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FACTORS OF GROWTH FOR THE BIGGEST HUNGARIAN FIRMS

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Abstract

Since the beginning of the financial crisis, one of the key challenges of the economic policy has been to boost the growth of firms, particularly in the CEE region. Various research has showed that obstacles limiting and boosters enhancing companies’ development potential differ across companies. This paper builds on both publicly available financial reports and a detailed questionnaire targeting the top 200 Hungarian firms with the highest sales in 2015. In top management’s opinion, the level of technology, innovation and export position improved most in the years 2013 to 2015. At the same time, results show that beside market factors and challenges within companies’ discouraging regulations, the limited amount of available trained workforce, high tax burden, and management capabilities are the major obstacles of growth. Even the biggest firms do not form a homogeneous group: constraints are different when controlled for export intensity, ownership, location, and strategic focus. So, access to financing is a real issue only with locally owned firms.

Keywords: workforce, regulation, competiveness, export, ownership

JEL Classification: G32, L21, L25, H32, M21

Introduction

Corporate growth is the driver of economic growth in any country. But to promote economic development, we have to see clearly what factors have a significant effect on business growth, so decision makers could contribute to increasing the GDP by influencing the key drivers. During recent years, convergence to Western Europe has gained a significant importance in the CEE countries, particularly in the EU member states. As Hungary has recently lost most of its impetus still present in the last decade, debates on causes and potential solutions have strengthened.

This paper aims to identify the key growth factors of the biggest Hungarian firms that are the main drivers of the local GDP. The objective of the research is to identify which of the factors earlier identified globally are relevant in the Hungarian economy today.
It is particularly important to list the obstacles to growth to see who and how could improve the growth potential of the country. Once the key drivers are found, economic policies could be tailor-made to enhance the speed of development and optimise the use of scarce resources spent on business incentives.

In the first part, this paper presents the obstacles to business growth previously identified in literature. Then, after reviewing the sample used, the most important findings on growth factors of top Hungarian firms are presented.

Constraints in literature

Over the last decades, various theories were developed to explain the differences in the size of firms. While transaction cost based explanations and expansion trends explained by biological analogies were useful to describe the behaviour of a typical firm, those offered little help for elaborating country specific policies.

Before investigating drivers of growth, it is vital to define and understand growth itself. Literature on business growth usually focuses on changes in the amount of sales or sometimes, the number of employees, as these quantities are relatively easy to measure and publicly available. Though, in corporate finance, growth is more likely to be linked to the increase in profit, dividend, share price or cash flow. Based on possible sources of growth, usually extensive and intensive growth types are told apart. While the former would result from purchasing other firms or business units, the latter is linked to extending an activity already internalised or owned by the company. But even here, understanding growth could be more complex than that. Achtenhagen et al. (2016) underline that instead of applying the traditional external and internal growth strategy categories, a more detailed analysis of business growth would be welcome. Based on case studies of medium-sized firms, they identified eight different growth models on the pure organic to pure M&A scale showing that external growth is more complex than commonly assumed. Because of all this, instead of building one complex growth model, researchers started to focus on measuring individually the effect of specific factors either picked based on models of business economics and corporate finance or identified through case studies and deep interviews with top managers. Relevant variables usually mentioned could be grouped as outer and inner factors based on their relations to the given business entity.

Outer factors

The effect of financing opportunities is probably the most researched topic in this field. Serrasqueiro and Nunes (2010) analysed the relationship between growth opportunities and debt at 39 non-financial Portuguese firms for the period 1998-2006. When growth opportunities of firms are low and high, the relationship between growth opportunities and debt was found to be positive, while for intermediate levels of growth opportunities, a negative relationship was identified. They believe creditors recognize high growth opportunities, and debt is used to discipline managers when investment opportunities are weak. They also found that more profitable firms turn less to debt.
This implies that the importance of access to credit is not constant, rather it is more relevant when growth opportunities are great or very low, and when profitability is weaker.

Building on a sample of more than 6000 firms for 2007-2012 from the Emerging Europe, Leitner (2016) underlines that it was particularly the growth of the firms from the Western Balkan countries that was hit by the financing constraints originating from the financial crisis. She emphasises that exporting without importing, and boosting of innovation are recipes for fast growth in the whole area, while the importing-only business model, and, surprisingly, foreign ownership, both retard firm growth. (Contradicting Majcen et al. (2009).) The reason why the foreign ownership effect could be questionable was identified by Vukšić (2016). He showed that in Croatia the productivity of labour has not improved in either greenfield or (predominant) brownfield FDI investments, so no general improvement in competitiveness was to be experienced. This led to a conclusion that it is the type and not the owner of investment that drives growth.

Quader (2016) found a U-shaped connection between firms’ size, age and growth rate when investigating 1122 listed UK companies. He also underlines the importance of internal cash flow generation. During years with low cash flows, the connection between growth and availability of external financing became stronger. The influence of internal cash flow generation was also higher for firms with more restricted outer financing sources. The validity of his results is well supported by Trefalt and Jagric (2014). The paper investigating Slovenian firms for the years 2004-2011 shows that access to outer financing only for larger firms reduces the importance of own cash flow generation when considering business growth. Based on a sample from Belgium, De Maeseneire and Claeys (2012) also conclude that the realisation of FDI projects and the growth of SMEs is limited by harder access to outer (both debt and equity) financing, making these projects and firms more dependent on their own internal cash flow generation.

Peev (2015) analysed determinants of firms’ growth in ten European transition countries over the period 1996-2011. According to his results, the quality of financial intermediation is more important for firms’ growth in countries with low quality of institutions. At the same time, the increase in private credit supply alone would not automatically result in faster growth: its effect is much stronger in countries with low governance quality. He also found that economic liberalization has no direct effect on firm growth. Instead, higher than average country governance indicators (Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption) seem to promote growth.

When examining the former CEE and CIS communist countries over the years from 1990 through 2008, Cojocaru et al. (2016) concluded that the efficiency and competitiveness of the financial system is more important than the amount of private sector credit provided by the banking system. (A result similar to that of Peev, 2015.) They discovered a particularly strong link to interest rate spreads and bank overhead costs.
International integration of companies through trading is also a popular field in growth research. Were (2015) analysed the effect of foreign trade on economic growth globally for the period 1991-2011. He concludes that trade promotes growth only in developed and developing countries, while there is no effect for the least developed countries. As a main reason for this, the paper identifies the structure of FDIs arriving in those countries and proposes to change local investment promoting policies to receive real growth benefit from international trade. Besides that, high cost of doing business, lack of infrastructure, low quality of human capital, lack of both technological innovation and promotion of entrepreneurship is quoted as another reason. Silberberger and Köninger (2016) found that both regulation and trade have a significant positive influence on growth. The effect of regulation was especially strong for countries with worse regulatory quality and middle-income level. Regulatory quality seems to have a decreasing marginal effect, but at the same time, the least developed countries do not seem to benefit from improved regulation. The role of education was found to be even more significant than that of trade, albeit mostly relevant for high-income countries. There is also no clear evidence of a direct effect of political institutions on income growth, but authors assume the effect to be indirect in the sense that countries with better political institutions will simply reform more and have better business regulation.

Lack of workforce is also an issue in the CEE region. Lazarov and Petreski (2016) highlight that the amount and quality of human capital could be a growth obstacle even in cases of high unemployment rates. In Macedonia, 12 percent of companies complained for inadequate workforce even though the average unemployment rate was 44.6 percent. Still, firms were unwilling to invest in training courses themselves. Bilal et al. (2016) examined the growth barriers of SMEs in China, India, and Pakistan. The availability of external financing had no effect on growth in China, but had positive effects in the other two countries. Besides that, infrastructure, workforce and corruption were identified as growth barriers. Innovation, one of the two mediators considered, promoted growth in all countries, while the other mediator, tax rate was found to have a contrary effect. Hanousek and Kochanova (2016) investigated the effect of bribery on firms’ performance in Central and Eastern Europe. They showed that higher bribery level is linked to slower sales and labour productivity growth. At the same time, higher dispersion of bribery paid went hand in hand with better performance. This latter finding is explained by more efficient firms not paying bribes while less efficient ones using bribes to get forward once the bureaucratic system is open for that. In this case, bribing is not required but well received by public officers.

Garsaa and Levratto (2015) measured how the growth of firms reacts to reducing the rates of social contributions linked to labour. Based on their sample of more than 44000 companies from the French manufacturing industry between 2004 and 2011, such tax reductions promote especially the growth of already fast growing and large (over 50 employees) companies. While the effect was also positive for smaller and stagnant firms, the extent was far smaller calling for a more differentiated economic policy to promote growth. The definition of growth may be of high importance here, as Leitner (2016) showed that in countries of Emerging Europe, tax reductions promoted growth of employment only but not that of sales. At the same time, regulatory institutions, which help resolve insolvencies quickly and at low cost, were obstructive to both sales and employment growth. Analysing 162 countries over the period 2007-
2011, Messaoud and Teheni (2014) conclude that most regulation indices in the World Bank Doing Business Database are positively correlated to the average growth rate. These fully include areas like starting business, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency. The only exceptions were dealing with construction permits (three indices) and the time needed to register properties.

García-Posada and Mora-Sanguinetti (2015) tested the effect of the judicial system on business growth in Spain. The paper underlines that one should not consider the overall functioning of courts, rather the focus should be on procedures the firms may face in case of conflict. According to their result, it is the efficiency of the declaratory stage, i.e. when fines are set, that promotes economic growth, while efficiency of the execution stage (when and how payment is to be made) has no impact. They showed that increased efficiency of the declaratory stage does not only promote the growth of incumbent (already existing) companies, but it also boosts the number of new entrants, while it has no effect on exits. Hence, according to their results, increasing judicial efficacy would improve welfare, regardless of its impact on the average firm size.

Benos et al. (2015) checked how geographical proximity of dynamic areas influence local growth in the EU. The paper concludes that entities surrounded by fast developing regions are more likely to grow faster than otherwise. Not only geographical, but also economic and technological linkages implied strong cross-regional spillovers, so authors recommend to give priority to higher physical and human capital investment in lagging regions across the EU.

Researches of growth obstacles do not only answer questions, but also tend to raise some. Lee et al. (2013) underline that the effect of big firms and SMEs on the economic growth is significantly different. Based on their results, big businesses have a significant effect on the extent and stability of economic growth all around the world. According to their results, these effects remain significant even if controlling for their influence on SME activity. At the same time, while the absolute presence of big firms (measured by their number) has a positive effect on economic growth, the relative presence of big businesses within the national economy (measured by their sales over GDP) is negatively linked to it. This result clearly contradicts the general argumentation for supporting SMEs in the first line as those would employ most of the people in any economy and determine the competitiveness of the country. It seems that some kind of equilibrium should be maintained – the exact values of which are still unclear.

Another issue is raised by Nițoi and Pochea (2016a). They tested the convergence in ten emerging countries within Central and Eastern Europe. The paper refuses the hypotheses of general convergence and identifies countries that outperform in some industries while underperform in others. When testing the convergence of financial markets in the region, Nițoi and Pochea (2016b) state that there is no single convergence pattern for these markets and during the period 2007-2014, disparities even increased. In both pieces of research, some specific countries may show convergence from one point of view and diverge when considering several others. This implies that industries within the same country may follow very different
development patterns raising the need for country and industry specific mapping of growth factors at the same time. It also seems that we have to set some kind of preference among industries when promoting economic growth. How that should be done is yet unclear.

**Inner factors**

In her classic article, Penrose (1955) called attention to internal (unique) factors that may hinder the growth of a company regardless of the outer environment like a pattern of a given industry in the economy. To explain the differences among firms operating under similar circumstances, she lists (1) planning capabilities, (2) availability of unused capacities, (3) limits on managerial resources, (4) limits of demand, and (5) diseconomies of scale as potential factors that may explain the disparities in the development of sales or employment. The importance of inner factors implies that just by changing the environment we may not see all firms growing faster, and companies developing more rapidly under given conditions may be superior to others in these unique characteristics. It seems that these inner factors have not lost any of their importance during the last decades. Majcen et al. (2009) focused on five CEE countries to show that the main drivers of productivity growth at foreign owned manufacturers are corporate governance, market orientation, and production capabilities. According to their findings, the higher the level of overall control and control of marketing and strategic functions at a local subsidiary, the higher the entity’s productivity growth. While they found no regional differences, subsidiaries with higher proportions of sales to foreign parent companies and businesses in low-tech sectors showed higher improvement. A positive connection between foreign equity stake and increase in efficiency was also identified.

D’Souza et al. (2014) concentrated on 27 Eastern European and Central Asian countries to identify growth obstacles of companies. According to their results, newly founded firms experienced higher financial, corruption, and legal burdens than privatised firms; still the former outperformed the latter group. The authors explain this phenomenon by the organic (and thus stronger) profit motive of the newly founded companies. This once again underlines the importance of inner factors, and assumes some kind of path dependency.

Jeraj et al. (2015) focused on entrepreneurial-psychology. Based on a multi-country survey with a sample of entrepreneurs from Slovenia, USA and Serbia, the paper showed that openness (entrepreneurial curiosity) is positively related growth of the firm. Their results are reinforced and extended by Yazici et al. (2016). This latter paper investigated 92 independent hotels in North Cyprus to identify growth factors and a number of growth drivers that were categorised as entrepreneur specific (strategic) and stakeholder specific (tactical) factors. An important contribution of this micro level research was to raise the idea of separating company specific growth factors and key decision maker (management and owner) specific factors. This grouping may be less important for larger firms with several distinct levels of complex decision-making culture based on agreement of a team of specialists rather than a single individual, but smaller firms might leave some more space for human traits of top management members in the process. Table 1 summarises potential growth factors based on the
literature review presented. It is worth noting that most of the factors may have both positive and negative effects depending on their extent or value. Items appear in the table as originally tested in the articles quoted.

Methodology and sample

Based on the literature review, it is clear that the range of factors affecting the growth of firms may be different depending on their (1) size, (2) location, (3) ownership structure, and (4) foreign trade activity, among others. To investigate which of the factors listed are relevant for the leading Hungarian firms a detailed questionnaire was sent to 200 local companies with top sales in 2015. As the focus was on the biggest companies based on literature, decision maker-specific factors are less relevant. So, when collecting data, variables linked to factors included in the other three categories were also considered.

Data was collected by the business information provider Bisnode. Besides collecting financial statements and demographic characteristics of the firms, a detailed questionnaire with a detailed list of other potential growth factors was sent to top managers. Altogether 74 answers (response rate: 37 percent) were received. The aggregated performance of those companies accounted for 24 percent of total export, 26 percent of total EBITDA, 35 percent of total employment, 39 percent of total after tax profit, and 42 percent of total invested capital of the top 200 Hungarian firms. So, an average firm in our sample was exporting less and using more capital than the average of the leading 200 enterprises, while employment and profitability were almost at the expected level.

Results and findings

When asked about key success factors of the last three years (2013 to 2015), top managers had to allocate 100 percent across the listed items. Based on percentages, allocated items were grouped as important (more than 40% of success coming from that factor), of mediocre importance (20% to 40%), and of low importance (0% to 20%). Figure 1 shows how different factors scored across the replies.
### Table 1. Factors influencing the growth of firms

<table>
<thead>
<tr>
<th>Influence on company growth</th>
<th>Decision maker specific factors</th>
<th>Company specific factors</th>
<th>Economic factors</th>
<th>Regulatory factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Entrepreneurial curiosity</td>
<td>Exporting only strategy</td>
<td>Absolute presence of big companies</td>
<td>Level of education</td>
</tr>
<tr>
<td></td>
<td>Autonomy</td>
<td>Innovation (mediator)</td>
<td>Importance of foreign trade in the country</td>
<td>Favourable tax regime</td>
</tr>
<tr>
<td></td>
<td>Innovativeness</td>
<td>Good planning capabilities</td>
<td>Availability of external financing,</td>
<td>Country governance</td>
</tr>
<tr>
<td></td>
<td>Competitive aggressiveness</td>
<td>Availability of unused capacities</td>
<td>Efficiency and competitiveness of the financial system</td>
<td>Efficient corporate juridical system</td>
</tr>
<tr>
<td></td>
<td>Desire to be one's own boss</td>
<td>Number of founders/owners</td>
<td>Proximity of rapidly developing regions</td>
<td>World Bank</td>
</tr>
<tr>
<td></td>
<td>Desire to succeed</td>
<td>Other business interests of the owners</td>
<td></td>
<td>Doing Business Indices</td>
</tr>
<tr>
<td></td>
<td>Active risk taking</td>
<td>Family, “investing” friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivation</td>
<td>Key employees, partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>Firm age</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management experience</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family history</td>
<td>Size of firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age of decision maker</td>
<td>Organisational culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prior sector experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network of contacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>Customer concentration</td>
<td>Relative presence of big companies</td>
<td>Effective insolvency regulations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier concentration</td>
<td>Lack of workforce</td>
<td>Lack of infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strong competitors</td>
<td>Low quality of human capital</td>
<td>Lack of technological innovation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limits of demand</td>
<td>Lack of promotion of entrepreneurship</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author, based on the literature review presented
Improving profitability, technology, and motivated, innovative team were the most significant forces. It is worth noting that the two latter ones are inner factors, while the first one is more a result of different forces. Increases in export sales had greater effect than the similar success in local markets, while improvements in productivity and growth in number of export countries were not mentioned at all. When asked what parameters were to be improved in the coming three years to boost growth, human resources, regulation, and management capabilities were the most common answers. At the same time, highly likely thanks to the recent financial supporting program of the National Bank of Hungary and the low interest environment, financing opportunities needed the least improvement. While boosting export is one of the key focus of the current national economic policy, this idea seems not to play a very important role in the future of the biggest firms. (It is worth remembering though, that our sample had lower than average export performance within the top 200 companies.)
When asking about the obstacles of growth these companies are facing, an open-end question was also formulated to give room for inputs and not to limit them by a potentially incomplete list of choices. Room for up to three factors was provided.

The answers received were clustered into homogenous groups. Regulation and unfavourable state influence was the most important group (62.2 percent). Within this cluster, unfriendly regulations were mentioned by 47.3 percent of the respondents, while 14.9 percent complained about various state burdens and taxes. The second most cited problem was lack of trained workforce mentioned by 54.1 percent of the managers. 52.7 percent of them complained about some kind of market factors, like fierce competition, new competitor entering the market, disadvantageous macroeconomic conditions or changes and uncertainties in market conditions. Other important factors listed include inner factors (e.g. technology, innovation, management efficiency) accounting for 24.3 percent and financing issues marked in 21.6 percent of the questionnaires. Bribery that is often mentioned by the opposition as an important issue in everyday Hungarian politics was not mentioned at all.

Beside of being able to judge the importance of these factors a very important lesson learned from the answer was that decision maker specific factors (management efficiency), company specific issues (technology) could be just as important as economic factors (market conditions, financing, workforce availability) or regulatory problems (taxation, laws), whiles these inner factors are far harder to track and measure.At the same time, results show that not even the biggest companies in a given country form a homogeneous group when considering growth obstacles. When tested for location, ownership, and market focus significant differences were measured. (Table 2)
Table 2. Significant differences in growth factors*

<table>
<thead>
<tr>
<th></th>
<th>Outside the capital</th>
<th>In Budapest</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavourable regulations</td>
<td>38.8%</td>
<td>64.0%</td>
<td>47.3%</td>
</tr>
<tr>
<td>Difficulties in financing</td>
<td>17.3%</td>
<td>42.9%</td>
<td>22.7%</td>
</tr>
<tr>
<td>Shortage of trained workforce</td>
<td>33.3%</td>
<td>64.0%</td>
<td>54.1%</td>
</tr>
<tr>
<td>Inner obstacles**</td>
<td>12.5%</td>
<td>30.0%</td>
<td>24.3%</td>
</tr>
</tbody>
</table>

* Differences significant at 5 percent significance level. **Significant at 8.5 percent.

Unfavourable laws and regulations were quoted by far bigger likelihood by firms headquartered in the capital. This could be most likely explained by the considerable differences in the industry structure of the two locations. Difficulties in financing were characteristic for locally owned firms (state owned companies were not considered), while shortage of trained workforce hit export oriented companies (achieving at least 25 percent of their sales in foreign markets). Probably one of the most interesting finding is that inner obstacles were far more likely to be identified by firms integrated to the international economy through their exports that might be more explained by the management culture than the actual abilities of the company. It is not very likely that non-exporting business have far less problems within the firm, rather companies with international connections are better in noticing their own disadvantages compared to rivals. This again highlights the importance a management culture in improving the performance of a business entity.

Conclusions and limitations

Based on literature a wide range of factors may potentially have an effect on the growth of companies for the years 2013 to 2016. One of the contributions of this paper is to group these factors into four categories underlining the importance of key decision maker specific and company specific characteristics that are harder to measure in contrast to market and macro factors more often tested. Another important result is that an order of relative importance of all the growth factors analysed was created instead of just listing obstacles and boosters. Besides, there are four important lessons to learn from the questionnaire bayed research performed among the biggest Hungarian firms.

(1) After the opinion of the top managers, the most important current obstacle of growth of the biggest companies is the state itself in Hungary. There is a lot of room for improvement particularly when considering current rules, regulations, and taxation. The influence on growth of these factors was earlier described by D'Souza et al. (2014), Messaoud and Teheni (2014), Garsaa and Levratto (2015), Bilal et al. (2016), and Silberberger and Königer (2016) for other markets.

(2) As during the last three years one of the key success factors was the more effective use of human resource, the current problem of missing workforce is a particularly severe one. It is not also workforce market conditions but also the abilities and knowledge of the employees and the management that calls for improvement. Still, just as Lazarov and Petreski (2016) state for Macedonia, even the biggest firms
usually evade spending on education of their current and potential employees in Hungary. The role of human factor was earlier presented not only by Penrose (1955), but also by Were (2015), Benos et al. (2015), and Yazici et al. (2016) more recently.

(3) Even the biggest firms do not form a homogeneous cluster. There are significant differences among those companies even in the importance of factors less influenced by individual characteristics (e.g. workforce shortage). Ownership, export orientation and location were all showing significant differences in some measures. While the importance of ownership was cited earlier by Majcen et al. (2009), Vukšić (2016), and Leitner (2016), export orientation was also highlighted as growth factor by Leitner (2016). Differences in location within the same country was less researched, but Benos et al. (2015) had similar results. At the same time it is highly likely that in our case it is more the difference in industry structure strongly linked to location that might explain the results of this paper.

(4) Not discovering inner obstacles of growth and neglecting exporting opportunities seem to be connected, at least among the biggest Hungarian firms. This underlines how important the corporate culture (decision making processes, striving for self-improvement) could be in explaining the extent of growth of a firm. This underlines that factors raised by Penrose (1955) are still relevant today, a result that was also emphasised by Jeraj et al. (2015) and Yazici et al. (2016).

As all analyses, this paper has its limitations too. The research focus was on the biggest companies so results may not be valid for the whole Hungarian economy. Also the sample had less than average export performance, while capital employed was more than typical for the top 200 firms, what might hint to difference in industry structure. There could be also obstacles overlooked by the top managers answering. Also because of the sampling, this research could not trace factors effecting mainly or only growth of SMEs.

Due to the development process of this research field, a number of questions remain still without answer. We can not be sure that (1) the growth of one variable (sales, employment) automatically triggers the growth of all others (profit, cash flow, added value and GDP) leading to an increase in the general term. Also, because of usually not focusing on the process of growth rather than on the outcome only, it is yet unclear, whether (2) a given driver affects the intensive or the extensive growth opportunities (or any possible strategies in between on that scale) or all of those. Next, (3) different factors may promote growth of SMEs and large firms, but we still do not know which kind of growth is to be preferred. Also it has been shown that growth can take very different directions and speed for different industries even within the same country and under the same economic policy. It needs to be answered yet, (4) which industries to focus on when stimulating business growth. Finally, very limited research was made on (5) which kind of these growth strategies would be more advantageous for a country in the long run.
References


DIFFERENT MEASURES, DIFFERENT TRENDS – CONTRADICTIONS IN MACRO AND MICRO LEVEL GROWTH MEASURES

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Abstract

When focusing on business performance of a country, industry or an individual firm the performance of companies may be tracked using various measures. By simulating the behaviour of a simple firm, our model underlines that the choice of measurement unit determines what distortions we will face, and thus, using different measures we may end up identifying completely contradicting cycles at macro, mezzo, and micro level. On top of that, these cycles would radically change if firms examined changed their operational, investment or financing strategy or when structural changes happen in the economy. This may end in researchers analysing non-existing cycle changes and looking for nearly identical explanations of development differences for industries, regions or countries.

Keywords: fluctuation, corporate performance, inflation, leverage, strategy

JEL Classification: D92, G31, G32, O14

Introduction

Business growth is a key issue at any level of economics. While company owners are concerned with their future profit, industry associations and market analysts focus on general trends hitting a given industry. At the same time, regulators and politicians usually concentrate on macro tendencies to enhance the wellbeing of the given country. Once growth is slowing down, all these decision makers are worried, while they become more relaxed if measures show an upward trend. In the CEE countries nowadays it is particularly important to find the right way to speed up convergence to western countries. When growth is weak at the macro level investigations start to
uncover causes that hinder the industry level growth. At the meso level there is an ever bigger need to identify key factors that explain why certain firms perform better than others in order to connect micro and macro level measures.

But is it really true that a macro level upward trend automatically means that most of the firms in the economy see their performance growing? Can we experience a fall back at the country level while most of the firms are actually doing better? Based on common sense, this is hard to imagine. But once we use different measures to track performance at all three levels, due to the heterogeneous approaches we may see the values measured showing completely different trends even in a radically simplified world, which makes it very hard to clearly identify when things are getting better or turning worse.

Corporate performance may be measured in various ways. Total sales, operational profit, or after tax profit are used by market analysts to describe a given industry, sum of added value (GDP – gross domestic product) is a common measure in macro papers, while at the firm level owners may focus on dividends, cash flows, or some profitability ratios, like ROI (return on investment), ROE (return on equity), or CFROE (cash flow return on equity). We may assume that an industry of well performing companies should be doing well at the sector level, and an economy consisting of boosting industries ends up with great trends at the macro level. This argumentation may be logical, but is that really true once we use different measures to access the performance at each of those levels? Our simple model shows how measurement results may differ across measures in case of a simple company when controlling for (1) operational and (2) financial leverage, (3) equipment lifetime, (4) demand fluctuations, and (5) inflation.

The main goal of our paper is to show how the measured (and not the actual) performance can differ depending on how we carry out our analysis: at the level of the whole economy, at the industry level or company level. This is an important question, since in the literature several papers are dealing with the question of performance measurement by contrasting firms, industries, and even countries or regions, but usually the researches focus on one of the levels, applying different indicators, and different analysis methods.

For example, at the macro level, a key issue related to performance is handling business cycles. Research related to the measurement of business cycles goes back to the late forties. The first notable research was carried out by Burns and Mitchell (1946). This research was followed by several more in this field. The main focus of these papers was to decompose the business cycle component from the empirical datasets, e.g. Baxter and King (1995), Hodrick and Prescott (1980), Hassler et al. (1992), Diebold and Rudebusch (1994), Darvas and Szapáry (2004), Zarnowitz and Ozyildirim (2006), and Yogo (2008). The most commonly used methods based on Baxter and King (1995) were the following: a two sided moving average; first-differencing; removal of a linear or quadratic trend; application of Hodrick-Prescott (1980) filter; and the band-pass filter.

Wagner et al. (2017) highlight that the way we measure economic fluctuations plays a central role in research. While the Gross Domestic Product (GDP) is most widely
used for the national economies, business cycles influence a number of economic activities. So, the Consumer Price Index (CPI), yield spreads, trade volumes, the Purchasing Managers Index (PMI), the unemployment rate, and special indexes like the Chicago Fed National Activity Index (CFNAI) are also applied in the literature, among other indicators, as good descriptors of business cycles. To that, we may add the GNP, total investment of the period or new workplaces created, and total employment, among others, yet staying at the macro level. Can someone really believe that all these measures end up showing the same trends and cycles? But if those differ, why should we be surprised to learn that some micro level indicators are not moving together with the “trend” identified at the macro level.

At the same time, performance is also measured at both industry and company levels in various ways both empirically and theoretically. For example Capon et al. (1990) are using a meta-analysis method to analyse corporate performance by applying financial and non-financial indicators. They collected the indicators based on the empirical literature of the industry and company level based researches between 1921 and 1987. Since in our paper we will focus only on financial indicators, we will use those which are usually used in the literature, like the Sales, EBIT or the ROE (Damodaran, 2012), but it is also very common to use some kind of management, trust or customer index to truck cycles.

Besides relying on the financial indicators generally used in the literature, we also take into account the results of the literature in another aspect as well. Previous papers found that the effect of inflation is notable regarding the profitability and the value of a company (Dömötör et al., 2013, Radó, 2005). Halling et al. (2016) showed that firms tend to change their leverage in accordance with business cycles. Using a sample from the US they showed that most of the companies follow a counter-cyclical strategy, but 10-25 percent of the firms stick to a pro-cyclical leverage. Wagner et al. (2017) showed for US companies that business cycles are strongly linked with the cycles of operational disruptions severity. This is why we include not only inflation, but also differences in the financial and operational leverage in our models.

The rest of the paper is structured as follows. After the literature review, our model will be introduced, then we show the results of a base scenario, where the demand on the market is stable and the leverage of companies is zero. Then, in the following part, we show how the fluctuation in demand will affect the performance of the company, the industry, and the whole economy. We will also analyse the performance effect of different operational and financial leverages, that of inflation, and the lifespan of equipment. Finally, conclusions and limitations of the research are presented.
Literature review

Skare and Stjepanović (2016) review the history of business cycle measurement. While offering an excellent summary of methodological issues and challenges in finding the appropriate definition of a cycle, it becomes clear that literature considers the problem of how to measure cycles far more important than to find out what exactly should be measured. The way of measurement poses two types of questions: what econometric methods to use, and what kind of effects to separate. For example, Zarnowitz and Ozylidirim (2006), and Yogo (2008) underline the difference between analysing growth cycles and business trends, the former requiring estimation and elimination of trends. Zarnowitz and Ozylidirim (2006) consider the effects of trends on cycles in the US, where they call attention to the common error of interpreting downward business cycles, as negative growth trends and state that growth trends and business cycles can be separated. Still, business cycles are measured by changes in GDP only assuming that the general performance of companies is similar to the development pattern of the GDP. Analysing business cycles for emerging markets Boz et al. (2011) tell apart permanent and transitory components – an idea very similar to Zarnowitz and Ozylidirim (2006). But when measuring macro performance, they focused on TFP, and not on the absolute amount of GDP.

Dabla-Norris et al. (2015) examined cyclical properties of development aids for the period 1970 to 2005. For testing that, they also separated the permanent component from the transitory component of the GDP. At the same time, it is very important to note that this is one of the rare articles which realise and state that this measurement is only one of the “proxies for the output cycle”. They found that bilateral aids are usually pro-cyclical with respect to both the donor and the receiving country, offering a cushion to developing countries during heavy downturns. They also emphasise that quantifying economic fluctuations is more difficult in aid receiving countries, particularly in low-income countries that are undergoing structural transformation and are subject to more frequent and severe shocks.

Using both a US and an international sample, Halling et al. (2016) conclude in their paper that leverage ratios in case of most companies are counter-cyclical, while for a minority of 10-25 percent of the companies, the leverage is pro-cyclical as usually assumed. The article uses business cycles and economic trends as synonyms and does not tell apart different industries, rather it compares data from years with macro crises with ratios of periods without such crises. While that could be a drawback, using various measures is a key contribution. They document pro-cyclical dynamics of profitability, market-to-book ratio, and corporate investments, while sales and PPE (plant, property and equipment)/assets showed no clear connection, and size and leverage was found to be counter-cyclical. This draws attention to the importance of what measure is used to track performance.

Wagner et al. (2017) emphasise that “the effects of business cycles should be taken into account to more accurately calibrate operational risk models used not only by banks, but also by manufacturing firms.” At the same time, they underline that contrary to the earlier seen application of GDP in the field of macro finance supply chain, management research has traditionally used the Purchasing Managers Index (PMI) as an economic indicator and studied the implication of it on supply chain.
management activities. When investigating US manufacturing and financial service industries they confirmed that severity of operational risk is pro-cyclical when cycles are derived from PMI, but frequency of losses is not. An important takeaway form this is that terms like pro-cyclical and counter-cyclical should only be used when indicating the cycle of the specific measure we consider. This is also emphasised by Perron and Wada (2016). They used both real GDP and consumption to measure business cycles in the G7 countries and showed that there are important qualitative and quantitative differences in the implied cycles.

The same problem appears at mezzolevel. When analysing firms’ growth in the EU 27 countries for 2000 to 2003, Oberhofer (2012) estimated the industry growth total manufacturing value added. He concluded that domestic demand fluctuations created detectable heterogeneity in the reaction among several different firm cohorts, while the adjustments to the European industry recoveries and recessions were homogeneous. In other words, when domestic level fluctuations were considered, company level fluctuation patterns were very far from those at the industry level.

Jovanovic and Rousseau (2014) translated the development of Tobin’s Q as firm level cycles and measured co-movement of investments with that measure. They showed that investment may be cyclical for newly established firms while it is counter-cyclical for older ones, highlighting that individual characteristics like age might play a role in how fluctuations influence certain activities often even aggregated at the national (macro) level. They even use an aggregate Q for the industry level performance measure. Bachmann and Bayer (2014) also investigate the connection of investment with business cycles. In their finding, the investment is pro-cyclical, while productivity, output, and employment growth have counter-cyclical dispersions. This means that the latter measures show a completely different business trend when tracked compared with the pattern of investments. They also call attention to the importance of how firms are chosen when mezzo and macro level measures are quantified: for example, we may end up with very different charts depending on whether we consider only firms with ongoing operations or all of them.

Funk (2006) has shown that firms’ reaction-to-demand swings differ across industries: companies in SIC 28 (Chemicals and Allied Products) and SIC 38 (Measuring, Analysing, and Controlling Instruments) reduce research investment during positive demand shocks, while for SIC 35 (Industrial, Commercial Machinery and Computer Equipment) the same occurs during negative demand shocks. Holly et al. (2013) underline the importance of another firm characteristic: ability to grow, which could be a measure for competitiveness. The paper shows that companies with low or negative growth rates (e.g. less competitive) are typically more responsive to aggregate shocks. Thus, effects of demand cycles may differ considerably depending on the distribution of competitiveness (ability to grow) of the companies. In other words, once the general competitiveness of the economy is changing, that will also change the way and extent demand fluctuations affect aggregated performance measures. When examining the North-South difference in Italian business cycles, Basile et al. (2014) conclude that 50 percent of the differences can be explained by firm-level heterogeneity, in particular by firm size, demand conditions and liquidity conditions.
Our literature review has three major findings. (1) We have to be very careful in defining what exactly is a trend or a cycle. Separating those from each other, and from one-time shocks is vital to get a fair result. (2) We cannot compare directly the cycles quantified in different measures. The inconsistency of measures may create blurred or fictive trends in itself. It is common to focus on GDP, GNP, TFP, and investments at the macro level, while manager indexes or total sales might be used at the industry level. Explaining these with firm level quantities like productivity, employment, cash flow, profit or R&D spending may fail or lead to wrong conclusions because our variables do not track exactly the same factor. (3) There are various factors affecting how a firm and industry or the economy of the whole country may react to cycles. The most important of them are summarised in Table 1.

**Table 1. Factors affecting reaction to cycles**

<table>
<thead>
<tr>
<th>Level of analysis</th>
<th>Issues to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro</td>
<td>telling apart country level and regional (e.g. EU) cycles; structural transformation of the country</td>
</tr>
<tr>
<td>Mezzo</td>
<td>(changing) distribution of firms (e.g. competitiveness), including firms with ongoing operation only; industry characteristics</td>
</tr>
<tr>
<td>Firm</td>
<td>age, size, ability to grow, demand, liquidity</td>
</tr>
</tbody>
</table>

Source: Literature review

**Model description**

Our model tracks the performance of one single simplified firm not following any specific growth trend but subject to business cycles. The company has only one product, which is manufactured using one type of machine. The net working capital of the operation is zero – payables completely financing inventory and customers –, so invested capital (IC) equals the total value of equipment.

The sales price (10) and demand quantity (2000 in the first period) is determined by the market forces and cannot be influenced by the firm itself. At the same time, the management will have an exact prediction of the demand at the beginning of each period, so they can purchase exactly the needed amount of machines and will manufacture all products that the market asks for. (There are no information barriers.) Though, they may not sell equipment purchased in the previous periods. Capacity only decreases once lifetime of the machine is over.

The firm has variable costs depending on the quantity produced and fixed costs that do not change with the amount produced. A pre-set part (50%) of both cost types is labour expense. Both sales and all types of manufacturing costs grow at the same inflation rate. To allow for comparison, we always set manufacturing costs such that during the first period the firm earns an operational profit before depreciation and amortization (EBITDA) of 8000.

There are several kinds of machines available for the production and they are all able to produce the same amount (10 thousand pieces) of product during one period.
Those only differ in their useful lifetime (from 1 up to 6 years) and are depreciated linearly. The cost of each machine is calculated so that the yearly cost equivalent for each type would be the same. (So, from a financial point of view, the company decision makers have no preference among the machine types.) The price of machines is indexed to inflation across periods and only a whole number of machines can be bought.

At the start of period 1 we always assume that the machines owned are just enough to serve the first period demand and had been purchased in equal quantities during the previous years, so those will need gradual replacement during the coming periods. Given the different lifespans of equipment, when the required product quantity on the market changes, the company may have to purchase new machines earlier than otherwise or accumulate unused capacity depending on the type of machine used.

To calculate the operational profit (EBIT), manufacturing costs (both variable and fixed) and D&A (depreciation and amortization) are deducted from sales. Then, the cost of debt (interest) is accounted for, and corporate tax (20%) is deducted to calculate profit after tax (PAT). The interest rate is automatically indexed for inflation. Retained earnings is calculated based on the required growth of equity, given the product demand of the next year. The difference of PAT and retained earnings is the sum of dividend paid and equity raised or repurchased. This is the cash flow that owners will face (FCFE – free cash flow to equity) and which would determine the real life market value of ownership.

**Base scenario**

In the base scenario, there is no growth or fluctuation in market demand, no inflation, and we have variable manufacturing costs only (operational leverage=0), the firm operates without debt (financial leverage=0). Due to this, all periods modelled look the same. Depending on the management choice of machines (financially completely value-neutral) we will see a different investment need, D&A, EBIT, tax, PAT, and dividend (FCFE). Though, sales and added value (AV = EBIT + D&A + Labour expenses) are the same in each case. As the choice of machine influences the investment need (IC), ROI, ROE and CFROE also differ heavily.
Table 2. Comparison across machine types

<table>
<thead>
<tr>
<th>Level of analysis</th>
<th>Performance measure</th>
<th>Lifetime of machines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 year</td>
</tr>
<tr>
<td>Macro</td>
<td>Added value</td>
<td>14 000.00</td>
</tr>
<tr>
<td>Industry</td>
<td>Sales</td>
<td>20 000.00</td>
</tr>
<tr>
<td>Industry</td>
<td>EBIT</td>
<td>2 990.38</td>
</tr>
<tr>
<td>Industry</td>
<td>PAT</td>
<td>2 392.31</td>
</tr>
<tr>
<td>Firm</td>
<td>ROI</td>
<td>59.69%</td>
</tr>
<tr>
<td>Firm</td>
<td>ROE</td>
<td>47.75%</td>
</tr>
</tbody>
</table>

Source: Calculation of the authors

Table 2 illustrates the differences between firms using machines of 1, 3 and 6 years of useful lifetime. We may conclude that while macro analysts would see no difference between the firms, industry analysts would see better performance at firms with machines of longer useful lifetime. At the same time, owners of the firms with shorter lifetime assets would be happier due to higher returns achieved.

Operational leverage would have no effect here, as costs are not changing over time, while the financial leverage decreases PAT and boosts ROE (if cost of debt is less than ROI). The effect of inflation may seem neutral for the first look, as both sales price and all types of expenses are inflated by the same percentage. This is indeed true for sales, added value, and investment but not for EBIT, PAT, and FCFE (dividend), once the useful lifetime of machines is longer than 1 year as it is shown in Figure 1.

Figure 1. Yearly growth rate at 10% inflation for machines of 6 years lifespan

The reason for this is that D&A is not indexed for inflation, so it takes time for it to reflect the growing price level with the gradual replacement of the machines at the
new price level. The lower than realistic D&A increases EBIT and PBT (profit before tax). As due to this effect, PBT is increased by more than the inflation rate, the real tax burden of the companies grows. As invested capital (and so equity) is not indexed by inflation either, ROI and ROE also grow radically. This phenomenon is also illustrated by Tables 3 and 4.

Table 3. Effect of inflation on the first year’s numbers (1)

<table>
<thead>
<tr>
<th>Machine lifetime</th>
<th>1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>0%</td>
</tr>
<tr>
<td>Added value</td>
<td>14 000.00</td>
</tr>
<tr>
<td>Sales</td>
<td>20 000.00</td>
</tr>
<tr>
<td>EBIT</td>
<td>2 990.38</td>
</tr>
<tr>
<td>Tax</td>
<td>598.08</td>
</tr>
<tr>
<td>PAT</td>
<td>2 392.31</td>
</tr>
<tr>
<td>ROI</td>
<td>59.69%</td>
</tr>
<tr>
<td>ROE</td>
<td>47.75%</td>
</tr>
<tr>
<td>IC</td>
<td>5 009.62</td>
</tr>
<tr>
<td>E</td>
<td>5 009.62</td>
</tr>
</tbody>
</table>

This means that depending on the average useful lifetime of machines applied, a suddenly appearing inflation may distort statements for several years showing improvement in some of the measures while leaving other unchanged. On top of all that, the exact extent of distortions is also dependent on the type of equipment used by the firm.

Introducing demand fluctuation

To get a more realistic model we assume some fluctuation in demand over time. To keep it simple we use a sinus function to achieve cycles between 2 and 3 million pieces per period. Figures 2 and 3 contrast the development of key quantities in case of different machine types. Our equation for demand (Q) is as follows:

\[ Q_t = Q_0 + a \times (1 + \sin(c \times t)) \]  (1)
For the sake of example, \( a=500 \) and \( c=100 \) have been chosen as parameter values.

**Figure 2.** Effect of demand fluctuation – lifetime of machines: 1 year

Note that longer lifetime leads to investment and FCFE following new patterns. It is key to see that even during times of increasing output, sales and added value, the investment may fall back as the current capacity is dependent not only on the current investment level, but also on those of the previous 5 years. Due to this fluctuation, FCFE may not only grow when performance increases, but also when lower proportion of current profit is needed to keep production capacity at the required level.
Thus, cash flow and accounting profit will show different patterns when analysing the performance.

**Figure 4. Effect of demand fluctuation – financial ratios**

Differences are more dramatic when focusing on financial ratios instead of absolute quantities. As Figure 4 shows, the previously experienced synchrony disappears: in case of using 1-year machines CFROE, ROI, and ROE are unchanged and equal, as the firm can adapt to market fluctuations perfectly. When using equipment with 6-years life time, the company will have some unused capacity during some periods, destroying its capital efficiency. This means that the risk of shares of companies with these different production strategies will also differ.

**Fluctuation and leverage**

Now, that manufactured amount changes from period to period, the amount of operational leverage (percentage of fixed costs) plays an important role. Assume that two technologies exist: the one used until now with 6 units of variable cost (VC) per piece and no fixed costs (FC), and another with 4 units of VC and 5000 units of FC. Note that both of these technologies imply an EBIT of 4960 for the initial manufacturing quantity.
The only two measures that the operating leverage does not affect are sales and investment. As fixed costs do not change over time, more fluctuation is to be seen in all other quantities. Figure 5 offers a comparison between two otherwise identical firms using two different technologies.

Financial leverage (we assumed D/IC=50% and interest=10%) only affects P/L (profit and loss statement) items after EBIT. PAT and FCFE are both lowered by interest payment, but this would only hurt CFROE if ROI was lower than the cost of debt. During investment periods, FCFE is higher for the company with leverage, as part of its investment would be covered from debt. So, CFROE is boosted at any time due to the continuously lower equity requirement, as can be seen in Figure 6. It is also worth noticing that operational leverage increased risk by enhancing downside potential, while financial leverage (under the given conditions) fuelled risk by letting the upside grow (as ROI is higher than the cost of debt).

Adding inflation to the fluctuations will also complicate trend analysis. The steady price growth pushes up profits faster than sales or AV due to the lagging historical prices in D&A. This is due to the fact that (historical) book value of machines (IC) is not indexed by inflation, while profit is higher due to the D&A effect. ROI and ROE distortedly show better performance. CFROE is more realistic as D&A effect is not hitting it. FCFE shows radical fluctuations because the demand fluctuation requires to buy a huge number of new equipment every twelfth year. As FCFE is growing slower than investment, during those years, fresh equity needs to be raised to cover extra investment, while the real performance of the firm has not changed at all.

This means that just to maintain the same performance, owners have to pay in additional capital because of inflation. In other words, shareholders have to pay not to increase their business but just to keep what they have already possessed earlier.

As we have seen, once demand is not constant, it is not only the useful lifetime of equipment but also operational and financial leverage and inflation that would modify the measurable performance trends. In the next step we investigate how all these factors together may influence the financial numbers of a firm.

Let us compare the development performance measures of two firms facing the same demand trends but using different machines (1-year lifetime against 6-years lifetime), different technology (VC=6 only and VC=4 and FC=5000), and different financing (D/IC=0 and D/IC=50% interest=10%). For simplicity, we assume that these firms operate in the same country and face no inflation (0%). Note that the first firm is identical to what appeared in Figure 2.

Figure 8 illustrates the performance measurement problem of a given sector. Though sales trends are just the same (flat line at 100%), all other performance measures differ across firms due to individual characteristics. It is easy to see that distortions are very different both in size, form, and timing. So, when aggregating (summing, averaging) certain performance measures, we would end up concluding totally different trends for the whole industry altogether depending for ex., on the relative weight of the firms following the two given strategies.
One might think that careful modelling may help us to get rid of these distortions. Unfortunately, Figures 9 and 10 support the fact that the problem is more complex. Just increasing the wave length of demand fluctuation twofold or fourfold (slower fluctuation of the same size: c=100, c=50, c=25) leads to a very different set of differences. Distortions in performance measures become more similar as wave length increases. (Endlessly long waves can be very similar to the flat demand we used at the beginning of this paper.)

It is important to notice that while in case of the original fluctuation (Figure 8), ROE was able to overperform the base model at peak times (Figure 2) due to a change in the wave length, this is not possible anymore for c=50 and c=25 cases. As for CFROE, only c=25 makes it impossible to perform better at any time. In other words, it is also the type of demand fluctuation that determines how successful a given strategy might be on the market. In our example, for fluctuations over longer periods, equipment with shorter lifetime is more adequate.

**Figure 5.** Performance with operational leverage as a percentage of that without leverage (machines used for 6 years)
**Figure 6.** Performance with financial leverage as a percentage of that without leverage (machines used for 6 years)

**Figure 7.** Performance with inflation (10%) as a percentage of that without inflation (machines used for 6 years)
Different measures, different trends – contradictions in macro and micro level growth measures

Figure 8. Comparing firms of different equipment, technology, and financing (a=500, c=100) (ratio of performance measures)

Figure 9. Comparing firms of different equipment, technology and financing (a=500, c=50) (ratio of performance measures)
Figure 10. Comparing firms of different equipment, technology and financing (a=500, c=25) (ratio of performance measures)

Conclusions and limitations

We prepared a simple financial model of a manufacturing firm and analysed how the useful lifespan of equipment used (length of replacement cycle), operational and financial leverage applied (business strategy), demand fluctuation and inflation (market conditions) would influence performance measures. Even in case of stable demand the kind of assets used had serious effects on financial performance although financially, all of equipment alternatives cost the same (same yearly cost equivalent) – a result quite counterintuitive that is explained by shocks that the uneven equipment replacement creates.

We also saw that appearance of inflation not only increases tax payment in real terms cutting back on the value of the firm but, at the same time, it distorts performance measures to show a contrary trend. When demand fluctuation was introduced into the model it became clear that investment may not peak in periods where demand does depend on the length of equipment lifetime. Due to that, cash flow to shareholders may also be higher in years with lower demand. This could be explained mainly by the lower average capacity usage of the company with longer equipment lifespan. The use of short lifetime equipment seems to protect owners from fluctuations of profitability ratios, while operational and financial leverage increase risk. Though added operational risk shows in increased downside potential only, while financial leverage (under our assumptions) offered an enhanced upside potential when the cost of debt was below ROI. When considering inflation, a new serious problem was identified: because of demand fluctuations, owners were forced to regularly pay in cash to maintain the operation, an event that did not happen at all in real terms.
Finally, we compared performance measures of firms with different strategies but the same inflation to figure out that the choice of firms of machines and leverage would have dramatic effect on the performance measures making the original demand trend nearly unrecognisable. Depending on what kind of measure we focus on, the industry cycle would be described completely differently. This issue becomes particularly important in transforming economies. Once companies tend to change their strategy (some technologies, machine types gaining popularity or access to debt financing is eased) or the structure of economy is shifted preferring firms with a given strategy, we may measure macro trend changes that are not existing at all. That has been underlined also by Boz et al. (2011) and Dabla-Norris et al. (2015).

Unfortunately, these distortions are not even stable, but rather depend on the speed of market fluctuations. It is not only the size but also the speed of market fluctuations that determine how successful a business strategy would be. Due to these we have to be very careful when choosing a metric to track financial performance of a given industry of firm across time. Even a change in strategy could lead to very wild fluctuations in performance on a relatively stable market when different waves interpolate. This conclusion is just in line with the result of Holly et al. (2013) and Basile et al. (2014) emphasising the importance of individual firm characteristics.

Our models have serious limitations, though. In real life, firms may not be able to precisely predict the quantity to be produced and sold during the next period, which may lead to distortions in investments and manufacturing. No matter whether they over or under estimate demand, they will have worse performance than predicted by our model, as both unneeded capacity and market growth potential which are not completely used causes losses compared to the optimum. Inflation rates may also differ across various types of cost, particularly the increase of wages may be very different to that of the material expenses. This could lead to even more complex distortions.

References


INTELLECTUAL PROPERTY RIGHTS KNOWLEDGE AND AWARENESS – ACADEMIC LEVEL EMPIRICAL ANALYSIS AND RECOMMENDATIONS

Kristina Popova¹
Marina Nacka²

Abstract

Commitment to Intellectual Property Rights (IPR) is a segment of students’ positive or negative behavior in the academic community. We define the negative behavior as students’ commitment to plagiarism and copyright violation. The overall objective of this paper is to give a recommendation to the non-IPR institutions that potentially show similar results in the level of awareness of students and their behavior regarding their academic program and teaching activities. This follows an empirical testing and analysis of the relationship between knowledge and the level of IPR awareness, and their influence over students’ behavior at a non-IPR committed Faculty. In this regard, the paper tests if students that have higher level of awareness and knowledge tend to demonstrate a positive behavior towards IPR more frequently. We use an online survey to collect data and construct scales to measure the level of awareness, knowledge and the type of behavior. Treating the constructed scales as categorical data, we apply log-linear analysis. Results showed that the higher the awareness level, the more frequent the positive behavior. On the other hand, the analysis of the knowledge of students does not provide clear findings; however, it is associated with the level of awareness. The negative behavior, as concluded from the sample, arises from the high cost of acquiring the basic studying material. Nevertheless, understanding students’ knowledge, awareness and behavior towards IPR could assist Faculties to implement policies for decreasing students’ negative behavior, promoting academic integrity and improving students’ ethics.

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Key words: Intellectual Property Rights, awareness, students' behavior, IPR policy recommendation

JEL Classification: C12, D83, I29

Introduction

Commitment to Intellectual Property Rights (IPR) is a segment of students’ positive or negative behavior in the academic community. We define the negative behavior as students’ commitment to plagiarism and copyright violation. Student plagiarism is a special problem of higher education, and plagiarism causes and practices are even coming beyond the academy (Park, 2010). Many cases of plagiarism are committed due to the lack of knowledge or lack of consequences for such behavior (Pupovac, et al., 2008). Increased access to Internet raises many reasons for students to violate the IPR and downplay the importance of plagiarism (Park, 2010). A recent study presents no difference between University students group and its awareness of IPR and the possibility of further research of online piracy, as a general tendency of relying of students (Krawczyk, et al., 2014). The Internet has impact on students’ attitude to intellectual property and raises the necessity to respect intellectual property among institutions worldwide (Marshall & Garry, 2005).

In general, there is a lack of studies that analyze IPR knowledge, awareness and students’ behavior in the university education context. Most of the research concerning the theme of plagiarism is written in the context of North American experience (Park, 2010) (Glendinning, 2014) (Datig & Russell, 2015) or Australia (Glendinning, 2014). Within European countries, many studies are done in Sweden and mostly in UK (Glendinning, 2014), some in Spain, Bulgaria and Croatia (Pupovac, et al., 2008). The fast growing trend of “epidemic cheating” was addressed by Park (Park, 2010), which emphasizes the lack of clear presentation about the nature of the plagiarism problem, the changing through time, the variation between undergraduates and graduate students. However, little information was available on the nature and effectiveness of policies and procedures for dealing with plagiarism or academic dishonesty in the majority of higher educational institutions in EU countries (Glendinning, 2014). Considering the motive and intentions of the UK student to plagiarize, most of the students plagiarize on purpose, but there is no doubt that some plagiarism is accidental or inadvertent (Park, 2010). A study of students endorsement to IPR at University if Warsaw shows that students have a poor understanding of the concept of plagiarism and the many different ways in which they can plagiarize (Krawczyk, et al., 2014). But, analyzing how well students understand this concept leads to the important role played by academic staff and the relevance of particular academic traditions (Park, 2010) and the imperative for a clear communication of plagiarism in terms which are readily comprehensible to students (Ashworth, et al., 1997).
This paper argues that students’ commitment to IPR is highly dependable on their knowledge and awareness of IPR and consequently influences their behavior. We focused on students from institutions which have not introduced IPR as part of their academic activities and teaching program (non-IPR committed institutions). The analysis of students’ attitudes toward breaches of academic and scientific integrity in different European countries’ societies may provide a deeper insight into the level of academic integrity in the emerging multicultural European community, which needs to harmonize its standards of education (Pupovac, et al., 2008).

In the Republic of Macedonia (RM), this empirical study is novelty in the field of IPR research. So far, IPRs are mostly researched in their legal aspect or economic aspect of their enforcement at the enterprises’ level. Educational programs in the RM technological, natural and scientific, informatics, art, economics and business sciences do not include education on IPR and therefore this topic is still less researched among the academic public (Dabovic-Anastasovska & Zdraveva, 2009). Besides the importance of commitment to IPR at the academic level, most of the students at different faculties do not have an opportunity to choose IPR as part of their teaching program. Thus, it raises the necessity for the student to be acquainted with different forms of breach of scientific and academic integrity including plagiarism (Pupovac, et al., 2008). Their main motives to plagiarize is the high price of textbooks or the phenomenon of cabinet selling editions of textbooks, thus compromising the integrity of teachers and collaborators, while students are brought to a very unenviable position (Dabovic-Anastasovska & Gavrilovic, 2008).

The latest research done on the topic of the relationship between the level of awareness and knowledge of students with the type of behavior that students tend to show was done by (Nacka, et al., 2017). Comparing students’ samples from two different educational institutions (the Faculty of Law as IPR committed institution and the Faculty of Agriculture and Food as Non-IPR committed institution) authors present that students coming from a non-IPR committed institution have lower level of awareness than the students coming from an IPR committed institution. Furthermore, the results regarding the existence of association between the level of awareness and type of behavior of students are statistically significant for the sample coming from the non-IPR committed institution, meaning that higher awareness level is associated with a more frequent positive behavior. On the other hand, even if providing evidence for existence of association between the level of awareness and type of behavior students show towards IPR, the students’ level of awareness does not seem to rise by each year spent in the educational process. This leads to concluding the necessity of formally introducing an IPR related program, since this should raise the level of awareness.

We decide on conducting further research of the relationship between the level of awareness and level of knowledge that students have with the type of behavior they show with regard to the IPR violation, previously started by Nacka (Nacka, et al., 2017). The overall objective of the research is to give a recommendation to the non-IPR institutions that potentially show similar results of students’ awareness and behavior, with regard to their academic program and teaching activities.
This follows an empirical testing and analysis of the relationship between the knowledge and the level of IPR awareness, and their influence over students’ behavior. As a part of the experimental research, students are the right sample choice, usually willing to participate and ready to follow written instructions and characterized as youth recognized to consitute the majority of unauthorized downloaders and uploaders (Krawczyk, et al., 2014). In this regard, the paper tests the relationship between the awareness and knowledge of IPR in students’ positive or negative behavior.

Taking into consideration that in 2011, a System for determination of plagiarism was introduced, which became a mandatory procedure for seminar and graduation papers, the justification of this effort to educate students to avoid plagiarism is in line with the experience in Croatia, which shows that the objective plagiarism detection method and penalty for perpetrators will deter students from plagiarizing (Pupovac, et al., 2008). However, during their studies, University students are obliged to use this system only for their graduation papers. It clearly indicates the problem for students to face the possibility of plagiarism detection at the end of their fourth year of studies, without having a previous opportunity to learn about the importance of the particular use of IPR in academic research. This is why we analyze if the IPR awareness level of students from a non-IPR committed faculty increases with each academic year even if they are not formally introduced with such a program.

The empirical analysis was conducted at the Faculty of Agricultural Sciences and Food – Skopje (FASF) as a non-IPR committed institution at the biggest State University in the Republic of Macedonia. The probability sample included a number of students enrolled in each academic year of studies in 2015/2016. A structured questionnaire gives insights in two issues: 1. General students’ information and knowledge (structured questionnaire) and 2. Students’ awareness (scenario survey) and behavior (analysis of the influencing factors). Log-linear analysis and Chi-square method of hypothesis testing are used to determinate the association of knowledge, awareness and students’ behavior.

The overall scenario was tested through three hypotheses:

**Hypothesis 1:** Level of awareness affects students’ behavior. Students with a high level of awareness, tend to behave positively in regard of respecting IPR more frequently.

**Hypothesis 2:** Level of knowledge affects students’ behavior. Students with a high level of knowledge, tend to behave positively in regard of respecting IPR more frequently.

**Hypothesis 3:** Students enrolled in higher academic years have a higher level of awareness and higher knowledge level and therefore tend to show positive behaviors towards respecting IPR more frequently.

The research results and conclusions have implications regarding: a) the ground for further discussions on the level of students’ knowledge, awareness and behavior towards IPR, as an empirical research done at a non-IPR committed educational institution (Faculty); b) providing insights in the scarcity and factors that influence students’ behavior, which enables taking further steps in providing recommendations.
related to the general policy of the non-IPR committed faculties which possibly show similar results to the studied sample and c) addressing the importance of promotion of academic integrity and possible adoption of formal codes in order to improve students’ ethics, especially when the average ethical judgment is less strict (Krawczyk, et al., 2014), and enhance social responsibility and institutional quality.

The paper is structured as follows. The second part presents the data used and methodology implemented for analyzing students’ awareness, knowledge and type of behavior towards IPR. In the third part, the results are presented and discussed. Finally, by emphasizing the importance of raising students’ IPR awareness through the role of the Faculty policy and academic staff, the main conclusions and recommendations are drawn.

Data description and methodology

This paper’s data was gathered using a semi-structured questionnaire distributed to students enrolled in each academic year of studies (both graduate and post-graduate). Students covered with the research are enrolled in the academic year of 2015/2016 in an educational institution at the biggest State University in the Republic of Macedonia. The sample includes 117 students from the Faculty of Agricultural Sciences and Food – Skopje (FASF) as a non-IPR committed Institution. The students consisting the sample in the study are randomly chosen, since the study was conducted near the end of the term, so participants completed the questionnaires online, outside their regular class time. The questionnaires were delivered by the Survey Monkey platform. We issued survey invitations via the social media, Faculty service and student organizations. All respondents were informed that the survey was anonymous and that the data provided would be used for research purposes.

The total sample of 117 respondents represents 17.6% of the total number of students enrolled in the FASF (663). By academic years of studies, the sample consisted of 18.5% from the students enrolled in the first year, 19% of students enrolled in the second year, 11.5% of students enrolled in the third year and 21% of students enrolled in the fourth year and post-graduate studies.

In the overall sample, there were 51.3% female participants. Thirty-three percent of the sample consisted of students enrolled in the first year, 20.5% from students enrolled in the second year, 15% from students enrolled in the third year, 28% from students enrolled in the fourth year of studies and 2.5% from students enrolled in post-graduate studies. Students from the sample said they spent 3.5 hours per day studying.

Fifty-six percent of the students included in the sample said they used original printed books and authorized lectures, while the rest said they used scripts and other copied materials. A high 64% of the students stated that professors do not mind if students bring copied materials to their lectures. Moreover, 61.5% stated that they are instructed by their professors to copy the book when it comes to textbooks that are no
longer reissued, while 38.5% said that professors refrain from suggestions in which way to provide the studying material.

When further assessing the sample in more details, we can say that students in general are aware of the existence of the punishment system for plagiarism (42%), but a high percentage (58%) of them are not introduced with the system implemented for detection of plagiarism at the University level. Moreover, students express their familiarity with IPR, however, only a small percentage of them were informed about IPR during their studies (28%). In a really high percentage (72%), the source of information on IPR is not related to the studies.

Students’ awareness in this research was measured by a scenario survey, where two general scenarios and 2 sub-scenarios determine the index of students’ awareness. In general, the majority does not agree with the student's behavior of copying the material without the permission of the author and are highly aware that they inflict material damage to the author by unauthorized reproduced copies. However, they provided confirmation that they print copies of the books (77%) because of the high price of their textbooks (71%) and 85% of the students expressed their willingness to copy the book again even though it is available in the original version.

The questionnaire, consisted of “yes or no”, Likert scale and multiple answers questions. The aim of the questionnaire was to provide insights into two issues – the general students’ information and knowledge on the subject, as well as students’ awareness and type of behavior. To be able to use the respondents’ qualitative judgements in order to measure the level of knowledge and awareness, as well as if their behavior is positive or negative, indexes in the form of summarized scores were constructed. This way, the qualitative data can be described and manipulated numerically (Spector, 1992). The score of each index resulted from standardizing and adding up the answers to the questions that addressed the three different issues. We provided the summated rating scales to be both reliable and valid by conducting the Cronbach alpha reliability test (Lee & Forthofer, 2005), (Cronbach, 1951). Cronbach’s alpha measures the internal consistency, or how closely related a set of items are as a group and is calculated as:

\[
\alpha = \frac{N^2 \overline{Cov}}{\sum S^2_{item} + \sum Cov_{item}}
\]

Where, the number of items \( N \) squared is multiplied by the average covariance between items in the top half of the equation, while the sum of all the item variances and item covariances is the bottom half of the equation. In our case, the Cronbach’s alpha for the knowledge index is 0.679 (5 items), for the awareness index is 0.748 (4 items) and for the behavior index it is 0.726 (7 items).
Kline (Kline, 1999) notes that although the general accepted value of 0.8 is appropriate for cognitive tests such as intelligence tests, dealing with psychological constructs values even below 0.7 can realistically be expected because of the diversity of constructs being measured. Having this in mind, the resulted alphas are acceptable.

Although sociologists were the first to be presented with the log-linear techniques, thanks to the work of Goodman (Goodman, 1972), (Goodman, 1972) (Goodman, 1972) (Gillespie, 1977), the techniques found used to be applied in studies in other fields as well. The log-linear techniques became popular to be used when the dependent variable is either a dichotomous or polytomous “qualitative” variable. These techniques on statistical grounds are superior to the commonly used alternative-treating the dependent variable(s) as a dummy variable (or set of dummy variables) and using standard multiple regression techniques to analyze the data (Gillespie, 1977).

Treating the constructed scales as categorical data, log-linear analysis was applied analyzing the data's frequencies, as suggested by Field (Field, 2009). The log-linear analysis, as an extension of the chi-square test method when considered more than two categorical variables, provides the basis for solid analysis of this data type when assessing their association (Trochim, 2005).

Results and discussion

The research focused on testing the following three hypotheses regarding the Intellectual Property Rights at the Faculty of Agricultural Science and Food, as a non-IPR committed institution at the biggest state University in the country:

Hypothesis1:  
Level of awareness affects students’ behavior. Students with high level of awareness tend to behave positively with regard to respecting the IPR more frequently.

Hypothesis2:  
Level of knowledge affects students’ behavior. Students with high level of knowledge tend to behave positively with regard to respecting the IPR more frequently.

Hypothesis3:  
Students enrolled in higher academic years have a higher level of awareness and therefore tend to show positive behaviors towards respecting the IPR more frequently.

In order to test the hypothesis, we addressed three categorical variables, each consisted of two opposite categories: (1) awareness level (higher if the summated scale score is above 55%; otherwise lower), (2) knowledge level (higher if the summated scale score is above 55%; otherwise lower) and (3) if students show
positive or negative behaviors (positive considered if the summated scale score is above 55%; otherwise negative).

To confirm if the criteria for conducting a log-linear analysis are met, the data is put into a contingency table. Every case, or in other words every student, falls into only one cross-classification field.

Table 1. Contingency table of the sample data

<table>
<thead>
<tr>
<th>BEHAVIOR</th>
<th>KNOWLEDGE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOWER</td>
<td>HIGHER</td>
</tr>
<tr>
<td>AWARENESS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOWER</td>
<td>Count</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>% within AWARENESS</td>
<td>70.4%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>43.2%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>25.3%</td>
</tr>
<tr>
<td></td>
<td>Std. Residual</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>28.2</td>
</tr>
<tr>
<td></td>
<td>% within AWARENESS</td>
<td>52.1%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>56.8%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>33.3%</td>
</tr>
<tr>
<td></td>
<td>Std. Residual</td>
<td>(.6)</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>44.0</td>
</tr>
<tr>
<td>Total</td>
<td>% within AWARENESS</td>
<td>58.7%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>58.7%</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>% within AWARENESS</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>30.8%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>19.0%</td>
</tr>
<tr>
<td></td>
<td>Std. Residual</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>21.0</td>
</tr>
<tr>
<td>POSITIVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGHER</td>
<td>Count</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>% within AWARENESS</td>
<td>52.9%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>69.2%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>42.9%</td>
</tr>
<tr>
<td></td>
<td>Std. Residual</td>
<td>(.7)</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>% within AWARENESS</td>
<td>61.9%</td>
</tr>
<tr>
<td></td>
<td>% within KNOWLEDGE</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>61.9%</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>AWARENESS</td>
<td></td>
</tr>
<tr>
<td>LOWER</td>
<td>Expected Count</td>
<td>20.9</td>
</tr>
<tr>
<td></td>
<td>% within AWARENESS</td>
<td>77.1%</td>
</tr>
</tbody>
</table>
The sample where the assumptions of the log-linear analysis which asks for big samples not to have more than 20% of the cells with expected frequencies with less than 5, and not even one with 1, could not be met having four variables (Table 1).

The log-linear analysis is based on the fact that the logarithm of a product is the sum of individual logarithms of individual terms in the product, \( \log (p \times q) = \log (p) + \log (q) \). This means that the logarithm of the cell frequencies is a linear function of the logarithms of components.

In a log-linear analysis, tables are formed to contain one-way, two-way, and higher order associations. The log-linear model so developed starts with all the one-way, two-way, and higher order associations in order to construct a model such that the cell frequencies in a contingency table are accounted for by the minimum number of terms. This is done by a process of backward elimination. Since we have three categorical variables each with two categories, we can find three-level interactions (main effects, second-way and third-way interactions) to be statistically significant.

The results from running a model selection log-linear analysis in SPSS (K-Way and Higher-Order Effects) indicated that even the three-way interactions are statistically significant. We do not reject the null hypothesis (\( \alpha=0.05 \)), following the Likelihood Ratio, meaning that even the three-way interactions affect the fit of the model. This, by definition applies, and the two-way interactions, as well as the main effects are significant leaving us with the saturated model. However, we can note that the three-way interactions seem to be statistically significant after (\( \alpha=0.1 \)).
Table 2. K-Way and Higher-Order Effects from log-linear analysis model selection

<table>
<thead>
<tr>
<th>K-way and Higher Order Effects</th>
<th>K</th>
<th>df</th>
<th>Likelihood Ratio</th>
<th>Pearson</th>
<th>Number of Iterations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chi-Square</td>
<td>Sig.</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>K-way and Higher Order Effects</td>
<td>1</td>
<td>7</td>
<td>48.624</td>
<td>.000</td>
<td>35/000</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>15.214</td>
<td>.004</td>
<td>10.482</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>4.153</td>
<td>.042</td>
<td>2.710</td>
</tr>
<tr>
<td>K-way Effects</td>
<td>2</td>
<td>3</td>
<td>11.061</td>
<td>.011</td>
<td>7.772</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>4.153</td>
<td>.042</td>
<td>2.710</td>
</tr>
</tbody>
</table>

a. Tests that k-way and higher order effects are zero.
b. Tests that k-way effects are zero.

The partial chi-association shows that from each of the single effects, only the second-order interaction between the knowledge level and type of behavior is not statistically significant (Chi-Square=0.666, p=0.415); all of the other interactions and the main effects are statistically significant (α=0.05).

Figure 1. Plot of frequencies across the different categories

When plotting the frequencies of students with different level of awareness and knowledge that tend to show positive or negative behavior, we can see that students with both lower level of knowledge and awareness tend to show negative behavior more frequently. It can be noted that when students have higher level of awareness, they tend to show positive behavior more frequently.

To confirm the relationship between the level of awareness and type of behavior students demonstrate, we further assess separately the association of the level of awareness and level of knowledge using the chi-square testing method. The test presents if the variables are independent or are associated in some way.
Further assessing the relationship between the level of awareness and the type of behavior, the results indicate that there is association between them (Chi-square=3.690 (1); p=0.027). However, the association is medium strong measured by the Crawer’s V coefficient which is ranged between 0 and 1 (Crawer’s V = 0.178). On the other hand, the level of knowledge and type of behavior that students show seem to be independent (Chi-square=0.117 (1), p=0.147).

Although the level of knowledge does not seem to have significant association with the type of behavior students demonstrate, it does have association with the level of awareness (Chi-square=6.229 (1), p=0.07), Crawer’s V =0.231). Their association is even stronger than the one that exists between the level of awareness and type of behavior when consulting the Crawer’s V score.

Calculating the odds for the students having a higher level of awareness and show positive behavior, versus the students having a lower level of awareness, will provide insight for the size of the effect that this has over students’ behavior. We do this by implementing the following relation:

\[
\text{ODDS} = \frac{\text{POSITIVE BEHAVIOR WHEN HIGHER AWARENESS}}{\text{POSITIVE BEHAVIOR WHEN LOWER AWARENESS}}
\]

and

\[
\text{ODDS} = \frac{\text{POSITIVE BEHAVIOR WHEN HIGHER KNOWLEDGE}}{\text{POSITIVE BEHAVIOR WHEN LOWER KNOWLEDGE}}
\]

The odds that students who have a higher level of awareness shall show positive behavior are 2.39 times higher than those of the students with a lower level of awareness. The odds that students with a higher level of knowledge shall show positive behavior are only 0.88 times higher than those of the students with a lower level of knowledge. This leads us to conclude that the higher the awareness level, the more frequent the positive behavior regarding the IPR.

We believe the proof and the effect size of the association between the awareness index and students’ behavior should be further analyzed. In order to at least partially do so, we assess the circumstances and answer what affects students’ behavior by looking at the answers of the questions contained in the questionnaire.

In order to address the question if every following academic year students from non-IPR committed institutions increase their level of awareness even if they are not formally introduced with such a program, we test for uniform distribution of the level of awareness for each academic year. The chi-square statistics (p=0.05) indicates that there are no statistically significant differences between the empirical and uniform theoretical data, put in other words, students from FASF did not show to increase their level of awareness by engaging longer in higher education. But, if IPR is part of the educational or teaching activities at Faculties, the further the students’ progress, the more likely they are to see plagiarism negatively and to expect their own rights as authors to be respected (Datig & Russell, 2015). In this case, the role of professors is
of great importance. Results showed that professors indirectly influence students’ negative behavior, allowing them to copy the books that are not reissued. However, Datig and Russell (Datig & Russell, 2015) discussed that students who are aware of IPR importance, think it is fair for their professors to ask them to cite their sources, thus increasing the positive behavior. This clearly emphasizes the role of professors in raising students’ awareness of plagiarism and copyright violation. When IPR is not part of the teaching and academic activities, for some students, professors’ attitude might be the main source of information regarding IPR knowledge and awareness.

Concussions and recommendations

The research results and conclusions have implications in three directions. Firstly, they follow the novelty of the previous research on the topic and present a ground for further discussions of the level of students’ knowledge, awareness and behavior towards the IPR, as an empirical research done at a non-IPR committed educational institution (Faculty). The results of the students from the non-IPR committed Faculty do not show an increasing trend of their IPR awareness in each following year in their studies. This presents the need for introducing a strict policy against plagiarism, as well as a model that will raise students’ awareness level of IPR importance. Understanding students’ attitudes to plagiarism and copyrights could help the non-IPR committed faculties to implement a proper IPR strategy, to build and keep the academic integrity and develop a good academic environment.

Secondly, the empirical analysis provides insights in the scarcity and factors that influence students’ behavior, which enables taking further steps in providing recommendations for the general policy of non-IPR committed faculties, which possibly show similar results to the studied sample. Any implemented activity for raising the IPR awareness could influence decreasing students’ negative behavior. At a non-IPR committed Faculty, the formal procedure for plagiarism detection should be more clearly introduced to students, illustrating more closely to the activities that are not permitted, as well as how a possible misbehavior can be avoided.

Thirdly, the research addresses the importance of promotion of academic integrity and possible adoption of formal codes in order to improve students’ ethics. The role of academic staff and their ethical behavior is very important in the process of raising students’ awareness of plagiarism and copyrights thus providing a solid ground for ethical culture of students. In this regard, professors should constantly educate students to prevent plagiarism, as well as to understand the importance of honesty in the academic world and professional work in general.

Further research recommendations

Further steps for enhancing the research should include a bigger sample form different Faculties and different field of sciences that would allow for a more detailed assessment of these categories. By including more Faculties from the University, or more Universities, a comparative analysis could be performed between students’ awareness, knowledge and behavior from different non-IPR committed institutions.
and different instructions that have formally introduced IPR in their teaching programs. In addition, more detailed questionnaires should be conducted and followed by interviews or focus group meetings that shall provide more helpful insights in understanding students’ negative behavior.

References


WHICH CURRENCY IS BEST FOR BUSINESS IN A SMALL COUNTRY?

Alexander Dilger, PhD

Abstract

The optimal currency for a country is an important topic. While it is difficult to identify the best option overall, for all stakeholders and including political considerations, it is easier to answer the more limited question of the title: Which currency is best for business in a small country? Several kinds of currencies are discussed and three criteria that business companies are interested in are applied. Although there are opposing considerations, the best compromise for business in a small country seems to be a currency board with a fixed exchange rate that can be adapted in case of a crisis. A currency board is also the best protection against speculative attacks. The anchor currency should be that of the largest trading partner, especially if the trade with it is much larger than with all other countries.

Keywords: crisis, currency, currency union, exchange rate, risk

JEL Classification: E42, F31, F45, G01, M21

Introduction

The optimal currency for a country is an important topic. The euro-zone opens a new option for a currency union although it is not an optimal one. It is an open and difficult question to decide what kind of currency and perhaps a currency union is optimal (see for example Mundell, 1961, and De Grauwe, 2014). It is also a question of high practical importance. A small country like Macedonia has several options like its free-floating independent currency, the Macedonian denar, with a target exchange rate to the euro. It could also choose a fixed exchange rate to another currency like the former denar from 1992 and 1993 relative to the D-Mark (see National Bank of the Republic of Macedonia, 1993). Besides a currency board, it is possible to introduce a foreign currency like the euro or even to apply as a member of the euro-zone although this requires membership of the European Union first.

While it is difficult to identify the best option overall, for all stakeholders and including political considerations, it is easier to answer the more limited question of the title:

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Which currency is best for business in a small country? Smallness is relative and means that a country has no real power to influence global exchange and capital markets and its fraction of foreign trade is quite high. The euro as a common currency with the euro-zone would reduce transaction costs and exchange rate risks for such a country and its business firms. However, there are other risks instead, like a break-up of the currency union or a fundamentally wrong exchange rate, if not at the beginning then in and after the next crisis. Especially a currency that is too strong without the option of devaluation is a large problem because it aggravates the crisis and demands painful real devaluation. For business companies this means that their costs including financial costs and debt service are too high and the demand for their products and services breaks down.

In Chapter 2, the main kinds of currencies a country can choose from are presented. In Chapter 3, three criteria are discussed in terms what business companies with their headquarters or at least operations in a small country are interested in concerning the currency of this small country. In Chapter 4, these criteria are applied to the different kinds of currencies presented in Chapter 2. Chapter 5 provides conclusions.

Kinds of Currencies

There are different kinds of currencies with different relationships to other currencies (for a classification see International Monetary Fund, 2004). The most important ones are explained in this Chapter.

Free Floating Currency

A currency can be free floating. In this case, its exchange rate is determined by supply and demand. The supply and demand can be set by market forces alone or influenced by central banks. While there is no clear strategy to reach a fixed exchange rate as in the following cases, there can be ad hoc attempts to lower or boost the value of one’s own currency. Other central banks can support such attempts, ignore them or try to counteract them, which may even result in a currency war. The main global currencies like US-dollars, euros and yens have been free floating against each other by now. As a result, the following strategies can be used in respect of one of these global currencies but not in terms of all of them at once, or only partially with regard to a weighted mix of them. A currency pegged to the euro will be free floating to the US-dollar, although not independently but in line with the euro.

Pegged Currency

There are several steps between really free floating currencies (see the last Section 2.1) and currencies with fixed exchange rates (see the next Section 2.3). They involve a kind of pegging one’s currency to one or several other currencies. For example, the currency can fluctuate 2% up or down around an otherwise fixed exchange rate. Alternatively, the limited fluctuations can be around a flexible rate itself like the

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average of the exchange rate of the last three months instead of a fixed rate. This means that a central bank has to, alone or with others, intervene when the bands of allowed fluctuations are reached, but within these bands the fluctuations are free. In normal times, there are fewer interventions than with a fixed exchange rate and market forces can be observed within limits. However, it can happen that always one extreme of the peg is reached such that it acts as a fixed exchange rate or a brake on a faster change of the exchange rate.

Fixed Exchange Rate

A fixed exchange rate means that there is no fluctuation between two (or more) currencies. There are several ways to fix an exchange rate. In the case of two currencies, the central banks of both can agree to intervene in the currency markets such that these currencies are (nearly) fixed. One central bank alone can always guarantee that the value of its own currency does not go up by selling it on the market, at least if the currency is fiat money and can be created by the central bank at will. However, one central bank alone cannot guarantee that its currency does not devalue without taking some precautions. A currency board as explained in the next Section 2.4 is one way to defend one given exchange rate to one particular other currency. Another way is an agreement with one or several other central banks to fix together the exchange rate(s). Nevertheless, there can be speculative attacks to test the commitment of the central banks and governments behind them.

Currency Board

A currency board means that a central bank creates its own currency only in exchange for another foreign currency. As a result, the central bank has enough reserves of this foreign currency to buy back its own currency at the fixed exchange rate at which it sold its currency in the first place. The value of its own currency depends on the value of the foreign currency and thus the monetary policy of the corresponding foreign central bank. Moreover, the domestic central bank and thereby the country has to earn and save this foreign currency. An independent monetary policy is not possible and the central bank at home cannot do much beside the administration of the currency board. Finally, the creation of money by credits in the banking sector has to be forbidden or cannot be guaranteed by the central bank because it has no reserves for this kind of bank money.

Metal-based Currency

Instead of using a foreign currency in a currency board as a guarantee for one’s own currency, a country can also use valuable things instead, like precious metals. Historically, gold or silver were mostly used for this purpose. Paper money can partially or totally be guaranteed by gold for example. It is also possible to use gold coins as a currency directly. Because their value depends only on the quantity (and quality) of gold, exchange rates of countries with gold-backed currencies are
determined by the gold and thus fixed between them as long as the amount of gold is not changed by one of the countries.

*Using a Foreign Currency as One’s Own*

A country can decide to use a foreign currency as its own ("dollarization"). An independent monetary policy is totally impossible in this case. It is also much harder to change this regime than to adjust a currency board or the exchange rate guaranteed by this board. The country would have to introduce its own currency first. This is a kind of protection for savers and investors in a country with weak institutions.

*Monetary Union*

Two or more countries can create a monetary union with a common currency. The most famous example is the euro-zone with nineteen European countries using the euro. Then the monetary policy is the task of a common central bank like the European Central Bank (ECB). Decisions can be very political, especially because members’ interests and situations are quite different. It is also difficult to leave the monetary union because both national central and commercial banks are quite intertwined.

*Parallel Currencies*

Finally, it is possible to mix two of the previous options. Most interesting is the case of a country with two parallel currencies at the same time. A country could use gold coins and paper money simultaneously or its own currency and a foreign one. In case of a fixed exchange rate between these parallel currencies Gresham’s Law applies, according to which the worse money drives out the better one (see Rolnick/Weber, 1986). This means that everyone will hold back gold coins for example and pay with paper bills. With free floating parallel currencies in the same country, the higher value of the better currency will correct for this. In this way, Gresham’s Law can even be reversed such that a very weak currency with hyperinflation is replaced by a stronger and more stable one.

*Criteria on what kind of currency business likes*

While it is difficult to identify the best kind of currency overall, for all stakeholders and including political considerations, it is easier to answer the more limited question in the title of this article: Which currency is best for business in a small country? To answer this question, criteria are given on what business is interested in (for more general discussions see for example McAleese, 2004, or Dilger, 2016). Individual firms or special industries like the banking sector can have other interests, but the following criteria are plausible for the business sector overall. In Chapter 4, these criteria are applied to the kind of currencies presented in the Chapter 2.
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**Stability**

Business is using money for its normal transactions and for longer-term investments. For both purposes a currency should be stable, not totally, but sufficiently. Stability means no large inflation or deflation in the country, as well as quite stable exchange rates at least with the most important currencies for imports and exports. Stability is also important for foreign companies operating in a small country such that their investments are save and their profits are of value, while costs and revenues can be calculated in advance.

**Small undervaluation**

For importing companies, the exchange rate could be a little bit higher than the purchasing power parity (PPP, see Cassel, 1918) such that import prices are lower than domestic prices. However, for exporting companies, as well as domestic companies that feel the competition from imports, i.e. for most companies, it is the other way round, a weaker currency is better. In this way domestic products are cheaper than comparable imports, whereas exporting is easier and the costs in the country are lower. Anyway, this undervaluation should not be too large and it is eroded over time without a force reproducing it. In the long run, prices are going in the direction of PPP but exchange rates adjustments can change all prices, including wages, at once. Finally, it is not possible that all currencies are undervalued, because this is relative, and for any undervaluation there has to be an overvaluation elsewhere as there has to be a deficit for any surplus. However, for a small country, it is easier to have and keep a small undervaluation because it is not important enough for reactions or even retaliation by much larger countries.

**Growth-friendly monetary policy**

Finally, business is interested in a monetary policy that generates growth without too many risks (undervaluation can also be good for growth, cf. Béreaua/López Villavicenciob/Mignon, 2012). Normally, this is a mildly expansive monetary policy. Accordingly, low inflation is better than higher inflation (a kind of instability) but also better than no inflation at all (cf. Akerlof/Dickens/Perry, 1996) or even deflation. When a crisis occurs, it should be possible to react to it (cf. for example Fornaro, 2015). Therefore, a too stable currency that cannot be adopted in any case is dangerous, while too much interference by politicians is also not in the interest of business companies.

**Comparing the currency options**

In this Chapter, the different kinds of currencies presented in Chapter 2 are looked at again to find the one that is best for this mix of stability, low risks, low inflation, a little undervaluation and monetary policies with a focus on growth. Moreover, the perspective will be that of business companies in a small country. Smallness is less
about the absolute size of a country economically or even geographically and more about the ratio of imports and exports compared to the domestic economic activity of the country (and the economic activities of other countries because little trade for a large country can be quite huge for a small trading partner). A country that is economically self-sufficient can have a currency as it likes. However, most business companies profit from international connections and thus are interested in a good currency according to the criteria of the Chapter 3, including quite stable and not too high exchange rates. When there is much fluctuation between the main global exchange rates, this fluctuation should be minimised with regard to the most important exchange rate for the country (or business).

**Free floating lacks stability**

Given these criteria, a (really, not only formally) free floating currency is not optimal for a small country, at least for business companies in this country and from abroad. Possible instability is the main problem. Little inflows or outflows of money from a global perspective can change the market value of the currency of a small country a lot. On a perfect market there would not be any fluctuations without a real reason and even any speculative attacks would be countered by counter-speculation. In reality there can be large fluctuations even when the long-term average may be the value justified by the fundamentals of the real economy (like PPP). It is even possible that a large company influences the exchange rate of a small country by its own behaviour, normally detrimental to its own interests, for example by increasing the exchange rate and thereby its expenses when investing in the small country and decreasing it later when exporting profits or even disinvesting. This risk of instability is also negative for the fulfilment of the other criteria. A small undervaluation will only happen by chance. There could also be a large undervaluation or a small or large overvaluation, all of which are less good for business. The inflation could be large or low or negative (i.e. deflation). When the central bank tries to fight too large fluctuations in the currency value, it has less or no room to realise other objectives by its monetary policy. As an example, high interest rates can be used to stop capital outflows and thereby devaluation but they have detrimental effects on real investments, consumption and growth.

**Currency pegs**

A pegged currency is more stable than a free floating one. However, it is not so easy to stabilise a currency in case of a crisis or when there are strong market forces against the peg as will be shown in the next Section 4.3 for the case of a fixed exchange rate. Limited flexibility can make this task even more difficult because everyone can see how limits are reached and tested.

**Fixing an Exchange Rate Is Difficult**

A fixed exchange rate is stable, at least between the currencies with a fixed exchange rate and as long as the fixing holds. As explained in Section 2.3, one central bank can
always guarantee that its own currency does not increase in value. The converse guarantee against devaluation is only possible with sufficient reserves (for example with a currency board, see the next Section 4.4) or an agreement with the other central bank(s) to stop any increase in the value of its currency (or their currencies). The problem with such an agreement is that it can be broken if it can at all be negotiated in the first place. This article concentrates on small countries that are more interested in fixed exchange rates with a larger country than the other way round. Accordingly, the larger country may not be interested in an agreement at all or may not honour it in the case of real problems.

A currency board is stable

A currency board is a way to stabilise a fixed exchange rate. It can be applied unilaterally by a small country that wants to anchor its currency to another one, normally from a much larger country. The small country should choose the currency of the economically most important trading partner, which is quite stable by itself. The central bank of the small country gives out its own money only against money of the larger country at the fixed exchange rate. When the currency board is complete, then there is enough foreign money to guarantee this fixed exchange rate for all outstanding money from the central bank. However, this implies enough foreign currency in the first place, which the central bank and thereby the country needs to save before starting with the currency board. An alternative is an incomplete currency board with lower reserves that are still high enough to guarantee the fixed exchange rate for all outstanding money in the currency of the country that can be reasonably expected to be exchanged. Some money will always remain in circulation or conversely be locked away such that it will not be changed into the foreign currency. In practice, a central bank can start with an incomplete currency board and increase the ratio of money backed by foreign currency over time, for example by giving out new money only for foreign currency at the fixed exchange rate.

The problem is bank money created by commercial banks. The central bank has not enough reserves to guarantee all of this money, either. Thus, this kind of money creation has to be prohibited or at least it should not be guaranteed as money from the central bank. In case of a severe banking crisis, it is possible to decide what is worse, the collapse of the banking sector or abandoning the currency board. The advantage of a currency board is that it is very stable but not totally so. If necessary, an adaption is possible. Another relevant case is depression in the real economy that could be moderated by devaluation.

A metal-based currency is risky

A metal-based currency is in a way like a currency board with a precious metal like gold taking the role of the anchor currency. There is a fixed rate at which the metal-based currency can be changed into gold and vice versa. The central bank has also enough gold to pay out all holders of banknotes. One problem of such an arrangement is that the stability of the currency is only relative to the value of gold (or another precious metal or a mix of two or even more such metals). However, this value is by
itself unstable, at least compared to real prices of other goods and to other currencies. That means the criterion of stability is not fulfilled. At the same time, there is some risk of overvaluation of the metal-based currency relative to other currencies. Even if the exchange rate in the beginning is set quite low, it will increase over time on average, while the current exchange rate fluctuates a lot. Moreover, an autonomous monetary policy is not possible, but it is determined by the market price of gold. Finally, creating and holding the necessary gold reserves is quite expensive for a country and has to be paid for by its people and companies, while gold pays no interest.

Using a foreign currency is very stable

Using a foreign currency as one's own is like a currency board in many regards. Enough foreign currency is needed and an independent monetary policy is impossible, while the value of the currency is stable, at least relative to the foreign currency that is used. The main difference is that actually using a foreign currency is even more stable than a currency board. A currency board could be abolished or the exchange rate could be changed. Even when the foreign currency is replaced by one's own currency in the future, people and business companies still have the foreign money in their pockets and its value is unchanged. However, even this difference vanishes in regard of bank accounts in the home country. If a government wants to change the currency, it could force the banks in its country to change all bank accounts accordingly. Only the foreign bills in circulation would keep their value or would even get a higher real value in the country introducing its own money. However, as long as a country uses the foreign currency as its own, it is as stable as this foreign currency and the exchange rate is fixed because there is no exchange but identity of the currency.

A monetary union is dangerous

A monetary union is like using a foreign currency by each member of the union. All members together can decide their common monetary policy but they cannot differentiate it for every member and its distinct economic situation. This may seem better than using a completely foreign currency because even a small country has some influence on the common currency, its central bank and monetary policy, while it has no such influence in case of a really foreign currency. However, the common currency of a monetary union is a collective good for which no one is fully responsible. There are also problems in collective decision making and the results can be worse for all than those taken by each country in its own interest. Thus, a common currency is probably less stable than the currency of a well-managed large country and consequently also the currency of a small country attached to the currency of the large one by fixed exchange rates, a currency board or even using the same currency. Moreover, the business of the small country can profit from growth-friendly monetary policy in the large country, whereas the monetary policy of a monetary union will be more erratic. Furthermore, splitting a monetary union is much more difficult than changing a fixed exchange rate or even a currency board or a foreign currency used in one's own country because the connections are much more complex. This is a large problem in a crisis when a country would need to devalue its currency or to borrow a
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lot, but cannot as a member of a currency union. Conversely, a monetary union can also split with all accompanying problems against the will of a country. Finally, there is no example of a monetary union of sovereign countries that worked for a longer time. Either the monetary union splits or the sovereignty is lost and a common state created. That means a country should only join a monetary union if it is ready to cede its sovereignty and to become part of a larger state or at least political union. Nevertheless, some business firms can profit from a monetary union even before, especially exporting firms in exporting countries (cf. Dilger, 2016).

Parallel currencies are a compromise

Parallel currencies can have the advantages of both kinds of currencies that are used in parallel. It is possible to combine any kind of currency with each other or even with a second version of the same kind like currencies based in gold and silver or using euros and dollars at the same time. However, one large disadvantage consists of higher transactions costs as well as more risks inside the country. All prices have to be set in two currencies. Depending on the kind of currencies, they can freely float or they are fixed with or without the possibility of changes of the exchange rate from time to time. Normally, it is better to have just one authoritative currency in one country. Nevertheless, people and companies should be free to use any currency they like in their transactions and treaties. Parallel currencies can be used in transition from one currency to another or by very small countries with two very large trading partners of nearly equal importance.

Conclusion

In this paper several kinds of currencies and criteria on what business companies of a small country like regarding the currency were discussed. It is not possible to fulfil all criteria optimally at the same time. However, the best compromise for business in a small country seems to be a currency board with a fixed exchange rate that can be adapted in case of a crisis. A currency board is also the best protection against speculative attacks. The anchor currency should be that of the largest trading partner, especially if the trade volume with it is much larger than with all other trading partners. Nearly as good, but perhaps a little bit too stable in case of a crisis, is using a foreign currency as legal tender. A free floating currency is (possibly) too unstable. Fixing an exchange rate without a currency board is difficult and not trustworthy enough. A metal-based currency is instable because of the fluctuation in the value of the precious metal like gold. A monetary union is dangerous because of the collective good and collective decision, making problems without much room for manoeuvre in case of a crisis. Finally, parallel currencies have higher transaction costs than just choosing the best kind of currency. Further research could reassess this argumentation with an empirical study.
References


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