion deductive thinking in new contexts that shape commitments, capacity/identity and expectations. Furthermore, in comparison with existing research on shared cognitive frames (Bartunek, 1984; Labianca, 2000), we find that changes in shared cognitive frames do not necessarily originate only from structural changes but can be the result of actions taken by organizational members, which then reform organizational structures. In accordance with our third theoretical proposition (the processes of strategizing and theorizing are intertwined as the organizational processes of Sensemaking and sensegiving, and are closely related to explaining change in an organizational setting), we found that strategizing as a bottom-up process is an organizational learning process, in which implementation is part of strategizing. Thus, strategy formation can be a transparent process, which is inseparably intertwined with operational action.

In terms of practical implications, our research suggests that firms can empower operation-level individuals to engage in strategizing, which strengthens their organizational commitment, structurally enables their organizational capacity and formation of organizational identity. Creating positive preconceptions lead to actions, which set in motion strategizing

processes, in which strategic propositions and implementation/testing occurs iteratively; creating formal strategies as an outcome of organizing. Furthermore, considering development of discursive practices as a mechanism for enabling change in shared cognitive frames is a valuable notion for managers in all change initiatives. Concerning limitations, this research is informed by multiple accounts of cases referring to core processes of deductive and inductive sensemaking, testing and iterating these processes in one global firm, therefore generalizability cannot be defended but transferability of key processes can be assumed (Feldman & Orlikowski, 2011) providing us with suggestions for further research. For future research, testing the propositions outlined in our paper with a larger sample could provide valuable information on bottom-up strategizing practices.

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