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AIMS AND SCOPE

Transition is the widely accepted term for the thorough going political, institutional, organizational, social, and technological changes and innovations as well as economy-wide and sector changes in societies, countries and businesses to establish and enhance a sustainable economic environment.

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Inclusive Society as a Necessary Condition for Knowledge-Based Competitiveness in the European Union

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The latest growth strategy of the European Union, the Europe 2020, represents a new approach towards economic growth. From our point of view the most important innovation of the strategy is that, beside intelligent and sustainable growth, it sets out the establishment of an inclusive society as one of its priorities. We believe that member states' competitiveness is a key factor of their economic growth. For that reason, we included the World Economic Forum's Global Competitiveness Index in our analysis to find the relationship between competitiveness and an inclusive society. We investigate the EU member states' performance on country group level, and then we set up an inclusive indicator based on the main components of the inclusive pillar of the Europe 2020 strategy. Our findings suggest that an inclusive society is one of the necessary conditions for economic prosperity.

Key Words: society, education, economy, knowledge

JEL Classification: I25, I32, J24

Introduction

In the last 15 years, the European Union has launched two long-term growth strategies with different targets. First, the Lisbon strategy emphasized that the European Union should in 10 years' time become the most competitive, knowledge-based economy in the world with sustainable growth and high level of employment. Then the Europe 2020 strategy has three priorities: it claims that intelligent, inclusive and sustainable growth is desirable in the European Union. This strategy was announced in 2010 when the member states were focusing on fire-fighting the effects of the global economic crisis and were rather concerned about short-term growth. Still, the Europe 2020 strategy is not dealing with crisis management but highlighting the necessary conditions of long-term economic

growth instead. In our paper, we are focusing on the indicators that determine inclusive growth: employment, education, and people living in or at risk of poverty or social exclusion.

In this article, we would like to emphasize the importance of human aspects of competitiveness such as human capital and social inclusion. We claim that the human and social aspects of competitiveness are the basis of a knowledge-based economy. The aim of this paper is to discover the relationship between competitiveness and social inclusion. Our initial hypothesis is that social inclusion is one of the necessary conditions for a competitive economy. Moreover, we assume that there is a core-periphery divide in the performance of the member states.

In our paper, first we overview the related literature, which suggests a correlation between social inclusion and competitiveness and gives a special highlight to the role of knowledge in the economy. Second, we thoroughly present our methodology (country groups, indicators) and the results of the calculations. Finally, we discuss the relationship of competitiveness and social inclusion based on our findings and we draw our conclusions.

Interpretations of an Inclusive Growth

The concept of inclusion is very open and has been the subject of various interpretations. A widely accepted definition of inclusive growth was established by the Commission on Growth and Development: ‘output growth that is sustained over decades, is broad-based across economic sectors, creates productive employment opportunities for a great majority of the country’s working age population, and reduces poverty’ (Samans and Corrigan 2015, 3).

However, the European Union has its own distinctive approach towards inclusive growth. As the European Commission has stated it, there are inclusive challenges (European Commission 2010) that are needed to be met in the framework of the Europe 2020 strategy. Two of these challenges are very similar to the aforementioned, namely employment and the reduction of poverty. What makes the European Union’s approach unique is its commitment to territorial cohesion by reducing regional disparities in parallel. The notion of inclusion may also be determined reversely: social exclusion can be viewed as an antidote to inclusion, and it can be the result of different causes such as discrimination based on age, gender, social status, race, disability, etc. (Begg 2011, 2–3). The question is how we can prevent these phenomena from occurring. For sure,

education plays a crucial role in building an inclusive society (Armstrong and Spandagou 2009, 4).

Besides this, we know from theoretical growth literature that education has a significant role in economic well-being as well. This issue is again rather complex and now we are trying to grasp the essence of the importance of education via three simple assumptions. Firstly, education improves human capital that is inherent in labour force and results in higher level of output (Mankiw 1992). Secondly, education also improves the innovative capacity of the economy leading to new products, processes, and technologies that promote growth (Lucas 1988; Romer 1990; Aghion and Howitt 1998). Finally, education facilitates the understanding, the use, and the implementation of new technologies (Nelson and Phelps 1966; Benhabib and Spiegel 1994). Nevertheless, it is important to note that the quality of education strongly matters in successfully reaching such outcomes (Hanushek and Woessmann 2010, 245).

In our paper, we refer to knowledge as an asset, which has a unique nature with special characteristics and a vital role in the production process. Knowledge can be assumed as a global public good (Stiglitz 2006): it does not devalue when it is used by other people; the value of knowledge is in fact higher when it is shared; nobody can be excluded from possessing it, and it cannot be unlearned once it is learned (Witoń 2014). Moreover, knowledge can be understood as a form of capital and, as such, it also requires investment (Schultz 1961) or else it is going through amortization with time (Pelle 2013). On the other hand, knowledge is strongly linked to individuals: it can only be used by them, and it contributes to economic growth only when it is utilized. In this sense, education plays a crucial role in giving individuals skills and cognitive abilities (Hanushek and Woessmann 2008) and investment in education is indirectly an investment in human capital (Schultz 1979).

The Importance of Competitiveness in Economic Growth

The term 'competitiveness' has been long discussed in the history of economic theory. From the classical Ricardian model based on comparative advantages, along with the neoclassical schools emphasizing the role of effectiveness, and new institutional economics pointing out the importance of the quality of institutions to the latest growth models incorporating factors of growth such as governance, human capital, and technological progress, saying that these are not mutually exclusive and can influence a country's productivity jointly (Sala-i-Martin 2004; Ro-

drik 2007; Acemoglu and Robinson 2012). In line with theory, we use the World Economic Forum's definition of competitiveness, according to which competitiveness is 'a set of institutions, policies and factors that determine the level of productivity of a county' (World Economic Forum 2014, 4). The definition implies that the more productive a country, the more competitive it is and the more it is able to generate and provide wealth to the members of its society. At the same time, other competitiveness definitions such as international competitiveness (Durand and Giorno 1987), trade competitiveness (Inter-American Development Bank 2001) and global comparative advantages are based on cost and price differentials. As some authors suggest, the member states of the European Union are developed economies that should not enter the race of cost competitiveness, but rather focus on a knowledge-based competitiveness to enhance aggregate productivity (Di Mauro and Foster 2011).

Furthermore, the quality of individuals and thus the quality of society has a strong effect on countries' economic performance and competitiveness. Without a strong basis of skilled, healthy and active individuals, who are living in a society that is providing equal opportunities for its members, the success of economic performance is hindered. Moreover, the growing number of social groups living in poverty threatens the long-term growth prospects of an economy and, at the same time, appears as a major risk to stability and social progress (Stiglitz 2012).

Data and Methodology

In our analysis, we examine the European Union member states' performance in terms of competitiveness and social inclusion. For this purpose, we rely on data from the World Economic Forum (WEF) and the Eurostat. Based on the European Union member states' performance on the WEF Global Competitiveness Index (table 1), we create six country groups (table 2). These country groups are also aimed to reflect the territorial cohesion problematic in the European Union. Furthermore, although the GCI is comprised of 114 indicators, the components of social inclusion are not included in the index. In case there is a correlation between competitiveness and an inclusive society that is not on the level of data.

In table 3, the countries are grouped according to their performance on the GCI (see also table 1). The order of the country groups follows the group average scores and at the same time each group includes countries with growing from-to ranks. The Northern and Western European countries perform better scores than the EU average. The biggest range

TABLE 1 Ranking and Score on the GCI of the EU Member States

Country	2013-4		2014-5		Country	2013-4		2014-5	
	(1)	(2)	(1)	(2)		(1)	(2)	(1)	(2)
Austria	16	5.15	21	5.16	Italy	49	4.41	49	4.42
Belgium	17	5.13	18	5.18	Latvia	52	4.40	42	4.50
Bulgaria	57	4.31	54	4.37	Lithuania	48	4.41	41	4.51
Croatia	75	4.13	77	4.13	Luxembourg	23	5.09	19	5.17
Cyprus	58	4.30	58	4.31	Malta	41	4.50	47	4.45
Czech Republic	46	4.43	37	4.53	Netherlands	8	5.42	8	5.45
Denmark	15	5.18	13	5.29	Poland	42	4.46	43	4.48
Estonia	32	4.65	29	4.71	Portugal	51	4.40	36	4.54
Finland	3	5.54	4	5.50	Romania	76	4.13	59	4.30
France	25	5.05	23	5.08	Slovakia	78	4.10	75	4.15
Germany	4	5.51	5	5.49	Slovenia	62	4.25	70	4.22
Greece	91	3.93	81	4.04	Spain	35	4.57	35	4.55
Hungary	63	4.25	60	4.28	Sweden	6	5.48	10	5.41
Ireland	28	4.92	25	4.98	United Kingdom	10	5.37	9	5.41

NOTES Column headings are as follows: (1) rank, (2) score.

TABLE 2 Country Groups

Country group	Members
1 Northern Europe	Denmark, Sweden, Finland
2 Western Europe	Austria, Belgium, United Kingdom, France, Netherlands, Ireland, Luxembourg and Germany
3 Baltics	Estonia, Latvia, Lithuania
4 Southern Europe	Cyprus, Malta, Portugal, Spain, Italy
5 Central and Eastern Europe	Czech Republic, Slovakia, Poland, Hungary, Slovenia
6 Balkans	Croatia, Greece, Romania, Bulgaria

in points can be found in the Western European group, mainly because it is the most numerous country group with eight countries. The positions of the EU member states range between 4 and 81 on the GCI index, with the biggest difference in ranks (33) in the group of Central and Eastern European Member States. These rankings already suggest a competitiveness divide within the European Union.

In the following section, we investigate the EU member states' perfor-

TABLE 3 Country Groups According to the Performance on the Global Competitiveness Index, 2014–2015

Country group	Average (score)	Range (points)	Range (rank)
Northern Europe	5.40	0.22	9 (4–13)
Western Europe	5.24	0.51	20 (5–25)
Baltics	4.57	0.22	13 (29–42)
Southern Europe	4.45	0.33	23 (35–58)
Central and Eastern Europe	4.33	0.31	33 (37–70)
Balkans	4.21	0.33	27 (54–81)
EU (total)	4.73	1.47	77 (4–81)

NOTES Adapted from World Economic Forum (2014).

mance along the indicators under the inclusive priority of the Europe 2020 strategy. Nonetheless, we analyze the data on a larger time scale in order to reveal the dynamics of performance and the effects of the 2008 economic crisis. The first such indicator is employment rate (table 4).

When calculating the employment rates (e_i^j) for the country groups (CG), we add up the countries' active (a_i^j) and inactive (ia_i^j) 20–64 year-old population groups, thus receiving the working-age population in each country group. Afterwards, we add up the number of employed persons in all country groups respectively. Then we divide the number of employed persons by the number of people in the working-age population of the country group, for all six groups, and for all five years.

$$j = 1, 2, 3 \dots 6.$$

$$i_j: \quad i_1 = 1, 2, 3, \quad i_2 = 1, 2, 3 \dots 8, \quad i_3 = 1, 2, 3,$$

$$i_4 = 1, 2, 3 \dots 5, \quad i_5 = 1, 2, 3 \dots 5, \quad i_6 = 1, 2, 3, 4, \quad i \in \text{CG}_j.$$

$$e_{\text{CG}j} = \frac{\sum e_i^j}{\sum a_i^j + \sum ia_i^j}.$$

In terms of employment, we can observe various paths in the country groups. Northern European countries perform the best: before the 2008 economic crisis, employment rate was 78.95%; however, as a result of the crisis, it fall back to 76.11% in 2010 and since then only a modest growth can be observed. The Western European country group seems to be the most resistant to the crisis with a steady performance in employment rate. On the other hand, the deviation is the biggest within this group.

TABLE 4 Employment Rates in the European Union, 2007–2013

Country	2007	2008	2009	2010	2011	2012	2013
EU-28	69.8	70.3	68.9	68.6	68.6	68.4	68.4
Belgium	67.7	68.0	67.1	67.6	67.3	67.2	67.2
Bulgaria	68.4	70.7	68.8	65.4	62.9	63.0	63.5
Czech Republic	72.0	72.4	70.9	70.4	70.9	71.5	72.5
Denmark	79.0	79.7	77.5	75.8	75.7	75.4	75.6
Germany	72.9	74.0	74.2	74.9	76.5	76.9	77.3
Estonia	76.9	77.1	70.0	66.8	70.6	72.2	73.3
Ireland	73.8	72.2	66.9	64.6	63.8	63.7	65.5
Greece	65.8	66.3	65.6	63.8	59.6	55.0	52.9
Spain	69.7	68.5	64.0	62.8	62.0	59.6	58.6
France	69.8	70.4	69.5	69.3	69.3	69.4	69.6
Croatia	63.9	64.9	64.2	62.1	59.8	58.1	57.2
Italy	62.7	62.9	61.6	61.0	61.0	60.9	59.7
Cyprus	76.8	76.5	75.3	75.0	73.4	70.2	67.2
Latvia	75.2	75.4	66.6	64.3	66.3	68.1	69.7
Lithuania	72.7	72.0	67.0	64.3	66.9	68.5	69.9
Luxembourg	69.6	68.8	70.4	70.7	70.1	71.4	71.1
Hungary	62.3	61.5	60.1	59.9	60.4	61.6	63.0
Malta	58.6	59.2	59.0	60.1	61.6	63.1	64.8
Netherlands	77.8	78.9	78.8	76.8	77.0	77.2	76.5
Austria	72.8	73.8	73.4	73.9	74.2	74.4	74.6
Poland	62.7	65.0	64.9	64.3	64.5	64.7	64.9
Portugal	72.5	73.1	71.1	70.3	68.8	66.3	65.4
Romania	64.4	64.4	63.5	64.8	63.8	64.8	64.7
Slovenia	72.4	73.0	71.9	70.3	68.4	68.3	67.2
Slovakia	67.2	68.8	66.4	64.6	65.0	65.1	65.0
Finland	74.8	75.8	73.5	73.0	73.8	74.0	73.3
Sweden	80.1	80.4	78.3	78.1	79.4	79.4	79.8
United Kingdom	75.2	75.2	73.9	73.5	73.5	74.1	74.8

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

The employment rate in the Baltic countries was above 74% in 2007 and 2008. In the following year, there was a sharp decline to 67.48%, and it decreased further to 64.81% in 2010. Since then, employment rate here

TABLE 5 Employment Rates in the Country Groups, 2007–2013

Country groups	2007	2008	2009	2010	2011	2012	2013
Northern Europe	78.38	78.95	76.81	76.11	76.88	76.88	76.92
Western Europe	72.90	73.47	72.80	72.78	73.25	73.60	73.95
Baltics	74.33	74.14	67.48	64.81	67.48	69.14	70.53
Southern Europe	66.54	66.16	63.53	62.71	62.24	60.96	59.87
CEEU	64.91	66.31	65.60	64.93	65.15	65.57	65.94
Balkans	65.25	65.78	64.73	63.36	61.51	60.78	60.58
EU total	69.80	70.30	69.00	68.50	68.50	68.40	68.40
Deviation	5.602	5.506	5.214	5.584	6.160	6.617	7.025

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

has risen above the EU average with 70.53% in 2013. Southern European countries and the Balkans group experienced the biggest setback in the period between 2007 and 2013: employment rate in their case has gradually decreased (with the exemption of 2007–2008 in the Balkans group) and there are still no signs of improvement. For the Central and Eastern European countries, employment rate declined in the period between 2008 and 2010 while a moderate growth can be examined since 2011. Still, employment rate in this country group is below the EU average.

As it is indicated in the last line of the table, the deviation between the country groups in terms of employment rate has increased, suggesting that there are growing differences in their performance. The situation is the most urging in the Southern European and Balkans country groups as their performance is lagging behind the others. They have not managed to even maintain their employment rates even though its importance is strongly emphasized in the Europe 2020 strategy.

The second indicator is linked to education. In accordance with the Europe 2020 strategy, we examine the ratio of early school leavers and tertiary level education attainment in the country groups. The rate of early school leavers (table 6) refers to the number of population aged 18–24 years with at most secondary education who are not enrolled in further education or training (see <http://ec.europa.eu/eurostat/data/database>). The rate of early school leavers shall be reduced to 10% while tertiary level education attainment shall be increased to 40% by 2020 according to the strategy's respective objectives (table 7). This latter indicator refers to the percentage of population aged 30–34 years who have successfully finished their tertiary studies (see <http://ec.europa.eu/eurostat/data/database>).

TABLE 6 Early School Leavers in the European Union, 2007–2013

Country	2007	2008	2009	2010	2011	2012	2013
EU-28	14.9	14.6	14.2	13.9	13.4	12.6	11.9
Belgium	12.1	12.0	11.1	11.9	12.3	12.0	11.0
Bulgaria	14.9	14.8	14.7	13.9	11.8	12.5	12.5
Czech Republic	5.2	5.6	5.4	4.9	4.9	5.5	5.4
Denmark	12.9	12.5	11.3	11.	9.6	9.1	8.0
Germany	12.5	11.8	11.1	11.9	11.6	10.5	9.8
Estonia	14.4	14.0	13.5	11.0	10.6	10.3	9.7
Ireland	11.8	11.4	11.7	11.5	10.8	9.7	8.4
Greece	14.3	14.4	14.2	13.5	12.9	11.3	10.1
Spain	30.8	31.7	30.9	28.2	26.3	24.7	23.6
France	12.6	11.5	12.2	12.5	11.9	11.5	9.7
Croatia	4.5	4.4	5.2	5.2	5.0	5.1	4.5
Italy	19.5	19.6	19.1	18.6	17.8	17.3	16.8
Cyprus	12.5	13.7	11.7	12.7	11.3	11.4	9.1
Latvia	15.6	15.5	14.3	12.9	11.6	10.6	9.8
Lithuania	7.8	7.5	8.7	7.9	7.4	6.5	6.3
Luxembourg	12.5	13.4	7.7	7.1	6.2	8.1	6.1
Hungary	11.4	11.7	11.5	10.8	11.4	11.8	11.9
Malta	30.2	27.2	25.7	23.8	22.7	21.1	20.5
Netherlands	11.7	11.4	10.9	10.0	9.1	8.8	9.2
Austria	10.8	10.2	8.8	8.3	8.5	7.8	7.5
Poland	5.0	5.0	5.3	5.4	5.6	5.7	5.6
Portugal	36.5	34.9	30.9	28.3	23.0	20.5	18.9
Romania	17.3	15.9	16.6	19.3	18.1	17.8	17.3
Slovenia	4.1	5.1	5.3	5.0	4.2	4.4	3.9
Slovakia	6.5	6.0	4.9	4.7	5.1	5.3	6.4
Finland	9.1	9.8	9.9	10.3	9.8	8.9	9.3
Sweden	8.0	7.9	7.0	6.5	6.6	7.5	7.1
United Kingdom	16.6	17.0	15.7	14.8	14.9	13.4	12.3

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

In this case, we follow a three-step calculation method to get the proportion of early school leavers and the proportion of people with tertiary level education attainment. In order to be able to interpret the rates of

TABLE 7 Tertiary Educational Attainment in the European Union, 2007–2013

Country	2007	2008	2009	2010	2011	2012	2013
EU-28	30.1	31.2	32.3	33.8	34.8	36.0	37.1
Belgium	41.5	42.9	42.0	44.4	42.6	43.9	42.7
Bulgaria	26.0	27.1	27.9	27.7	27.3	26.9	29.4
Czech Republic	13.3	15.4	17.5	20.4	23.7	25.6	26.7
Denmark	38.1	39.2	40.7	41.2	41.2	43.0	43.4
Germany	26.5	27.7	29.4	29.8	30.6	31.8	32.9
Estonia	33.5	34.4	36.3	40.2	40.2	39.5	43.7
Ireland	43.3	46.3	48.9	50.1	49.7	51.1	52.6
Greece	26.3	25.7	26.6	28.6	29.1	31.2	34.9
Spain	40.9	41.3	40.7	42.0	41.9	41.5	42.3
France	41.4	41.2	43.2	43.4	43.3	43.5	44.1
Croatia	16.8	18.5	21.3	24.5	23.9	23.1	25.6
Italy	18.6	19.2	19.0	19.9	20.4	21.9	22.5
Cyprus	46.2	47.1	45.0	45.3	46.2	49.9	47.8
Latvia	25.7	26.3	30.5	32.6	35.9	37.2	40.7
Lithuania	36.4	39.9	40.4	43.8	45.7	48.6	51.3
Luxembourg	35.3	39.8	46.6	46.1	48.2	49.6	52.5
Hungary	20.6	22.8	24.0	26.1	28.2	29.8	32.3
Malta	20.8	21.0	21.9	22.1	23.4	24.9	26.0
Netherlands	36.4	40.2	40.5	41.4	41.1	42.2	43.1
Austria	20.9	21.9	23.4	23.4	23.6	26.1	27.1
Poland	27.0	29.7	32.8	34.8	36.5	39.1	40.5
Portugal	19.5	21.6	21.3	24.0	26.7	27.8	30.0
Romania	13.9	16.0	16.8	18.3	20.3	21.7	22.9
Slovenia	31.0	30.9	31.6	34.8	37.9	39.2	40.1
Slovakia	14.8	15.8	17.6	22.1	23.2	23.7	26.9
Finland	47.3	45.7	45.9	45.7	46.0	45.8	45.1
Sweden	41.0	42.0	43.9	45.3	46.8	47.9	48.3
United Kingdom	38.5	39.7	41.4	43.1	45.5	46.9	47.4

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

early school leavers in the six country groups, we make the following calculations. Since there are data available only for age categories, first we have to add up the number of people ($\sum pop_{18-24_i}$) from ages 18 to 24

years in the period between 2007 and 2013 (1). This way we get the total population aged 18–24 years in the European Union member states and also in the country groups. In the following step, the number of the total population aged 18–24 years ($pop_{18-24_i^j}$) is divided by the percentage of early school leavers ($esl\%_i^j$) of the Eurostat Europe 2020 indicator (2). This way we get the number of population aged 18–24 years not enrolled in education or training (esl_i^j). As a final step, the total number of population aged 18–24 year not enrolled in education or training in the country group is divided by the total number of population aged 18–24 years in the same country group. Finally, as a result, we arrive to the percentage of early school leavers in each country group (esl_{CGj}).

$$\begin{aligned} \sum pop_{18-24_i^j} &= \sum pop_{18_i^j} + \sum pop_{19_i^j} + \sum pop_{20_i^j} \\ &+ \sum pop_{21_i^j} + \sum pop_{22_i^j} + \sum pop_{23_i^j} \\ &+ \sum pop_{24_i^j}. \end{aligned} \quad (1)$$

$$\frac{\sum pop_{18-24_i^j}}{esl\%_i^j} = esl_i^j. \quad (2)$$

$$esl_{CGj} = \frac{\sum esl_i^j}{\sum pop_{18-24_i^j}}. \quad (3)$$

Similarly, in the case of tertiary education attainment, the numbers of population from 30 to 34 years are summed up, in order to get the total number of population ($\sum pop_{30-34_i^j}$) in this age group (4). As a next step, this number is divided by the percentage of Europe 2020 tertiary education indicator ($tea\%_i^j$) from the Eurostat, giving the result of the number of population with tertiary education attainment (tea_i^j) in the age group of 30–34 years (2). Finally, the total number of population with tertiary level education attainment in the country group is divided by the total number of population aged 30–34 years in the country group. As a result, the percentage of population aged 30–34 years with tertiary level educational attainment (tea_{CGj}) in the country groups is calculated (3).

$$\begin{aligned} \sum pop_{30-34_i^j} &= \sum pop_{30_i^j} + \sum pop_{31_i^j} + \sum pop_{32_i^j} \\ &+ \sum pop_{33_i^j} + \sum pop_{34_i^j}. \end{aligned} \quad (4)$$

TABLE 8 The Rates of Early School Leavers and Tertiary Educational Attainment, 2007–2013

Country groups	2007	2008	2009	2010	2011	2012	2013
<i>Early School Leavers</i>							
Northern Europe	9.55	9.59	8.87	8.63	8.19	8.27	7.89
Western Europe	15.53	15.12	14.38	14.35	14.16	13.15	11.99
Baltics	11.75	11.51	11.53	10.15	9.40	8.56	8.07
Southern Europe	26.05	26.22	25.15	23.50	21.86	20.64	19.69
CEEU	5.95	6.04	6.06	5.95	6.19	6.41	6.48
Balkans	14.95	14.21	14.52	15.09	14.17	13.83	13.47
<i>Tertiary Educational Attainment</i>							
Northern Europe	41.69	42.13	43.52	44.27	45.07	46.03	46.16
Western Europe	35.09	36.14	37.73	38.49	39.38	40.43	41.11
Baltics	32.31	34.30	36.31	39.42	41.29	42.81	46.06
Southern Europe	28.36	29.23	29.04	30.38	30.92	31.48	32.23
CEEU	22.59	24.87	27.39	29.85	32.08	34.35	36.06
Balkans	19.34	20.63	21.56	23.03	24.22	25.32	27.38

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

$$\frac{\sum pop_{30-34}_i^j}{tea\%_i^j} = tea_i^j. \quad (5)$$

$$tea_{cgj} = \frac{\sum tea_i^j}{\sum pop_{30-34}_i^j}. \quad (6)$$

The 10% percent target has already been achieved in the Northern European region where the rate of early school leavers is decreasing further. The rate of early school leavers is also under 10% in the Central and Eastern European country group (mainly due to political traditions); however, there has been a growing tendency in the number of early school leavers in the past few years. For the Southern European region, the rate of early school leavers decreased by 6.36%points but it is still the highest among the country groups with 19.69%. In the case of the Baltic countries, the decrease in the rate of early school leavers was relatively the largest. In the Balkans group, the rate of early school leavers was increasing in the period between 2008 and 2010 when it gradually started to decrease.

The rate of tertiary educational attainment shows a growing tendency

in all country groups (the only exception is a slight drop in the Southern European group in year 2009). The greatest progress has been achieved in the Baltic group where the rate of tertiary educational attainment increased by 13.75%points in the period between 2007 and 2013. Similarly, in the Central and Eastern European group, the rate of tertiary education attainment increased by 13.47%points in the same period. The relatively smallest growth was experienced in the Southern European country group, only 3.87%points over the 7 years period.

Overall, the Member States of the European Union are heading towards the education targets of the Europe 2020 strategy. There is a clear progress in these terms but there are evident differences in the performances of the country groups.

The third and final indicator of an inclusive society under the Europe 2020 strategy is poverty. The indicator of people living at risk of poverty or social exclusion is composed of three sub-indicators, namely the people living in low work intensity households, the people living in poverty after social transfers, and the severely materially deprived people. At risk of poverty are the persons with an equivalized disposable income below the risk-of-poverty threshold, which is set at 60% of the national median equivalized disposable income (after social transfers). Material deprivation covers indicators relating to economic strain and durables. Severely materially deprived persons have living conditions severely constrained by a lack of resources, they experience at least 4 out of 9 following deprivations items: cannot afford (1) to pay rent or utility bills, (2) keep home adequately warm, (3) face unexpected expenses, (4) eat meat, fish or a protein equivalent every second day, (5) a week holiday away from home, (6) a car, (7) a washing machine, (8) a colour TV, or (9) a telephone. People living in households with very low work intensity are those aged 0–59 living in households where the adults (aged 18–59) work less than 20% of their total work potential during the past year (see <http://ec.europa.eu/eurostat/data/database>). It is important to note that the people who belong to more than one category are only considered once.

In the case of poverty rates, the number of people living at risk of poverty or social exclusion ($\sum arope_i^j$) is divided by the number of total population ($\sum population_i^j$) in each country group.

$$arope_{cgj} = \frac{\sum arope_i^j}{\sum population_i^j} \tag{7}$$

TABLE 9 People living at risk of poverty or social exclusion, 2007–2013

Country	2007	2008	2009	2010	2011	2012	2013
EU-28	–	–	–	23.7	24.3	24.7	24.5
Belgium	21.6	20.8	20.2	20.8	21.0	21.6	20.8
Bulgaria	60.7	44.8	46.2	49.2	49.1	49.3	48.0
Czech Republic	15.8	15.3	14.0	14.4	15.3	15.4	14.6
Denmark	16.8	16.3	17.6	18.3	18.9	19.0	18.9
Germany	20.6	20.1	20.0	19.7	19.9	19.6	20.3
Estonia	22.0	21.8	23.4	21.7	23.1	23.4	23.5
Ireland	23.1	23.7	25.7	27.3	29.4	30.0	29.5
Greece	28.3	28.1	27.6	27.7	31.0	34.6	35.7
Spain	23.3	24.5	24.7	26.1	26.7	27.2	27.3
France	19.0	18.5	18.5	19.2	19.3	19.1	18.1
Croatia	–	–	–	31.1	32.6	32.6	29.9
Italy	26.0	25.3	24.7	24.5	28.2	29.9	28.4
Cyprus	25.2	23.3	23.5	24.6	24.6	27.1	27.8
Latvia	35.1	34.2	37.9	38.2	40.1	36.2	35.1
Lithuania	28.7	28.3	29.6	34.0	33.1	32.5	30.8
Luxembourg	15.9	15.5	17.8	17.1	16.8	18.4	19.0
Hungary	29.4	28.2	29.6	29.9	31.0	32.4	33.5
Malta	19.7	20.1	20.3	21.2	22.1	23.1	24.0
Netherlands	15.7	14.9	15.1	15.1	15.7	15.0	15.9
Austria	16.7	20.6	19.1	18.9	19.2	18.5	18.8
Poland	34.4	30.5	27.8	27.8	27.2	26.7	25.8
Portugal	25.0	26.0	24.9	25.3	24.4	25.3	27.5
Romania	45.9	44.2	43.1	41.4	40.3	41.7	40.4
Slovenia	17.1	18.5	17.1	18.3	19.3	19.6	20.4
Slovakia	21.3	20.6	19.6	20.6	20.6	20.5	19.8
Finland	17.4	17.4	16.9	16.9	17.9	17.2	16.0
Sweden	13.9	14.9	15.9	15.0	16.1	15.6	16.4
United Kingdom	22.6	23.2	22.0	23.2	22.7	24.1	24.8

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

Now we first analyze the portion of people living at risk of poverty or social exclusion in general, then we present the decomposition of the indicator in order to get a more detailed picture of the poverty problem

TABLE 10 People Living at Risk of Poverty or Social Exclusion, 2007–2013

Country groups	2007	2008	2009	2010	2011	2012	2013
Northern Europe	15.51	15.85	16.46	16.39	17.33	17.06	17.08
Western Europe	19.81	19.75	19.38	19.81	19.86	20.09	20.15
Baltics	29.77	29.05	30.87	32.67	33.13	31.65	30.59
Southern Europe	25.03	25.20	24.77	25.58	27.83	29.04	28.07
CEEU	28.82	26.29	24.58	24.72	24.60	24.68	24.12
Balkans	42.99	39.49	39.12	39.26	39.81	41.35	40.51

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

(table 9). Similarly to the previous indicators, we analyze the time period between 2007 and 2013. (Unfortunately, some data were unavailable for Croatia from 2007 to 2009. To solve this problem, we took the median value of the data 2010–2013 and substituted the missing information this way.)

The proportion of people living at risk of poverty or social exclusion shows a growing tendency in the period between 2007 and 2013 in four of the country groups, with the exception of the Central and Eastern European region and the Balkans. However, it is still worrisome that 40.51% of the population in the Balkans region is living at risk of poverty or social exclusion. The largest increase in the portion of such people occurred in the Southern European country group where 28.07% of the population was exposed to this risk in 2013. The growing number of people living at risk of poverty or social exclusion in the Northern and Western European region is signalling a need for policy implications in this field in these rather developed countries as well.

As a following step, we present the decomposition of the people living at risk of poverty or social exclusion indicator, revealing the very nature of the poverty issue.

When focusing on the tendencies in the proportion of people living in low work intensity households, the aftermaths of the 2008 crisis can be traced back. It was the year 2010 when the proportion of people living in low work intensity households grew in five country groups, followed by the increase in the Balkans group one year later, in 2011. By 2013, the Western European and the Baltic countries managed to reduce the proportion of people living in low work intensity households. In the Northern and in the Central and Eastern European country groups there is a year-by-year fluctuation in this respect. The situation is the most worry-

TABLE 11 Decomposition of the Poverty Indicator, 2007–2013

Country groups	2007	2008	2009	2010	2011	2012	2013
<i>People Living in Very Low Work Intensity Households</i>							
Northern Europe	5.92	5.13	5.57	6.01	6.64	6.02	6.69
Western Europe	7.99	7.67	7.90	8.39	8.04	7.82	7.72
Baltics	5.00	4.17	5.36	7.90	9.18	8.32	7.62
Southern Europe	6.52	6.26	6.21	7.81	8.63	8.97	9.77
CEEU	7.74	6.52	5.73	6.20	5.99	6.01	6.11
Balkans	8.05	6.85	6.30	6.24	7.56	8.38	8.72
<i>People Living in Poverty After Social Transfers</i>							
Northern Europe	11.40	12.39	13.22	13.01	13.63	13.72	13.42
Western Europe	14.74	14.73	14.56	14.61	14.70	14.73	14.49
Baltics	20.07	22.08	22.03	19.60	18.68	18.51	19.73
Southern Europe	19.72	19.57	19.13	19.50	20.57	20.47	19.66
CEEU	14.49	14.16	14.19	14.59	15.02	14.80	14.74
Balkans	22.87	22.17	21.70	21.21	22.47	22.85	22.67
<i>Severely Materially Deprived People</i>							
Northern Europe	2.81	2.10	2.07	2.08	2.10	2.14	2.36
Western Europe	4.29	4.84	4.50	4.72	4.94	5.53	5.57
Baltics	17.00	13.27	15.74	20.03	20.58	19.42	16.72
Southern Europe	5.89	6.23	6.27	6.39	8.38	10.67	9.96
CEEU	18.19	15.04	13.62	13.38	12.79	13.57	12.76
Balkans	32.11	27.54	27.26	27.73	27.63	29.07	28.26

NOTES Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

ing in the Southern European and Balkans country groups as the proportion of people living in low work intensity households here was clearly decreasing before the crisis but since then there has been no success in tackling this problem.

The rate of the population living in poverty after social transfers is ranging from 13.42% to 22.67% among the country groups. The deviation between the country groups' performances was decreasing until 2010, implying that up to this point the proportion of such people was also declining. From 2010 onwards, however, the deviation has started to increase, and there are fluctuations in the performance of all the country groups. We can say that the rate of people living in poverty after social transfers is

stably low in the Northern, the Western, and the Central and Eastern European country groups. The respective rate is the highest in the Balkans group, followed by the Baltics and Southern Europe although some tendencies of improvement can be traced in these groups since 2007.

The proportion of people living in severely materially deprived circumstances shows the biggest deviation among the poverty indicators. In the Northern and in the Western European region the rate of these people is relatively low; however, it shows a growing tendency from 2010 onwards. The rate of severely materially deprived people reached its peak in 2011 in the Baltics group with 20.85%. This ratio has decreased by 3.86% points until 2013, which is now lower than before the crisis in 2007. Still, it is the second highest among the country groups. The Central and Eastern European countries are performing well on this indicator: the portion of severely materially deprived people has been decreasing since 2007; their rate is currently 5.43% points lower than it was 7 years ago. On the other hand, the respective rate is constantly growing in the Southern European region. In fact, it has almost doubled since 2007 and by now 9.96% of the population belongs to this group. Although the countries of the Balkans have achieved some improvements, the indicator for this country group is constantly high; 28.26% of the population was affected by the problem in 2013.

Competitiveness and an Inclusive Society

We were keen on finding relations between inclusion and competitiveness. For this purpose, we created a new indicator that summarizes the performance of the EU member states along the four inclusion indicators that have been discussed above in detail (table 12). We named it ‘inclusive indicator’ and in our calculations we used the Eurostat headline indicators of the Europe 2020 strategy. The inclusive indicator is based on the WEF’s methodology used for creating secondary indices, calculated by applying the following formula:

$$\frac{\text{country score} - \text{sample minimum}}{\text{sample maximum} - \text{sample minimum}} \quad (8)$$

The member states are assigned values between 1 and 0 according to their performance. Obviously, 1 for the best and 0 for the worst performance (in the case of early school leavers and people at risk of poverty or social exclusion, the countries with the lowest values got 1). We apply this formula for all the 28 member states and in the case of all four indicators

TABLE 12 Inclusive Indicator

Country	(1)		(2)		(3)		(4)		(5)
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(b)
Austria	75.5	0.840	7.3	0.827	27.3	0.162	18.8	0.874	0.676
Belgium	67.2	0.531	11.0	0.639	42.7	0.672	20.8	0.814	0.664
Bulgaria	63.5	0.394	12.5	0.563	29.4	0.231	48.0	0.000	0.297
Croatia	57.2	0.159	4.5	0.969	25.6	0.105	29.9	0.541	0.444
Cyprus	67.2	0.531	9.1	0.736	47.8	0.841	27.8	0.604	0.678
Czech Republic	72.5	0.728	5.4	0.923	26.7	0.142	14.6	1.000	0.698
Denmark	75.6	0.843	8.0	0.791	43.4	0.695	18.9	0.871	0.800
Estonia	73.3	0.758	9.7	0.705	43.7	0.705	23.5	0.733	0.725
Finland	73.3	0.758	9.3	0.725	45.1	0.751	16.0	0.958	0.798
France	69.6	0.620	9.7	0.705	44.1	0.718	18.1	0.895	0.735
Germany	77.3	0.907	9.9	0.695	33.1	0.354	20.3	0.829	0.696
Greece	52.9	0.0	10.1	0.685	34.9	0.413	35.7	0.368	0.366
Hungary	63.2	0.382	11.8	0.598	31.9	0.314	33.5	0.434	0.432
Ireland	65.5	0.468	8.4	0.771	52.6	1.000	29.5	0.553	0.698
Italy	59.8	0.256	17.0	0.335	22.4	0.000	28.4	0.586	0.294

Continued on the next page

(employment rate, rate of early school leavers, tertiary educational attainment, and poverty). In the following step, we take the simple average of these four scores that finally give us a value of the inclusive indicator for each individual member state (table 12). This indicator is reflecting the differences in the performance of the member states along the indicators related to the widely agreed criteria of an inclusive society.

Since the latest data available on Eurostat are from 2013, we have decided to use the scores of member states on the 2013–2014 Global Competitiveness Index representing their competitiveness performance. Figure 1 presents the connection between competitiveness and the degree of social inclusion in the EU member states.

As the value of $R^2 = 0.4741$ suggests, there is a positive and medium strong correlation between competitiveness and social inclusion. Figure 1 visualizes a picture of a divided European Union into three categories, whereas our initial notion was rather a core-periphery divide (Pelle and Végh 2014a; 2014b). Not surprisingly, the Northern European countries are the top performers together with the Western European countries.

TABLE 12 Continued from the previous page

Country	(1)		(2)		(3)		(4)		(5)
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(b)
Latvia	69.7	0.624	9.8	0.700	40.7	0.605	35.1	0.386	0.579
Lithuania	69.9	0.631	6.3	0.878	51.3	0.956	30.8	0.514	0.745
Luxembourg	71.1	0.676	6.1	0.888	52.5	0.996	19.0	0.868	0.857
Malta	64.8	0.442	20.8	0.142	26.0	0.119	24.0	0.718	0.355
Netherlands	76.5	0.877	9.2	0.730	43.1	0.685	15.9	0.961	0.813
Poland	64.9	0.446	5.6	0.913	40.5	0.599	25.8	0.664	0.655
Portugal	65.4	0.464	18.9	0.238	30.0	0.251	27.5	0.613	0.392
Romania	63.9	0.408	17.3	0.319	22.8	0.013	40.4	0.227	0.242
Slovakia	65.0	0.449	6.4	0.873	26.9	0.149	20.4	0.826	0.574
Slovenia	67.2	0.531	3.9	1.000	40.1	0.586	19.8	0.844	0.740
Spain	58.6	0.211	23.6	0.000	42.3	0.658	27.3	0.619	0.372
Sweden	79.8	1.000	7.1	0.837	48.3	0.857	16.4	0.946	0.910
United Kingdom	74.8	0.814	12.4	0.568	47.6	0.834	24.8	0.694	0.727

NOTES Column headings are as follows: (1) employment rate, (2) early school leavers, (3) tertiary education, (4) people at risk of poverty, (5) total, (a) percentage, (b) score. Based on data from Eurostat (<http://ec.europa.eu/eurostat>).

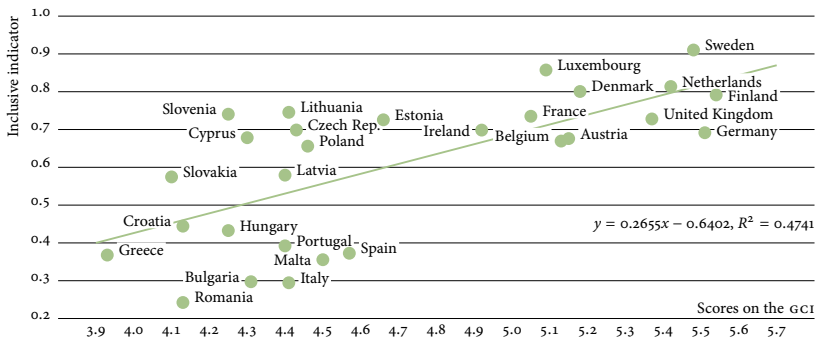


FIGURE 1 The Connection between EU Member States' Competitiveness and Social Inclusion

Interestingly, there are some countries from the Baltics group (Estonia, Lithuania) and from the Central and Eastern European region (Czech Republic, Slovenia) that have similar performance to the Western European countries in terms of inclusiveness; however, their scores on the GCI are significantly lower. Therefore, we assume that an inclusive society is a

necessary but not sufficient condition for a competitive economy. Nevertheless, the cases of the Southern European and the Balkans group support our basic hypothesis. The performance of the countries belonging to these groups shows that the absence of an inclusive society is hindering countries in their exploiting their full potential, thus their competitiveness.

Accordingly, based on the relations between competitiveness and an inclusive society, we can distinguish three country groups: firstly, there are countries with relatively high scores on both the GCI and our inclusive indicator (Northern and Western Europe in our grouping); secondly, countries with moderate scores on the GCI but relatively high scores on our inclusive indicator (Central and Eastern Europe and the Baltic states); thirdly, countries with relatively lower scores both on the GCI and the inclusive indicator (Southern Europe and the Balkans). Regarding the territorial aspects, there are two exceptions: Hungary and Cyprus. Hungary, although a Central and Eastern European country, shows a closer relation to the Southern European and Balkans groups according to its performance (relatively lower scores both on the GCI and the inclusive indicator) while Cyprus' position is more similar to that of the Central and Eastern European countries (moderate scores on the GCI but relatively higher scores on the inclusive indicator). All the other countries' performance is in line with that of the other members in their (territorially organized) country groups. All this suggests that there are fractions in the European Union that threaten not only the territorial cohesion but also the EU's performance as a whole.

Conclusion

The aim of our analysis was to discover and present the components of an inclusive society in the European Union. For this purpose, we analyzed the EU member states' performance along the four indicators of the Europe 2020 strategy targeting inclusive growth. Furthermore, the classification of EU member states into country groups on a geographical basis has enabled us to trace the discrepancies in territorial cohesion as well.

According to our investigations, evident differences in the performance of country groups have been revealed, along all the indicators. Our results further suggest a divide between the core (Northern and Western Europe) and the periphery (all the rest) of the European Union. In most cases, the Northern and the Western European countries outperform the others while the Southern European and Balkans regions are

lagging behind. In the case of employment rates, nevertheless, which has been targeted by both the Lisbon and the Europe 2020 strategies, there is either a moderate growth or a decline in the country groups. The situation is somewhat brighter for the education targets where all member states are making progress; however, this progress is not even. Poverty appears to be the greatest social problem as the proportion of people living at risk of poverty or social exclusion has been increasing since 2007, reaching 40.51% in the Balkans and 28.07% in Southern Europe. Through a deeper analysis of the poverty indicator and its elements, we have shown that the rate of severely materially deprived people is the most diverse among the country groups, and it represents a threat on social inclusion, especially in the Balkans.

Overall, we assume that an inclusive society is a necessary condition for a competitive economy. To prove this assumption, we have established an inclusive indicator and have compared it with the EU member states' scores on the Global Competitiveness Index. We have found that the lack of social inclusion worsens the competitiveness of countries; in addition, differences among the member states can be identified on these dimensions as well. Our results show that there are fractions in the European Union and imply the need for policies in the social field, for competitiveness reasons as well.

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Practices of Technology Parks Supporting Innovative Activities: Evidence from Poland

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The aim of the paper is to reveal the role of technology parks (TP) in the creation of new businesses and the expansion of existing ones. This issue is part of a study aimed at finding an answer to the question of whether there is a link between the creation of new businesses and the development of existing ones, and regional environment factors. The analysis is carried out through the identification of activity of TPs functioning in Poland. The results of the study may also be the starting point for the diagnosis on behaviours of TPs as environmental factors in a specific region and an indication of the desired directions of its changes. The subject undertaken by us draws attention to the fact that the management of existing competences and creating new ones could allow TPs to compete outside of their current arenas of competition.

Key Words: Technology Parks, entrepreneurship, innovation, innovative activities

JEL Classification: L53, M13, O32

Introduction

The added value of Science and Technology Parks (STP) for tenants is analyzed by many scientists (Löfsten and Lindelöf 2002; Yang, Motohashi, and Chen 2009). Current studies investigate the innovativeness of new technology-based firms located in science parks (Hartung and MacPherson 2000; Nieto and L. Santamaria 2007; Yang, Motohashi, and Chen 2009) and overall performance (e.g. Sampson 2007).

Our studies fit in with this trend. We identify the role of TP in supporting the creation and development of enterprises implementing innovations and innovativeness of companies located in Technology Parks (TP) in Poland.

Identification of the role of TP in the process of generating new ideas and transforming them into new products (services) is becoming cru-

cial for the development of enterprises (Pelagidis 2008). Generating and implementing innovations introduce disorders in the enterprise. Here, the field for TP activity as accelerators of innovation barriers opens up (Musyck and Reid 2010).

Barriers of innovativeness of organizations are defined as factors delaying, transforming or inhibiting the process of generating and/or implementing innovation (Mirow, Hoelzle, and Gemuenden 2008) Barriers of innovativeness are factors that have a negative impact on the course of the innovation process (Sandberg and Aarikka-Stenroos 2014). Thanks to the wide offer, the parks should be successfully neutralizing these barriers. To do this, on the one hand, a well-prepared offer of support from parks is needed, addressed at enterprises implementing innovations (Durão et al. 2005). On the other hand, enterprises willing and able to properly implement the support offered by parks.

Identification of the role of TP is associated with determining not only similarities, but also differences in the activities of TP in Poland addressed to companies implementing new technologies. A sign of the proactive role of TP in Poland includes the widening offers of TP ahead of the present needs and expectations of current businesses (TP tenants) implementing innovations. Strength of our study, compared to previous ones, is unveiling externally unobservable strategic goals of TP managers. This is despite the fact that all TPs in the study are managed parks, affiliated with a university or a research centre, are subject to the same laws and regulations, and benefit from the same fiscal supports.

Study Methodology

In order to obtain a wider context of the studied phenomena and be able to confront the data collected, triangulation of study methods was used (desk research was combined with a free-form interview). The examination of documents included, among others, reports, offers of TP operating in Poland and related institutions. Report on companies operating in technology parks and incubators in Poland in 2013, the offer of TPs operating in Poland and related institutions. The data presented in tables and charts was collected by Association of Organizers of Innovation and Entrepreneurship in Poland. Some of the data used is generally available in the database of this association, but some of it can be obtained only through TP managers. However, the method of using this data and conclusions made on its basis is a contribution of this article's authors.

The entities of the study were TP in Poland. There were 42 Technol-

ogy Parks in Poland in 2013. An analysis of reports and offers of TP for the year 2013 enables the identification of the innovativeness of companies located in TP and similarities of TP activities in Poland. Applying only methods of examining documents was insufficient, because the use of this method did not allow identifying the factors that distinguish parks from each other. The realization of this goal required this article's authors to carry out free interviews with four managers of technology parks in Poland (May–June 2014). A significant limitation of free-form interviews is that conclusions cannot be generalized to the population of TP in Poland. The role of TP is determined by identifying the scope of their activities. The studies assume that the meaning of the existence of parks is based on the aptly formulated offer of services and infrastructure. A practical expression of accuracy of TP offers is the ability to treat them (the offers) as tools for supporting the creation of new and development of existing enterprises implementing new products and technologies. (In)accuracy of offers of Technology Parks was assessed based on the identification of the degree of use of individual components of TP offers by companies operating in parks and beyond. Due to the high usefulness of this data, they are used, among others, by managers of parks to reconfigure the offers. However, the publication will present aggregated data. In contrast, the innovation of enterprises – TP tenants in Poland was established based on reports and other documents that show the structure of these companies and the range of services which they used in 2013.

Technology Parks in the Role of Enterprise Innovation Accelerators

The International Association of Science Parks (IASP) defines TP as an organization managed by specialized professionals, whose main aim is to increase the wealth of their community by promoting the culture of innovation and the competitiveness of associated businesses and knowledge-based institutions (Almeida, Santos, and Silva 2008; Cantu 2010; Closs et al. 2012). Such a definition is unique considering the references to research and technology parks.

Therefore, the main objective of the parks is to support the creation and development of knowledge-based enterprises (Vásquez-Urriago et al. 2014). Firstly, it was decided to recognize their declared and actual activity.

The range of services offered by Technology Parks in Poland is closely linked to the functions that they have to fulfil. These functions can be

divided into primary and secondary. In the course of their primary functions, TP:

- Support undertaking business activity based on new technological and organizational solutions, especially in the area of services. This function is performed through the assessment of: the market potential of new projects, added value brought by the park for the developmental potential of the project and management competencies of people undertaking business activity. This feature also includes support for the development of enterprises through specialist services tailored to the needs of enterprises.
- Advice in the scope of: establishing and registering the company, business plan and financing sources. This is a stage when the parks choose, among others, new companies that meet the criteria for entering the park. Moreover, parks offer advice in the scope of innovative project management, technology transfer, intellectual property rights protection, marketing, market research and export.
- Establish relationships with other organizations at the regional, national and European level.
- Rent office, laboratory and production space.
- Run investor service and sales offices of land real estate for technology enterprises within the managed investment areas.

On the other hand, in the course of additional functions, TP:

- Activate entrepreneurial attitudes in the academic environment. Since academic entrepreneurship (academics, alumni and students) can be an important source of projects in the incubator. This function is carried out in cooperation with academic incubators of entrepreneurship.
- Support the transfer of technologies from universities and scientific and research entities, as well as enterprises – especially the large ones.
- Conduct training activities in the scope of undertaking business activity, management and financing of technology ventures, technology transfer. In carrying out this function, parks primarily work with universities and financial institutions.

The scope of these functions is determined by the specialization of parks set out at the moment of their creation. Because by assumption they are profiled parks. Fulfilling the above functions by parks requires

TABLE 1 Components of the Technical Potential of Technology Parks in Poland

Components of the technical potential of TP in Poland		(1)
<i>Technical infrastructure</i>		
Databases		53%
Broadband Internet		92%
Wireless Internet		92%
Library/ reading room		25%
Teleconferencing equipment		61%
Specialist software		73%
<i>Infrastructural potential (rentable space)</i>		
Usable space of buildings at the disposal of technology parks in total (m ²)	373,654	
Office space for own needs (m ²)	22,001	
Rentable usable space (m ²)	154,490	
Own laboratory space (m ²)	14,090	
Rentable laboratory space (m ²)	20,383	
Classrooms / seminar rooms (number)	129	
Conference rooms (number)	92	
Computer labs (number)	18	

NOTES (1) TP having the component. Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

the ownership of property, infrastructure and a suitably composed offer of services. An overview of the resources owned by parks, which may be relevant for the realization of both the primary and additional functions, has been shown in table 1.

The data contained in table 1 reveal that TP have adequate technical and infrastructural potential to the declared functions. TP can offer services related to real estate (e.g. renting offices, conference centres, production halls, office space, and laboratory space). Therefore, carefully selected components of technical and infrastructural potential can be an effective tool for supporting enterprises implementing innovations.

In the identification of the importance of real estate and infrastructure in supporting the innovativeness of enterprises, interviews with TP managers in Poland were used. These interviews allowed getting to know their views on the importance of TP resource potential.

From the statements of manager 1, it can be concluded that the im-

portance of real estate and infrastructure in fulfilling the functions performed by TP is immense:

The construction and development of the Technology Park was and is to create a multi-functional area of economic activity, aimed to support innovative ideas – start-up, but not forgetting mature companies. The Park's offer is comprehensive and allows a sole proprietorship company to transform into a large international company. The park provides the right office or laboratory infrastructure, and a package of services at every stage of the company's operation.

According to manager 1, this very high usability of real estate and infrastructure of technology parks is conducive to expanding the customer base of the park:

We are currently conducting technology audits, we conduct brokering of own laboratory services and other laboratories operating in the Park. We systematically conduct networking of the science and business world. At the request of companies we perform chemical research, noise level measurements, and a number of other studies that are in demand on the market.

This statement proves that the offers of parks in Poland are not dedicated exclusively to enterprises – tenants of technology parks, but also companies from outside the park. His statement demonstrates a growing interest in research, which is another argument for the legitimacy of creating such parks in Poland. Moreover, he notes (manager 1) that conducting studies in park laboratories relieves the company of expenses. Companies do not have to allocate scarce resources to build their own laboratories and employ highly qualified personnel. The use of such services is positive for the enterprises, because access to external sources of knowledge enhances the ability of enterprises to effectively and efficiently use this knowledge to develop new processes and products.

Such an offer of the park relieves the enterprise of maintaining extensive R&D facilities in the enterprises. Everyone has their own [laboratory]? In my opinion, this puts into question the viability of continuous investments on the side of enterprises. If we have an accredited laboratory, then the companies do not have to build their own laboratories. Conducting studies in small and medium-sized enterprises is difficult for several reasons, the most important being the lack of infrastructure and qualified staff.

Manager 2 explains that adequate infrastructure is the basis of the activity of each of the parks. He also recognizes that even in this area parks can differ from one another:

The basic offer of a technology park is access to modern infrastructure, and there can never be too much of this. [...] The foundation is infrastructure, but even here we differ; one has only offices, another has production infrastructure, yet another powerful server rooms.

The above is an argument that managers use the parks' resources for their intended purpose, presenting their offer to companies outside the parks, i.e. not being their tenants. TP are also active in other fields. The high usability of the infrastructure and offer of parks, as well as the involvement of TP employees in supporting the activities of entrepreneurs in the region is confirmed by the statement of manager 3.

I wouldn't want to speak for all my park colleagues in this matter. But I know what we're doing. In our park we care about the environment, water management and promote the widely understood wood industry (furniture). So, we make sure to constantly keep in touch with entrepreneurs involved in a given specialty in the region, we help them in mutual networking, in counselling and monitoring.

The benefits of such activity of TPs are mutual. On the one hand, the company benefits (tenant of the park). On the other hand, the park gathers knowledge of the real needs of these enterprises, which may be useful in reconfiguring the park's offer.

In another one of the parks, expanding the service offer with services that support *rebranding* proved an extremely effective choice, for both the parks and the businesses. The application of these services in practice has meant that businesses can separate themselves from certain stereotypes and connotations that have clung to them. In this way, the businesses could directly inform customers about changes taking place within the company, better standard of services or products. Manager 4:

This was the case e.g. with rebranding services, or marketing and technological audits. We were the ones to persuade our tenants that they need these types of services, and through their implementation, they will offer their customers better products.

Today, the expectations of tenants towards parks are growing. Therefore, in order to extend the circle of tenants outside the infrastructure, parks add pro-innovation services to their offer. These services can be

dedicated to the park's tenants, as well as companies outside the park. These services are characterized by the following features:

- dominance of immaterial elements,
- difficulty with clearly identifying the requirements related to the service,
- diverse nature and complexity of problems to solve, forcing an individual character and scope of each service,
- difficulty of precise planning of services in terms of specificity, the required technical, personnel and financial resources, as well as time of realization,
- difficulty in coordinating implementation measures, resulting from their diversity and the diversity of contractors,
- frequently appearing limits in the usefulness of experience with previous actions and projects.

These features set a number of requirements before the parks implementing them, which include:

- individualized approach to each of the problems addressed and services offered,
- the need for comprehensive preparation of each task and service,
- careful selection of the team of contractors, compliance with accepted orders and offered services,
- key importance of creativity and flexibility of activities, which involves the necessity of continuous learning by each TP employee,
- the need for careful monitoring of the implementation of activities, as well as the analysis and evaluation of their results, facilitating the accumulation of experience, improving activities and selecting new courses of action.

Therefore, TP are also active in other fields. Full support for enterprises from technology parks covers a wide range of consulting services. The data provided in table 2 show that the offer of parks in a certain scope of pro-innovative services is similar. This is an argument to claim that parks are a multifunctional area of economic activity, which is created for companies interested in implementing innovations and new technologies. For example, every second TP offers assistance in establishing contact with the technology supplier or recipient, it also offers consultations and the selection of innovative ideas. On the other hand, every third TP offers consultancy in the scope of the protection of intellectual property

TABLE 2 Pro-Innovative Services Offered in Technology Parks in Poland in 2013

Type of services	(1)
Assistance in establishing contact with the supplier or recipient of technology	50
Consultation and selection of innovative ideas	44
Preparation of offer or inquiries about technology	36
Consultancy in the scope of the protection of intellectual property rights for companies	33
Cooperative mediation abroad – internationalization	36
Market analyses and determining the market potential and technical possibilities of developing an idea	36
Advisory assistance in implementing technologies	28
Technology audit	28
Developing a plan for the implementation of innovative solutions	28
Assistance in the development of a prototype solution, product, or goods ready for testing	22
Assistance during negotiation and conclusion of agreement between the technology recipient and supplier	22
Searching for specific technologies on order of companies,	17
Monitoring the implementation of technologies or realization of agreement	14
Assessment and evaluation of technologies on order of companies	14
Defining the subject of transfer	11
Market tests of prototypes of products/services	6
Certification of solutions/technologies/products	3

NOTES (1) Parks offering the given type of services (%). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

rights for companies, market analyses and determining the market potential and technical possibilities of developing an idea and advisory assistance in implementing technologies. Even this kind of service offered by most parks in Poland may neutralize some barriers of innovativeness of enterprises, among others:

- problems related to communication and cooperation with internal partners. Lack of information necessary for the implementation of innovative projects,
- problems related to communication and cooperation with external partners in the process of generating and/or implementing innovations,

- unwarranted interruptions in the realization of innovative projects,
- problems with the purpose of the right amount of time, i.e. as much as is necessary, e.g. for market tests of prototypes of products/services, or the development of a prototype solution, product, or goods ready for testing.

The highly homogeneous structure of offers of TP in Poland intrigued to seek answers to the following questions:

- Are similar or different offers of parks more favourable for enterprises and the parks themselves?
- What are managers guided by when reconfiguring the parks' offers?

The undertaken problem of reconfiguring offers of parks is important, because the scope of the offers determines the future structure of enterprises – TP tenants, i.e. the specificity of each of the parks.

From the opinion of manager 3, we learn that the parks' offers are similar:

Yes. The foundations, framework of operation of the Parks should be similar. However, the detailed and dedicated offer should be different in each park. This is what specialization consists in. [...] The offer is very much like what you see, among others, in the area of Eastern Poland. A large part of the parks proposes incubation services and areas for production. Only some of the parks are specialized to support a particular industry. Over time, the choice of smart specialization will probably force this process. One cannot say that the offer is identical, but it is similar. [...] In my opinion, one should remember about specialization already in the basic offer, if such specialization occurs in a given region.

The high similarity of offers is also reflected in the statement of manager 2:

The basic offer is support in setting up the business, obtaining financing, realization of projects at the interface science-business, and of course the availability of infrastructure on preferential terms. [...] The offer of parks in Poland may not be identical, but it is still based on identical parts, e.g. in the form of real estate services, namely offering offices, laboratories in the general sense or production halls. Also, parts of the business services in the parks are the same. However, a number of prodevelopmental services or specialized laboratories are adapted to the profile of tenants and businesses in the region.

Additionally, the statements of manager 1 tell us about the need to distinguish the parks from one another. He also identifies the type of service that could play this role:

I think the basic offer should be similar, but not identical, for parks operating in Poland. It is important to stand out in advanced, highly specialized services. Technology parks must specialize. Professionalization results in benefits for both the parks and for their tenants and other service recipients.

Similar statements were made by manager 4:

I think it (the offer) is very similar. One cannot really talk about major differences here. [...] The key to specialization seem to be highly specialized services such as research for industry in the field of chemistry, computer science, physics or industrial design.

The statements of these managers allow one to determine the scope of the additional offer and, by analogy, the range of services that would form the basic offer. In addition, manager 1 emphasizes that the evolution from a universal park to a specialist one requires time, because the park must accumulate expertise and experience:

Expertise is a brand one works for years. It would be model to create highly specialized parks in Poland, where the sum of offers provides a full range of services for which there is market demand. They would create a kind of Hub – a coherent ecosystem of services at a high level. I think we should move in this direction in development of Parks in Poland.

These observations of the managers indicate the differentiation of the range of offers of parks, as a way to achieve competitive advantage of a specific park against other parks. In some parks, actions are currently already being undertaken to build a unique offer that allows the particular park to stand out against the background of offers of other parks in Poland. This is confirmed by the statement of manager 1:

The Technology Park stands out against the background of business environment institutions in the macro region in that it owns an own-managed accredited research laboratory. We specialize in the study of water, fluids (e.g. beer), wastewater, we conduct research and development works in the field of energy recovery from municipal waste (pyrolysis). We cooperate with law enforcement agencies in identifying the causes of environmental disasters. In the coming

years, we intend to successfully obtain financing for the development of laboratory services, and on this basis to build our competitive advantage in Poland and Europe.

Similarly, the statement of manager 4 shows that proactive reconfiguration of offers is in progress:

Awareness of many companies is limited to making money from the sale of products and services available here and now. Our innovative research services are often not seen as a source of building competitive advantages. We recognize this problem and are undertaking a number of actions to make entrepreneurs aware of what the benefits are of cooperating with science in terms of developing new solutions that are 'producible' and give a chance for successful commercialization.

In reconfiguring the offer, manager 2 is also not only directed by the current expectations of tenants, but the needs of potential companies – tenants of technology parks:

Of course, the range of services of a park includes services that suit the current expectations of service recipients, but also services that are ahead of their expectations. Departments of the park that offer support to tenants monitor current trends on the market and try to design services that will help in the development of tenants. [...] Ideas for new services also appear from people interested in opening their own business, from participants of trainings or consulting services, inquiries come from external influence (local, national, international). We want to suit their expectations. Provide them with custom-made services.

While the statements of the third manager tell us about how the park's offer is created:

Surely we can say that the profile of the park should be shaped 'from the bottom up.' This is what we did in our park. We did not define this profile when creating the park. Only when we occupied the buildings that had been built for a year, we decided what industries dominate. In expanding infrastructure, we create R&D facilities in new areas. On the basis of competence and creativity centres, we will provide new types of services, tailored to the profile of the park's enterprises.

This and the above statements are an argument for the fact that the parks' offers can be created incrementally.

These observations lead to the following conclusions that managers are not focusing solely on existing clients. Despite the facts that this would allow managers to quickly diagnose the needs and expectations of current clients depending on their current and expected organizational and technological development. Such actions of managers are appropriate. Since reconfiguration of the offer should not be done solely based on the needs of current tenants. Because the present tenants of parks do not have full knowledge, about the changes taking place on the market or technological trends appear. As a result, parks could be overly focused on the needs of existing tenants. Thus, inhibit the development of the offer in the direction appropriate for the parks. From the knowledge of activity of TP in Poland collected in this way, it can be seen that there is a permanent reconfiguration of offers, expansion of real estate and infrastructure. And the kind of changes made is proactive, rather than reactive in nature.

In reconfiguring offers, in the opinion of manager 1, the role of good practices is also significant:

I always first listen to the needs of our tenants, but often, I spontaneously implement ideas that are experimental at the beginning, and consequently they become very useful services. [...] I am not a supporter of implementing the offers of other parks, because it is often the case that what can be applied in a big city does not always work in a medium-size city. I am guided by intuition, but generally, I don't invent something that has already been invented somewhere else.

In the case of manager 2, imitation plays a large role of good practices tested in Poland and around the world:

When building the Park, we visited well and poorly functioning institutions in Poland and abroad. The park's offer is an offer that responds to the local, regional need. It is not possible to copy the model and services of a particular park, but one can imitate them and adjust to the realities of the given region. In our case, we looked for models in Finland and the USA. An example of programs taken from other parks is e.g. the soft landing program. [Entities, which will begin cooperating with the park, will be able to count on three months rent-free, and for the entire period of operation in the park, on business support.] [...] Everything actually depends on where, geographi-

cally, a given technology park is located. If it is situated in an area where for generations a given industry developed, it is logical to develop a given technology park in this area and profile. A benefit for parks may be the availability of specialists who will develop around a particular specialization and create new businesses. For tenants, it will be an opportunity for development and mutual cooperation with similar entities.

The statements of manager 3 also show that comparing offers of a specific park to the offers of other parks plays a large role in reconfiguring offers:

We look at national and international Parks. We draw conclusions from what works. As part of the benchmarking of Parks, we introduced simple services like the virtual office, correspondence service, as well as more advanced services – technology audit services, as well as technological broker service. We draw from models and try to learn from others' mistakes. We observe the best and thanks to cooperation with them, we build an offer.

Mainly, adapting TPS to changes in the environment is done by imitation, which is confirmed by the statement of manager 4:

We conduct ongoing monitoring of the demand for services among the park's tenants and other service recipients. We systematically adapt the range of services to suit the expectations of our customers. Therefore, we also remove services, which are not popular and replace them with new ones. Recently, we removed providing telephone services from our range of services. In contrast, we introduced a number of advanced services. We have created a soft-landing programme. Several research centres and competence centres. We have a Centre for Advanced Laser Technologies. We create it primarily for our tenants. For tenants operating in the metal industry and building specialized machines. But it will also be available for all entrepreneurs interested in cooperation. [...] Yes. We are open to cooperation with outside companies. We are also opening a CNC Centre [Computerized Numerical Control] – this is computer control of numerical equipment. The numerical control system, equipped with a microcomputer, which can be freely interactively programmed. CNC systems control the graphic operation of the monitor which displays programs, information about tools, correction information of tools which are extremely important when

cutting surfaces of different angles to the axis parallel to the working movement, processing parameters, they integrate the machine with other computer systems. [This usually refers to devices such as milling machines, lathes, etc.] It will be equipped with halls, numerically controlled equipment (machines), which will make it possible to create a research and development centre in the field of CNC. We are doing it for businesses operating in the production of field of manufacturing precise machine parts and devices. For manufacturing enterprises we are also opening a Rapid Prototyping Centre. The prototype created will allow entrepreneurs to see what a product looks like, if it is convenient, if the keys are fitted in the right way. Already at the design stage, one can exclude certain shortcomings.

These statements reveal the adaptation capacity of TPS in Poland. It can be seen that these capabilities are high. TP managers are able to overcome existing obstacles or limitations that result from the broadly understood conditions of the market game and the regulations and conditions determining the framework of activity of TPS. The interviews also show how complex the activities of TPS are.

A closer look at these citations leads us to the conclusion that they talk about how managers of technology parks in Poland adapt them (the parks) to new conditions, what measures they take so that new investments in the parks were accurate and used in accordance with purpose.

Another dilemma solved in the studies was how parks support enterprises implementing innovations. What do parks have to offer, when they (the enterprises) cannot cope with introducing innovations and they turn to the park for support? Because we know from literature (Kattila 2004, 305) that introducing innovations can cause significant disturbances in the enterprise. Introducing innovation requires the enterprise to develop new capabilities, often mismatched to existing practices. This is because implementation of innovation is not limited only to one functional area.

Implementation of innovations brings about changes in the organizational structure, competences of employees, methods of distribution and methods of corporate management.

As a result, the company must create new combinations of resources and capabilities that will ensure its uniqueness within the existing market and increase the chances of acquiring and maintaining competitive advantage.

Innovations are actively stimulated by the organizational conditions.

TABLE 3 Scope of Consultancy Subjects, Information and Education Offered in Technology Parks in Poland in 2013

Scope of services	(1)
Business law	86
Entrepreneurship and creating new companies	82
Developing business plan	77
Access to EU funds	73
Business management	64
Technology and patent information	59
Market research and marketing	59
Finances and taxes	59
Computer science	55
Cooperative mediation	50
Implementing new products and technologies	50
Bookkeeping and accounting	45
Foreign trade and international cooperation	41
Human resource management	36
Quality management	18

NOTES (1) Parks offering the given scope of services (%). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

Therefore, in cases when the company has certain shortcomings in resources, particularly in relation to property and infrastructure, then one of the ways to eliminate this barrier is to join a technology park. As a result, these enterprises can benefit from consulting. The scope of consultancy subjects is presented in table 3.

The scope of training and consultancy in the area of business law, tax law, management, finance, market analysis, marketing and others necessary at the stage of establishing and developing a company (table 3), allows adjusting the offer to the needs of a particular enterprise. For example, access to EU funds neutralizes one of the more severe barriers to the innovativeness of enterprises. This barrier is the lack of financial resources, human resources or property necessary for the effective realization of the process of generating and/or implementation of innovations. The scope of consultancy indicates that the offer is dedicated to both young companies that need help in the first years of operation, as well as mature companies. Therefore, parks have very much to offer enterprises. Technology

TABLE 4 Selected Results of Operation of Technology Parks in Poland in 2013

Type of service	(1)
Consultancy clients	103.10
Training clients	256.52
Pro-innovative services	13.10
Spin off companies	2.45
Spin out companies	0.85
Incubated projects	11.40

NOTES (1) Average for 1 park (a significant restriction of using the SOOTIP base in Poland is only access to information about the arithmetic average, and at the same time the lack of access to information on the standard deviation, which impedes making conclusions). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

parks can act as a platform to the production of knowledge and its transfer to the economy in the form of spin-offs or simple knowledge spillovers, enhanced by the co-location of R&D university centres and high technology enterprises on site. This leads to the recognition of usefulness of these offers by the beneficiaries.

The studies assume that the meaning of the existence of parks is based on the aptly formulated offer of services and infrastructure. Therefore, identification was conducted on the degree of using a package of services and infrastructure offered by technology parks. That is why the scope was identified of using services provided by the technology park for enterprises, which came from technology incubators after an incubation period and want to continue to work in the technology park, as well as directly entering the park without the incubation stage (see table 4).

The data presented in table 4 reveal that the parks' offers are used by companies, which are at different stages of development, i.e.: at the pre-incubation stage, the incubation stage and subsequent stages. The offer is used by enterprises providing services in the field of modern technologies and start-up. Parks providing comprehensive and professional support for new businesses fulfil incubation functions. Therefore, they are an ideal habitat for companies implementing innovations.

The revealed scope of using offers covering services and infrastructure, demonstrates the accuracy of the individual components of offers of parks in Poland. Thanks to this, the beneficiaries of these services and infrastructure can adapt to new conditions more quickly.

Identification of Innovativeness of Enterprises Operating in Technology Parks in Poland

Growing expectations of the business environment are forcing companies to implement innovations. Innovation is more than just a novel idea; it is a process that includes the development of a concept of a useable product or service in order to gain and maintain competitive advantage (Yang 2012). Innovations implemented at the right time increase the company's chances for not only achieving this advantage, but also maintaining it.

In literature, innovation is understood as the introduction of new products, services and technologies (Yang 2012). In essence, it reveals the contradictions between the discovery of existing things and creating new things. Innovation can include the introduction of a new product, a new application of an old product, new methods of production, distribution channels, processes, technologies, and new methods of competing (Alvarez and Barney 2002, 89–105).

Innovation is an ambiguous concept, closely associated with the concept of innovativeness, and often identified with it (Cho and Pucik 2005). Innovativeness is treated as a certain attribute of a company, as its ability to introduce innovation, which can be measured and evaluated. An important feature of a company's innovativeness is the continuity of innovation processes and their long-term nature. Therefore, innovation is treated as determinants of the sustainability of competitive advantage.

It is generally assumed that a company's innovativeness expresses willingness and the ability to implement new solutions, also (non)technological in nature. However, one should pay attention to another meaning of innovativeness as a measurement of the degree of innovation, especially product innovations (Garcia and Calantone 2002). This leads to answer the question: what is new and for whom? Innovations can have a varying scope of novelty. Innovativeness of products and processes can be measured by the degree in which the companies create new things. The scale of novelties fits on two extreme positions of the continuum: from products/processes that are completely new on a global scale to products/processes that are new only for a given enterprise. In other words, product innovation can bring with it a novelty for the given market and the company itself. A novelty for the company is connected with the creation of market or technological knowledge distinguishing the enterprise from the competition (Garcia and Calantone 2002). Therefore, it is worth recognizing the scale of the novelty of implementing innovations by en-

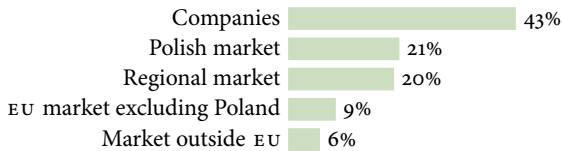


FIGURE 1 The Scale of Newly Implemented Innovations by Companies Operating in Technology Parks in Poland in 2013

terprises – TP tenants in Poland. The data presented in figure 1 show that many of the companies (TP tenants) introduce fairly standard products. However, they are characterized by high innovation of processes: production, distribution and management.

Innovations introduced by these enterprises are mostly new to the companies themselves (43%). A large part of the implemented innovations is new for the Polish market (21%) and regional market (20%). The least innovations are implemented, which are new on markets outside the European Union (6%). And these are examples of products (services) unique on a global scale, produced by these companies.

On the other hand, in the evaluation of innovativeness of enterprises (TP tenants), a division has been applied into sectors according to the methodology of the OECD (Eurostat 2009), which is based on the amount spent on research and development in relation to the value of production sold (figure 2).

The classification of the types of innovative activity according to the level of expenditure ‘R&D intensity’ developed by the OECD distinguishes the following sectors: high tech, medium-high tech, and highly technical knowledge and services (figure 2). The analysis was conducted based on the criterion of a leading type of PKD (Polish Classification of Activities) business valid as of 24 December 2007 adapted to International Standard Industrial Classification of all Economic Activities ISIC Rev. 4).

An important factor is the structure of communities in TP, i.e. the specialization of companies. After analyzing the PKD of the studied com-

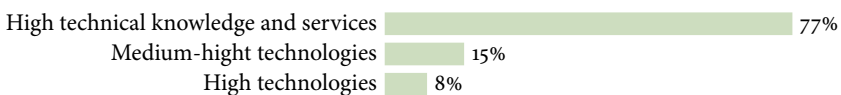


FIGURE 2 The Level of Innovativeness of Companies Operating in Technology Parks in Poland in 2013

TABLE 5 The Structure of Innovative Companies According to Polish Classification of Activities (PKD) in 2013 (%)

Sector/type of economic activity	%
<i>High technologies</i>	
Manufacture of basic pharmaceutical substances	0.99
Production of computers, electronic and optical products	6.13
Manufacture of air and spacecraft and related machinery	0.99
<i>Medium-high technologies</i>	
Production of chemicals and chemical products	3.36
Production of electric devices	3.36
Production of machines and devices, not classified elsewhere	6.32
Manufacture of motor vehicles, trailers and semi-trailers, excluding motorcycles	0.99
Production of ships and boats	0.20
Production of medical devices, instruments and products, including dentistry	0.40
<i>High technical knowledge and services</i>	
Motion picture, video and television program, sound recording and music production activities	2.57
Computer programming and computer consultancy activities and associated activities	44.07
Scientific studies and developmental works	18.38
Services in the scope of information	9.49
Telecommunications	2.77

NOTES Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

panies, it was found that in 2013 77.27% of all innovative enterprises located in TP were from the group ‘highly technical knowledge and services.’ The least numerous were companies from the area of ‘high technology’ (8.10%). In the group of ‘medium-high technology’ companies, 14.62% constituted innovative enterprises. Therefore, it is worth conducting a more thorough identification of the structure of innovative companies – TP tenants (table 5)

A detailed analysis of the structure of innovative companies in the group ‘high technical knowledge and services’ indicates that most of them work with software and consulting in the field of information technology and related activities (44.07%), scientific studies and developmental

works (18,38%) and service activities in the field of information (9,49%) While in the group of 'medium-high technologies' the largest group constitutes enterprises manufacturing machines and devices, not elsewhere classified, and production of electrical equipment, and then those, which produce chemicals and chemical products. Among the enterprises belonging to the group 'high technologies' the largest group constitutes enterprises producing computers, electronic and optical products. And the least numerous group of companies are both companies that produce pharmaceutical substances and aircrafts, spaceships and similar machines. The multiplicity of types of enterprise activities – TP tenants, testifies to the high diversification of their innovative activity.

Conclusion

Technology parks bring together high-technology companies with the promise that collocation with other companies and opportunities for networking will make them more innovative and successful. They try to imitate the success of naturally occurring clusters by generating economies of agglomeration. Specifically, they hope to replicate conditions that would lead to collocated companies sharing resources, trading with each other, working on joint projects, and benefiting from knowledge spillovers (Koçak and Can 2013).

Technology parks in Poland are the instruments of creating a favourable environment for innovative business development. Their role as actors aimed at promoting the diffusion of innovation is revealed, among others, by:

- creating favourable conditions for business through the use of real estate and technological infrastructure on contractual principles,
- consultancy relating to business management.

The model of TP activity can distinguish primary and additional functions. Primary functions determine the activities that aim to provide businesses connected with the parks with cheaper infrastructure and administrative-training-consulting support. An important element of the parks are technology incubators that support the creation and development of companies transferring the results of scientific studies, as well as commercializing products and technologies produced at the laboratory level.

Currently, TP activity in Poland in the primary area of service is almost identical. It is becoming more diverse in the area of pro-developmental

services. The type of such support is closely linked to the phases of the development of enterprises (tenants of technology parks), so that parks could supply what they need.

Reconfiguring offers and TP real estate and infrastructure is done for both the needs and expectations of present and potential enterprises – TP tenants. Which is an expression of the proactive approach of TP managers to reconfiguring offers and park resources? Study results indicate the need for diversification of the character of these parks. On the one hand, in addition to the package of basic services, these parks should be open to introducing a package of services dictated by the changing needs and expectations of enterprises – current tenants of technology parks. On the other hand, if a technology park when expanding its offer thinks only about particular needs of current enterprises operating in TP (tenants) it could be a major brake on the development of the technology park. TP managers focusing on the needs of current enterprises (TP tenants) can have a short-term value. One can lose sight of those types of services, which should be gradually extinguished and those hidden (latent) that should be added to the TP offer. Managers are aware of these restrictions and are already constantly observing world trends in this regard. In order to be able to benefit from the opportunities, or neutralize the threats. The nature of TP activity reveals their entrepreneurial orientation. Our findings indicate that technology parks can be treated as a tool that accelerates the growth of enterprises implementing new technologies.

Parks are a regional innovation policy instrument that aim to promote interactions and technology transfer, thus stimulating innovation and growth. These infrastructures have also been described as seedbeds for innovation bearing a regional embedded focus. It is important to understand how a science park infrastructure fits in the Regional Innovation System (RIS) concept. Future studies may investigate which park-level factors not used in our study may account for the differences across parks in equipment sharing and trade-based networks.

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New Keynesian Phillips Curve Estimation: The Case of Hungary (1981–2006)

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This paper investigates for the presence of a New Keynesian Phillips (NKPC) curve in Hungary in the period 1981:3–2006:2. The empirical model we test features forward-looking firms who pre-set prices for a couple of periods ahead, using Calvo (1983) pricing rule. We also estimate a hybrid version of NKPC, where some of the firms are backward looking, and others are forward-looking in their price-setting behaviour. Real marginal costs and forward-looking behaviour are statistically significant and quantitatively important in the NKPC. However, there are some econometric issues to be considered, such as the weak identification of the parameters of the structural NKPC as well as those of the hybrid NKPC.

Key Words: New Keynesian Phillips curve, Hungary, instrumental non-linear GMM Estimation, weak identification

JEL Classification: C22, C2, E24

Introduction

This paper investigates for the presence of a New Keynesian Phillips (NKPC) curve in Hungary in the period 1981:3–2006:2. Hungary is a unique case among the transition economies as a country that traded freely with Western European countries even before the fall of the socialist regime, and thus is an interesting case of study. Under that regime, export firms had to use market prices in order to be competitive and gain market share in Western Europe. In that sense, we can regard the behaviour of exporting firms as closely resembling the behaviour of a profit-maximizing Western firm operating in a competitive environment. Therefore, we will adopt models developed for the US to study the dynamics of inflation in this transition country.

Given the enormous literature on the subject, the paper will not provide a detailed overview of the topic; instead, the interested reader is referred to the recent study in Vasicek (2011) and the references therein. The study follows the methodology proposed by Galí and Gertler (1999), who claim that a potential source of inflation may be the sluggish adjustment of real marginal costs to movements in output. The empirical model

tested features forward-looking firms who pre-set prices for a couple of periods ahead, using Calvo (1983) pricing rule. In addition, measures of real marginal cost are used instead of the old-fashioned output gap. The reason is that marginal costs are a better proxy for the impact of the productivity gains on inflation, which the ad hoc measure output gap misses. A hybrid version of NKPC, where some of the firms are backward looking, and others are forward-looking in their price-setting behaviour, is also estimated.

Despite the presence of a substantive literature on the subject of NKPC in Hungary (Menyhert 2008; Vasicek 2011; Franta, Saxa, and Smidkova 2010), earlier studies either take a much shorter time span (Menyhert 2008; Vasicek 2011), or focus on inflation persistence (Franta, Saxa, and Smidkova 2010). In this paper the emphasis is on the transition experience of Hungarian economy (hence the time period that is chosen), and not on inflation forecasting. In addition, the paper touches upon the problem of weak identification, which previous studies do not discuss. Therefore, given the different focus of the paper, the results from earlier studies are not directly comparable.

The paper is organized as follows: the second section describes Gali and Gertler's (1999) approach and, thus provides a brief review of the theory that gave rise to the new Phillips curve, and discusses some existing empirical results. The third Section contains the estimates of the new Phillips curve. In the fourth section, the model is extended to allow for backward-looking firms and results of a so-called 'hybrid Phillips curve' are presented. The fifth section concludes.

The New Phillips Curve: Background Theory and Evidence

The setup of the model features monopolistically competitive firms who face some constraints on price adjustments. The price adjustment rule is time-dependent – every period a fraction $1/X$ of firms set their prices for X periods ahead in the spirit of Taylor (1980). In order to keep track of the histories of all firms we use Calvo pricing (1983) rule, which simplifies the aggregation problem: in any given period, each firm has a fixed probability $1 - \theta$ that it may adjust its price during that period. Therefore, the average time over which a price is fixed is given by $(1 - \theta) \sum_{k=0}^{\infty} k\theta^{k-1} = 1/(1 - \theta)$.

Another common assumption is that the monopolistically competitive firm faces a constant price elasticity of demand curve. Then, Gali and Gertler (1999) show that the aggregate price level p_t evolves as a convex combination of the lagged price level p_{t-1} and the optimal reset price p_t^*

(the price selected by firms that are able to change the price at period t). Therefore, the pricing rule takes the following form:

$$p_t = \theta p_{t-1} + (1 - \theta)p_t^* \tag{1}$$

Let mc_t^n be the firm's marginal costs (as a percentage deviation from the steady state) and β denotes the discount factor. Each firm chooses a price at t to maximize expected discounted profits subject to the Calvo pricing rule, so the optimal reset price is:

$$p_t^* = (1 - \beta\theta) \sum_{k=0}^{\infty} (\beta\theta)^k E_t\{mc_{t+k}^n\} \tag{2}$$

Now let $\pi_t = p_t p_{t-1}$ denote the inflation rate. Combining (1) and (2), Gali and Gertler (1999) obtain the following equation for the inflation dynamics, or the 'traditional forward-looking New Keynesian Phillips curve.'

$$\pi_t = \lambda mc_t + \beta E_t\{\pi_{t+1}\}, \tag{3}$$

where $\lambda = (1-\theta)(1-\beta\theta)/\theta$ depends on the frequency of price θ adjustment and the discount factor β . Iterating forward for inflation they obtain

$$\pi_t = \lambda \sum_{k=0}^{\infty} \beta^k E_t\{mc_{t+k}^n\} < \infty. \tag{4}$$

Therefore, the theory says inflation is a discounted stream of expected future marginal costs. Note that the sum above is finite due to the discounting effect and the assumption that marginal costs are bounded in each time period.

Traditional Phillips curve emphasizes the use of a proxy for real activity, namely the 'output gap,' or the observed GDP series less of a trend. In other words, this is a measure, which shows how current GDP differs from the potential one. It is obtained by taking logs from the series, seasonally adjusting the quarterly series, differencing to eliminate the unit root and applying the Hodrick-Prescott filter so that we express it as a percentage change from the steady state. Thus, $mc_t = kx_t$, where k is the elasticity of the marginal cost. Plugging the expression above into the inflation equation, we obtain

$$\pi_t = \lambda kx_t + \beta E_t\{\pi_{t+1}\}. \tag{5}$$

Substituting forward, the resulting expression becomes

$$\pi_t = \lambda k \sum_{k=0}^{\infty} \beta^k E_t \{ mc_{t+k}^n \}. \quad (6)$$

It is widely known fact that conventional measures of the output gap contain a substantial amount of measurement errors. That is primarily because the theoretical measure of ‘natural level’ of output is not an observable. The gap is estimated by fitting a smooth deterministic trend and subtracting it from the series. This trend fitting itself involves measurement error. Depending on whether supply or demand shocks are predominant in the economy, estimation could lead to counter-intuitive signs of the coefficients.

Gali and Gertler (1999) concentrate on obtaining a measure for real marginal costs, estimated in a way that it is consistent with theory. Their theory is used as a guide for the estimation in this paper: Output is assumed to be produced by A Cobb-Douglas production function, $Y_t = A_t K_t^{\alpha_k} N_t^{\alpha_n}$, where A_t denotes total factor productivity, K_t capital, and N_t labour. Real marginal cost (MC) is the ratio of the real wage to the marginal product of labour (MPL). Thus, $MC_t = (W_t/P_t)(\partial Y_t/\partial N_t) = S_t/\alpha_n$, where $S_t = (W_t N_t/P_t) Y_t$ is the labour income share. Using lower-case letters to denote percent deviation from the steady state, the formula becomes $mc_t = s_t$. That measure is obtained by first taking natural logs from the series and then applying the Hodrick-Prescott filter to it. This series, as well as the series for inflation, is stationary: Dickey-Fuller test rejects the presence of a unit root at 1% level of significance.

After plugging the expression for real MC into the inflation equation, we obtain

$$\pi_t = \lambda s_t + \beta E_t \{ \pi_{t+1} \}. \quad (7)$$

Since this is a rational expectations (RE) model, the forecast of π_{t+1} is uncorrelated with any of the variables in the information set, i.e. variables in time t or earlier. This leads to the following moment condition

$$E_t \{ (\pi_t - \lambda s_t - \beta \pi_{t+1}) z_t \} = 0, \quad (8)$$

where z_t is a vector composed of the variables taken from the information set, which are orthogonal to the inflation surprise. The moment condition above is used to estimate the model using the Generalized Method of Moments (GMM).

TABLE 1 Reduced-Form Estimates

Proxy for real MC	β	λ	J-statistic	p-value
LN_ULC_HP	0.1247 (0.1494)	-0.0002 (0.0007)	9.793	0.2006
LN_SHLABOR_HP	0.1135 (0.1320)	0.0250 (0.0654)	8.9113	0.2591
DLGDP_SA_HP	0.1321 (0.1453)	-0.0642 (0.1227)	9.1982	0.2591

NOTES $N = 100$, $df = 7$.

An important reason why GMM estimation is used is that non-linear least squares (NLLS) will give biased and inconsistent estimates since $\text{corr}(\pi_t, \pi_{t+1}) \neq 0$, and thus $\text{corr}(\varepsilon_t, \pi_{t+1})$, which violates one of the underlying assumptions for using NLLS. Note that using NLLS-IV estimation with homoscedasticity assumption and no autocorrelation yields exactly the GMM orthogonality condition.

The data used is quarterly for Hungary over the period 1981:3–2006:2. Estimation results are presented in the next section. For s_t , natural logarithm of the labour income share is used. Inflation is measured as a percentage change in the Consumer Price Index (CPI), seasonally adjusted and differenced in order to eliminate the unit root in the series. The instrument set includes four lags of inflation, the labour income share, the output gap, the long-short interest rate spread, wage inflation and the growth in money supply (M1 aggregate).

The New Phillips Curve: Estimation

We first estimate the reduced form equation, which involves only λ and β , but not the structural parameter θ , which was the measure of price rigidity. In addition, Appendix 1 checks the identification of the model parameters. Three cases are considered, with log of cyclical component of unit labour costs (LN_ULC_HP), log of cyclical component of the labour share (LN_SHLABOR_HP), and the differenced log of seasonally adjusted output gap (DLGDP_SA_HP), respectively, as a proxy for real marginal costs. Results are provided in table 1, where the Newey-West estimate of the covariance matrix was used to provide robust standard errors.

Neither the coefficient on the real marginal costs, nor the estimate of the discount factor β is statistically significant. The last result, however, is in line with Gali and Gertler's (1999) findings for US: using output gap

TABLE 2 Estimates of the New Keynesian Phillips Curve

MC proxy used		θ	β	λ	J -stat	p -value
LN_ULC_HP	(1)	1.0002 (0.0008)	0.1241 (0.1493)	-0.0002 (0.0007)	9.7527	0.203
	(2)	1.0000 (0.0001)	0.1247 (0.1494)	0 (0.0000)	9.7931	0.2006
LN_SHLABOR_HP	(1)	0.2963 (0.0908)	2.6178 (0.8581)	0.1579 (0.0527)	8.3573	0.3021
	(2)	0.9969 (0.0093)	0.1137 (0.1321)	0.027 (0.0001)	8.9167	0.2587
DLGDP_SA_HP	(1)	0.4023 (0.0604)	1.3682 (0.2757)	0.2687 (0.0455)	9.7798	0.2014
	(2)	1.0096 (0.0273)	0.1368 (0.1453)	-0.0083 (0.0005)	9.1927	0.2391

NOTES (1) Case 1. (2) Case 2. $N = 100$, $df = 7$.

should not generate a NKPC when quarterly data was used. In order to recover the structural estimate of θ non-linear instrumental GMM was also estimated. Fuhrer and Moore (1995) show that in small samples GMM is sensitive to the nature of normalization of the orthogonality conditions. In this paper the ones used by Gali and Gertler (1999) are used:

$$E_t\{(\theta\pi_t - (1 - \theta)(1 - \beta\theta)s_t - \theta\beta\pi_{t+1})z_t\} \quad (9)$$

and

$$E_t\{(\pi_t - \theta^{-1}(1 - \theta)(1 - \beta\theta)s_t - \beta\pi_{t+1})z_t\} \quad (10)$$

Their claim is that (9) minimizes non-linearities, while in (10) the coefficient of inflation in the current period is restricted to be one. We do each specification for (log) labour share, (log) unit labour costs and output gap.

The results are reported in table 2, where cases [1] and [2] denote specifications (9) and (10), respectively. The first two columns give the estimates of the structural parameters θ and β , and the third provides the estimate for λ . Standard errors for λ were obtained using the delta method. J -statistic for over-identifying restrictions is also provided. At 5% level of significance, the model is always correctly specified.

The two specifications yield some heterogeneity in the results: the esti-

mate of θ is unity (all the firms adjust), 0.3 in the case of log-labour income share, and 0.4 in the regression with the output gap. The estimates for λ and β are in the majority of the cases not statistically different from zero.

Generally, estimates are very sensitive to the GMM normalization procedure, and sometimes to the initial values chosen. The problem was that the program gives highly negative and statistically significant β , which is in conflict with the economic logic. The reason is that the reduced form model is identified, while the structural one is not. The latter has multiple solutions, and that is formally shown in the appendix. Therefore doing Continuous Updating (CU) will not solve the problem. Using Maximum Likelihood Estimation (MLE) is also of no help since the identification issue is not solved. Mavroeidis (2007) points out that Wald and LR test are not robust to failure of the identification assumption. That is a serious issue to be considered for all Neo-Keynesian economists who have NKPC equation in their models. In a very recent working paper, Boug, Cappelen, and Swensen (2007) show that the estimate surface is flat; this finding is a sign of a weak identification. Hendry (2004) also advises that NKPC specification be used with caution.

In the other camp, Martins and Gabriel (2005) try to save the model by using Generalized Empirical likelihood. Stock and Wright (2000) develop confidence set estimation to fix weak identification. They admit, however, encountering problems with fixing Wald statistics. It is worth noting that Gali and Gertler (1999) do not discuss this econometric problem. They only mention several other reasons that may cause the estimate of θ , to have an upward bias. The first one is statistical: our measures of the real marginal cost are just proxies, and thus contain measurement error. Thus, the parameter λ is biased towards zero, and appears insignificant, while in reality MC is an important factor for determining inflation. The second reason lies in the theory, which serves as a basis for the model. It assumes a constant mark-up of prices over MC. If mark-up is allowed to vary over the business cycle, however, then price setting becomes less sensitive to MC, and this explains why λ is not statistically significant as well. In a recent paper, Gali, Gertler, and Lopez-Salido (2005) still claim their results are robust, again failing to mention the identification issue.

In the next section, an alternative, called 'hybrid' NKPC, is considered. It is a more sophisticated model of inflation dynamics. Unfortunately, much of the criticism in the paragraphs above is relevant for the hybrid version, as the problem of weak identification is even bigger in that specification.

Hybrid Phillips Curve

Inflation in data features a significant amount of inertia. Thus, in this section we extend the basic Calvo model, and allow for inertia in inflation. Now the environment includes two groups of firms – not only forward-looking, but also backward-looking ones. The latter use a rule of thumb (behave in an adaptive way) when setting prices. In this case, we can see what share of firms is not optimizing, and therefore not acting rationally.

We the share of the backward-looking firms is denoted by ω . The aggregate price level now evolves according to the following formula

$$p_t = \theta p_{t-1} + (1 - \theta) \bar{p}_t^*, \quad (11)$$

where \bar{p}_t^* is an index of the prices that were reset in period t . Let p_t^f denote the price set by a forward-looking firm at t and p_t^b the price set by a backward-looking firm. Then the index of the newly set prices may be expressed as

$$\bar{p}_t^* = (1 - \omega) p_t^f + \omega p_t^b. \quad (12)$$

Accordingly, p_t^f may be expressed as

$$p_t^f = (1 - \beta\theta) \sum_{k=0}^{\infty} (\beta\theta)^k E_t \{ mc_{t+k}^n \}. \quad (13)$$

Gali and Gerler derive a rule based on the recent pricing behaviour of the competitors as

$$p_t^b = \bar{p}_{t-1}^* + \pi_{t-1}. \quad (14)$$

Then they obtain the hybrid Phillips curve by combining (13) and (14),

$$\pi_t = \lambda mc_t + \gamma_f E_t \{ \pi_{t+1} \} + \gamma_b \pi_{t-1}, \quad (15)$$

where $\lambda = (1 - \omega)(1 - \theta)(1 - \beta\theta)\phi^{-1}$, $\gamma_f = \beta\theta\phi^{-1}$, $\gamma_b = \omega\phi^{-1}$, and $\phi = \theta + \omega[1 - \theta(1 - \beta)]$.

Note that when $\omega = 0$, this means that all the firms are forward-looking, and we are back to the NKPC. While the reduced form in this case is identified, the hybrid NKPC is adds another dimension of non-linearity and makes the identification problem even more severe.

Next, we provide the estimates of the empirical hybrid NKPC and evaluate its overall performance. Log labour share is again used as a measure of MC. To check for robustness, the regression is run with unit labour

TABLE 3 Hybrid NKPC Reduced-Form Estimates

Mc proxy used	γ_f	γ_b	λ	J-stat	p-value
LN_ULC_HP	0.0575 (0.1733)	0.0946 (0.1073)	-0.0023 (0.0007)	8.6720	0.1929
LN_SHLABOR_HP	0.1182 (0.1693)	0.1278 (0.1192)	-0.1543 (0.0919)	7.7079	0.2603
DLGDP_SA_HP	0.1828 (0.1522)	0.064 (0.1230)	0.2551 (0.2433)	8.5487	0.2388

NOTES $N = 100, df = 6$.

costs and output gap as well. Appendix 2 checks the identification of the model parameters. In this case, the model takes the following form

$$\pi_t = \lambda s_t + \gamma_f E_t\{\pi_{t+1}\} + \gamma_b \pi_{t-1} + \varepsilon_t. \tag{16}$$

As seen from table 3, the gamma coefficients are not significant, while lambda estimates are. However, their sign is negative, which makes no economic sense. Still, the J-test does not reject the null of correct specification.

The paper then proceeds with the structural estimation procedure using again non-linear instrumental GMM estimator. As in the previous sections, two alternatives are presented, where the first specification minimizes non-linearities, while the second restricts the coefficient of inflation in the current period to one.

$$E_t\{(\phi\pi_t - (1 - \omega)(1 - \theta)(1 - \beta\theta)s_t - \theta\beta\pi_{t+1})z_t\} = 0. \tag{17}$$

$$E_t\{(\pi_t - (1 - \omega)(1 - \theta)(1 - \beta\theta)\phi^{-1}s_t - \theta\beta\phi^{-1}\pi_{t+1})z_t\} = 0. \tag{18}$$

Results are provided in table 4, where [1] and [2] denote specifications (17) and (18), respectively. The automatic choice of the Newey-West covariance matrix provided robust standard errors.

The estimate of θ is almost everywhere 1, except for the case where the output gap is used, where it is 0.64. All other coefficients are not significant, with the exception for the regression with unit labour cost. That equation, however, gives puzzling results because the share of forward-looking firms is negative, which makes no economic sense. Still, the J-test confirms that the model is correctly specified.

The effect of the output gap was also found to be zero by Roberts (1997; 1999) when quarterly data are used, while Fuhrer (1997) obtains a signif-

TABLE 4 Estimates of the New Hybrid Phillips Curve

MC proxy	ω	θ	β	γ_f	γ_b	λ	J-stat	p-value
(a) (1)	0.3580 (0.1319)	1.0010 (0.0008)	-0.3517 (0.1279)	0.4093 (0.1277)	-0.4025 (0.1319)	-0.0008 (0.0000)	8.25	0.22
(2)	0.7018 (0.6067)	1.0054 (0.0310)	0.9465 (0.8394)	0.4204 (0.1202)	0.5700 (0.0399)	-0.0005 (0.0017)	7.59	0.27
(b) (1)	0.3792 (0.1273)	0.9763 (0.0805)	-0.3439 (0.1031)	0.4420 (0.1034)	-0.3913 (0.1292)	0.0199 (0.0794)	8.15	0.23
(2)	0.0611 (0.1339)	1.0140 (0.0737)	0.0575 (0.1071)	0.0601 (0.1142)	0.0573 (0.1068)	-0.0129 (0.0735)	8.63	0.20
(c) (1)	0.1593 (0.0970)	0.6384 (0.1034)	-0.1120 (0.1544)	0.2327 (0.153)	-0.1044 (0.0975)	0.5920 (0.1044)	8.59	0.20
(2)	0.0428 (0.1264)	0.9846 (0.1485)	0.0822 (0.1302)	0.0433 (0.1292)	0.0819 (0.0808)	0.0149 (0.0961)	8.46	0.21

NOTES (a) LN_ULC_HP. (b) LN_SHLABOR_HP. (c) DLGDP_SA_HP. (1) Case 1. (2) Case 2. $N = 100$, $df = 6$.

icant effect of the output gap in a model with many restrictions. One explanation, aside from the identification issue, is that compared to the US, Hungary is a small open economy, so firms take international prices as given. In a regime of free trade, those firms have to adjust quickly and act in a very competitive environment, as compared to the US firms, which may be acting indeed as monopolistically competitive producers and can afford to run a band of inaction. Indeed, the degree of backwardness is not statistically different from 0, and mark-up is seriously squeezed (theoretically equals the transportation costs of the foreign import companies).

Conclusion

This paper investigated for the presence of a New Keynesian Phillips (NKPC) curve in Hungary in the period 1981:3–2006:2. The study followed the methodology proposed by Gali and Gertler (1999), who claim that a potential source of inflation may be the sluggish adjustment of real marginal costs to movements in output. The empirical model tested featured forward-looking firms who pre-set prices for a couple of periods ahead, using Calvo (1983) pricing rule. In addition, measures of real marginal cost were used instead of the old-fashioned output gap. The reason was that marginal costs are a better proxy for the impact of the productivity gains on inflation, which the ad hoc measure output gap misses.

A hybrid version of NKPC, where some of the firms are backward looking, and others are forward-looking in their price-setting behaviour, was also estimated. However, there are some econometric issues to be considered, such as the weak identification of the parameters of the structural NKPC as well as those of the hybrid NKPC.

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Appendix 1 New Keynesian Phillips Curve Identification

We want to show whether $E(g_t(\delta)) = 0$ only at $\delta = \delta_0$, where $\delta = (\lambda = (1 - \theta)(1 - \beta\theta)/\beta^\theta)$.

We need to consider two sub-cases:

1. The reduced-form case

$$\begin{aligned} g_t(\delta) &= z_{t\bullet}(\pi_t - \lambda s_t - \beta E_t \pi_{t+1} + \lambda_0 s_t + \beta_0 E_t \pi_{t+1} - \lambda_0 s_t - \beta_0 E_t \pi_{t+1}) \\ &= z_{t\bullet} \varepsilon_t - z_{t\bullet}(\lambda - \lambda_0) s_t - z_{t\bullet}(\beta - \beta_0) E_t \pi_{t+1}. \end{aligned}$$

Therefore, $E(g(\delta)) = 0$ iff $\lambda = \lambda_0$ and $\beta = \beta_0$. The reduced form model is identified.

2. The structural parameter case

Here, $E(g(\delta)) = 0$ iff $\beta = \beta_0$ and $(1 - \theta)(1 - \beta\theta)/\theta = (1 - \theta_0)(1 - \beta_0\theta_0)/\theta_0$. By assumption $\theta_0 > 0$ (some of the firms always adjust). Therefore,

$$\begin{aligned} \theta_0(1 - \beta\theta - \theta + \beta\theta^2) &= \theta(1 - \beta_0\theta_0 - \theta_0 + \beta_0\theta_0^2), \text{ or} \\ \theta_0 - \beta\theta\theta_0 - \theta\theta_0 - \beta\theta^2\theta_0 &= \theta - \beta_0\theta_0\theta - \theta_0\theta - \beta_0\theta_0^2\theta. \end{aligned}$$

Cancelling equal terms on both sides, we obtain: $\theta_0\beta\theta^2\theta_0 = \theta + \beta_0\theta_0^2\theta$.

Imposing $\beta = \beta_0$, we obtain: $\theta_0 - \beta_0\theta^2\theta_0 = \theta - \beta_0\theta_0^2\theta$.

Thus, $(\theta - \theta_0)(1 + \beta_0\theta\theta_0)$, which holds when $\theta = \theta_0 \cup \theta = -(1/\beta_0\theta_0)$.

The second possibility creates a problem in the sense that the structural model is not identified – the t -statistics are not normally distributed.

Appendix 2 Hybrid New Keynesian Phillips Curve Identification

1. The reduced-form case

$$\begin{aligned} g_t(\delta) &= z_{t\bullet}(\pi_t - \lambda s_t - \gamma_f E_t \pi_{t+1} - \gamma_b \pi_{t-1} + \lambda_0 s_t + \gamma_f E_t \pi_{t+1} \\ &\quad + \gamma_{b0} \pi_{t-1} - \lambda_0 s_t - \gamma_f E_t \pi_{t+1} - \gamma_{b0} \pi_{t-1}) \\ &= z_{t\bullet} \varepsilon_t - z_{t\bullet}(\lambda - \lambda_0) s_t - z_{t\bullet}(\gamma_f - \gamma_{f0}) E_t \pi_{t+1} \\ &\quad - z_{t\bullet}(\gamma_b - \gamma_{b0}) \pi_{t-1}. \end{aligned}$$

Again, $E(g(\delta)) = 0$ iff $\lambda = \lambda_0$, $\gamma_f = \gamma_{f0}$ and $\gamma_b = \gamma_{b0}$. The reduced form is identified.

2. The structural parameter case: Here, $E(g_t(\delta)) = 0$ iff

$$\begin{pmatrix} \lambda \\ \gamma_f \\ \gamma_b \end{pmatrix} = \begin{pmatrix} \frac{(1-\omega)(1-\theta)(1-\beta\theta)}{\theta+\omega[1-\theta(1-\beta)]} \\ \frac{\beta\theta}{\theta+\omega[1-\theta(1-\beta)]} \\ \frac{\omega}{\theta+\omega[1-\theta(1-\beta)]} \end{pmatrix} = \begin{pmatrix} \frac{(1-\omega_0)(1-\theta_0)(1-\beta_0\theta_0)}{\theta_0+\omega_0[1-\theta_0(1-\beta_0)]} \\ \frac{\beta_0\theta_0}{\theta_0+\omega_0[1-\theta_0(1-\beta_0)]} \\ \frac{\omega_0}{\theta_0+\omega_0[1-\theta_0(1-\beta_0)]} \end{pmatrix} = \begin{pmatrix} \lambda_0 \\ \gamma_{f0} \\ \gamma_{b0} \end{pmatrix}$$

Note that the derivations for NKPC correspond to a specification with $\omega = 0$, and it was not identified. Now we allow for additional layer of non-linearity, therefore this model is not identified either and we can prove this using Monte Carlo simulations.



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Efficient Market Hypothesis in South Africa: Evidence from Linear and Nonlinear Unit Root Tests

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This study investigates the weak form efficient market hypothesis (EMH) for five generalized stock indices in the Johannesburg Stock Exchange (JSE) using weekly data collected from 31st January 2000 to 16th December 2014. In particular, we test for weak form market efficiency using a battery of linear and nonlinear unit root testing procedures comprising of the classical augmented Dickey-Fuller (ADF) tests, the two-regime threshold autoregressive (TAR) unit root tests described in Enders and Granger (1998) as well as the three-regime unit root tests described in Bec, Salem, and Carrasco (2004). Based on our empirical analysis, we are able to demonstrate that whilst the linear unit root tests advocate for unit roots within the time series, the nonlinear unit root tests suggest that most stock indices are threshold stationary processes. These results bridge two opposing contentions obtained from previous studies by concluding that under a linear framework the JSE stock indices offer support in favour of weak form market efficiency whereas when nonlinearity is accounted for, a majority of the indices violate the weak form EMH.

Key Words: Efficient Market Hypothesis (EMH), Johannesburg Stock Exchange (JSE), South Africa, Threshold Autoregressive (TAR) model, unit roots

JEL Classification: C22, C51, G14

Introduction

The ability of a stock market to perform its role efficiently is highly contingent to the extent on which it can be deemed efficient. The hypothesis demonstrating the efficiency of capital markets is grounded upon the realization that competitive behaviour existing among profit-seeking participants will ensure that asset prices continuously adjust to reflect all price-influential information (Jawadi, Bruneau, and Sghaier 2009). Deriving from this logic, an important attribute of efficient capital markets is that the prices of the securities must reflect all available information and any new information should be rapidly absorbed into the prices (Nisar

and Hanif 2012). The resulting efficient market hypothesis (EMH) suggests that stock prices fully reflect all available information in the market and no investor is able to earn excess return based on some secretly held private, public or historic information. In this sense, an efficient capital market makes it impossible for investors to forecast future price variations since the anticipated events are already integrated in the present stock price (Jawadi, Bruneau, and Sghaier 2009). Pragmatically, the EMH can be segregated into three forms depending upon the information set to which stock prices adjust. For instance, under the weak form EMH, prices reflect all past security market information; hence, information on past prices and trading volumes cannot be used for profit. Within a semi-strong form efficient market, stock prices fully reflect all publically available information and are concerned with both the speed and accuracy of the market's reaction to information as it becomes available. Under the strong form efficiency, prices are expected to reflect both public and private information and this hypothesis is concerned with the disclosure efficiency of the information market than the pricing efficiency of the securities market.

Plethoras of empirical studies have been conducted to test the efficiency of stock markets for both industrialized and emerging market economies. A vast majority of these studies opt to test the weak-form EMH by assimilating this hypothesis to the random walk of stock returns. While the findings of these studies generally support the weak-form efficiency for developed and mature stock exchanges, the empirical evidence for South Africa and other emerging economies remains inconclusive (Bonga-Bonga and Mukande 2010). One credible reason for the observed variation of empirical results obtained from previous studies is that they do not take into consideration possible nonlinear behaviour in the JSE stock indices. As conveniently noted by Lim (2011), the assumption of linearity may be trivializing the entire issue since this assumption implicitly implies that the level of market efficiency remains unchanged throughout the estimation period. Sources of asymmetric behaviour in stock markets are well documented in the literature and are inclusive of the presence of transition costs and market frictions; interaction of heterogeneous agents and diversity in agents beliefs (Hasanov and Omay 2007). Thus given the possibility of both linear and nonlinear structures being associated with underlying data generating processes, we formally test the stationary properties of the time series by applying a battery of unit root tests comprising of a combination of linear and nonlinear test-

ing procedures to investigate the market efficiency hypothesis within the Johannesburg Stock Exchange (JSE). In particular, we consider three unit root tests namely: the augment Dickey-Fuller (ADF) unit root tests, Enders and Granger (1998) nonlinear unit root tests as well as Bec, Salem, and Carrasco (2004) nonlinear unit root tests. We apply these unit root tests to five indices on the JSE: the all share index, the JSE top 40 companies index, the industrials index, the financial index, the mining index and the gold index.

Having outlaid the background to the study, we present the remainder of our study as follows. The following section presents a brief review of previous literature in the South African context. Section three of the paper outlines the empirical framework used in the study whereas section four presents the data as well as the empirical results obtained from the study. We then conclude our study in section five by drawing out academic as well as policy implications associated with our study.

Literature Review

Following the pioneering studies of Osborne (1962) and Fama (1965), weak-form efficiency in capital markets has been widely accepted as being a determining factor in supporting the evidence of efficient stock markets across the empirical literature. Since then, a plethora of authors have contributed to the expanding literature by running a variety of formal tests to confirm the existence of weak-form efficiency in various stock markets worldwide. However, the literature tends to present conflicting evidence pertaining to the subject matter, with such conflict evidence appearing to be more pronounced for developing or emerging economies with South Africa bearing no exception to this rule. In an extensive review of previous studies conducted on the JSE, Mlambo and Biekpe (2007) conclude that different methodologies applied to various time periods in the literature could account for the observed conflicting evidence in the literature. This insinuation becomes evident when considering the studies of Smith, Jefferis, and Ryoo (2002), Magnusson and Wydick (2002) and Jefferis and Smith (2005), who have all found the JSE to be weak-form efficient using the runs test and random walk tests. Conversely, Appiah-Kusi and Menyah (2003) found that the JSE is not weak form efficient during periods prior to 1995 while the stock indices revert to weak-form efficiency subsequent to the year 2000. Interestingly enough, such inconclusiveness is not only restricted to South African case studies and can be also identified for a host of other emerging economies as has been documented for

India (Gupta and Basu 2007), for Sri Lanka (Wickremasinghe 2005), for Jamaica (Robinson 2005), for South Asian economies (Nisar and Hanif 2012), for Latin American economies (Worthington and Higgs 2003) as well as for other African economies (Ntim et al. 2011).

In addition, even more recently, there has been growing empirical support in notion of a nonlinear data generating process (DGP) for various stock prices or indices worldwide. One of the earliest works on the subject matter was presented by Li and Lam (1995) who used a threshold autoregressive conditional heteroscedastic (TARCH) to establish that the model structure of Hong Kong stock returns data tends to fluctuate over a horizon of time periods. Another study worth taking note of is that presented in Shively (2003), who finds evidence of stock prices in international markets being consistent with a regime-reverting random walk process containing a deterministic trend. Other forms of nonlinear time series analysis which have also emerged in the literature include the Markov Switching (MS) models (Schaller and van Norden 1997), Neural Networks (NN) models (Albano, La Rocca, and Perna 2013); smooth transition regression (STR) models (Bonga-Bonga 2012) and statistical models incorporating the use of chaotic nonlinearity (Abyankar, Copeland, and Wong 1997; Kohers, Pandey, and Kohers 1997; Pandey, Kohers, and Kohers 1998). Yet despite these empirical advancements made in the literature, it should be noted that a majority of the empirical evidence obtained from the use of nonlinear econometric models have managed to produce but a weak consensus concerning the nature of various stock indices worldwide.

There also exists a separate class of empirical studies, which lean towards the use of nonlinear unit root testing procedures, and this strand of empirical literature appears to have attained more success in establishing weak-form EMH for various stock markets. A popular citation among these works are the studies of Narayan (2005; 2006) who applies the unit root testing procedure of Caner and Hansen (2001) to US stock prices and finds that the data evolves as a nonlinear time series characterized by a unit root process. Notably, this finding is highly consistent with the weak-form EMH. Similarly, Munir and Mansur (2009) apply similar unit root tests to those used by Narayan (2006) and establish a unit root process in the behaviour of the Malaysian stock exchange market. Furthermore, Lee, Tsong, and Lee (2014) apply smooth transition regression (STR) heterogeneous panel unit root tests to OECD, G6, Asian and other European economies and establish that a majority of the countries under observation conform to the weak-form EMH; whereas Hasanov

and Omay (2007) employ the STR unit root test of Kapetonois, Shin, and Snell (2003) to establish weak-form market efficiency for Bulgarian, Czech, Hungarian and Slovakian stock markets. Although still in its infants stages of implementation, Oskooe (2011) used nonlinear Fourier unit root tests for the Iran stock market and was able to validate the weak-form EMH in this particular stock market. Without discarding the positive developments presented in the literature thus far, the empirical literature, never-the-less, remain devoid of bridging the aforementioned two strands of empirical works examining asymmetric behaviour in the stock market prices. Undertaking such a task could prove to bridge the empirical hiatus existing between univariate nonlinear modelling of stock prices, on one hand, and nonlinear unit root tests, on the other hand.

Econometric Methodology

Given that the phenomenon of random walks is associated with EMH, one way to test the weak-form EMH is to examine whether a historical sequence of stock prices are independent of one another or whether they contain a unit root. For analytical purposes, we begin by subjecting a univariate time series of stock indices, p_t , to the following ADF auxiliary test regression:

$$\Delta p_t = \mu_t + \beta_t + \varphi p_{t-1} + \sum_{i=1}^p \alpha_i \Delta p_{t-1} + \varepsilon_t, \quad (1)$$

where μ_t is a drift term, t is time and ε_t is an independent and identically distributed white noise disturbance term. The DF statistic, $DF\varphi\mu$, is then used to test the null hypothesis of a unit root (i.e. $H_0: \varphi = 0$) against the alternative of a stationary process (i.e. $H_1: \varphi < 0$). The test statistic rejects the null hypothesis of a unit root when the statistic is of a lower absolute value compared with critical values tabulated in MacKinnon (1996). If the null hypothesis of a unit root cannot be rejected, then one can assume that the observed time series is non-stationary such that deviations from its mean trend are infinitely persistent. Conversely, when the null hypothesis of a unit root is rejected then it follows that the time series is considered to be stationary or integrated of order 1(0). However, the ADF unit root test has been heavily criticized from three main perspectives. Firstly, it is widely believed that the ADF test does not consider the case of heteroskedasticity and non-normality frequently revealed in raw data of economic time series variables. Secondly, the ADF

test is considered to be formulated on a misspecified econometric model devoid of a moving-average (MA) component. Lastly, the ADF tests are unable to discriminate between a unit root process and a near unit root process with a high degree of autocorrelation and are also sensitive to structural breaks or other nonlinearities existing within time series data. Therefore, seeing that stock return times series in emerging economies such as South Africa, are generally characterized by some stylized facts such as flat tails, excess kurtosis, skewness and volatility clustering; possible periods of nonlinearity may be the result of market adjustment as it is highly likely that financial asset prices are affected by events of a political, social and economic nature (Lim 2011). Hence, the appeal of nonlinear unit root testing procedures in evaluating the weak-form EMH for South African stock returns becomes apparent.

Methodologically, Enders and Granger (1998) as well as by Caner and Hansen (2001), have eloquently demonstrated how conventional linear unit root tests such as the Dickey-Fuller tests have got considerably low power in testing for unit roots when the underlying data generating process is found to be nonlinear. Hence, when evidence of asymmetries in a univariate time series emerges, then corresponding asymmetric unit root tests must be implemented to determine the stochastic properties of the time series. In introducing asymmetric adjustment in the unit root testing procedure, we apply the asymmetric unit root tests of Enders and Granger (1998) and Bec, Salem, and Carrasco (2004) to evaluate the integration properties for both two-regime and three-regime processes, respectively. Notably, both of the aforementioned unit root tests are both generalizations of the Dickey-Fuller unit root testing procedure implemented under Hansen's (2000) TAR framework. Take for instance, the unit root test of Enders and Granger (1998) which is derived from the following Dickey Fuller auxiliary unit root testing regression:

$$p_t = \varphi p_{t-1} + \xi_t, \quad (2)$$

where ξ_t is a white noise error term. As a means of accommodating asymmetric behaviour within the unit root test regression Enders and Granger suggest the re-formulation of equation (3) in terms of their first differences. The resulting nonlinear auxiliary unit root testing regression is specified as:

$$\Delta p_t = I_t \psi_1 \xi_t + (1 - I_t) \psi_2 \xi_t, \quad (3)$$

where I_t is a zero-one Heaviside indicator function which governs the regime switching behaviour of the error term ξ_t . In our paper, we will consider four different functions for the Heaviside function. Under the first function, we specify the indicator function as TAR process with a zero-threshold value:

$$I_t = \begin{cases} 1, & \text{if } \xi_{t-1} \geq 0 \\ 0, & \text{if } \xi_{t-1} < 0 \end{cases} \quad (4)$$

Under the second specification we, specify a c-TAR process with consistently estimated or a non-zero threshold estimate:

$$I_t = \begin{cases} 1, & \text{if } \xi_{t-1} \geq \gamma \\ 0, & \text{if } \xi_{t-1} < \gamma \end{cases} \quad (5)$$

The third method of partitioning the threshold regimes is to specify the Heaviside indicator function based on the differences in the error terms. The resulting momentum threshold autoregressive (MTAR) model with a zero threshold value assumes the following indicator function:

$$I_t = \begin{cases} 1, & \text{if } \Delta\xi_{t-1} \geq 0 \\ 0, & \text{if } \Delta\xi_{t-1} < 0 \end{cases} \quad (6)$$

whereas the fourth method of partitioning the threshold models is to specify them as a MTAR model with a consistently estimated or non-zero threshold value (i.e. c-MTAR) and this is represented by the following indicator function:

$$I_t = \begin{cases} 1, & \text{if } \Delta\xi_{t-1} \geq \gamma \\ 0, & \text{if } \Delta\xi_{t-1} < \gamma \end{cases} \quad (7)$$

Based on regressions (2-6), three empirical issues need to be addressed. Firstly, the threshold value (i.e. γ) for the c-TAR and c-MTAR regressions need to be estimated since they are not specified a priori. Therefore, we follow Hansen (2000) by ordering the threshold value in ascending order such that $\gamma_0 < \gamma_1 < \dots < \gamma_T$, where T is the number of observations after truncating the upper and lower 15 percent observations. Thereafter, we perform a grid search and estimate the true threshold value as the threshold value, which minimizes the residual sum of squares (RSS). Secondly, we need to test for asymmetric effects among

the time series. To this end, Enders and Dibooglu (2001) propose the use of a modified F -statistic, φ_μ , to test the null hypothesis of linear process, that is, a test that the model regime coefficients, ψ_1 and ψ_2 , are equal (i.e. $\psi_1 = \psi_2$) against the alternative nonlinear hypothesis in which the regime coefficients differ (i.e. $\psi_1 \neq \psi_2$). Lastly, we test for unit roots in the observed time series. Following Enders and Silkos (2001) we use of a modified F -statistic, $\text{NDF}\varphi_\mu$, to test the null hypothesis of a unit root, which is essentially a test of the model regime coefficients being simultaneously equal to zero (i.e. $\psi_1 = \psi_2 = 0$) against the alternative of a stationary two-regime TAR process in which the model coefficients differ and are both not equal to zero (i.e. $\psi_1 \neq \psi_2 \neq 0$). In the aforementioned tests of asymmetries and unit root behaviour, the null hypotheses can be rejected if the F -statistic is lower in absolute value in comparison with the critical values as tabulated in Enders and Granger (1998).

Yet there remains the possibility that the time series may evolve as a three-regime mean reverting process as opposed to a two-regime process. Henceforth, as a means of circumventing this issue, we follow in pursuit of Bec, Salem, and Carrasco (2004) by implementing unit root testing procedures based upon the following three-regime threshold autoregressive (TAR) auxiliary function:

$$\Delta p_t = \begin{cases} \mu_1 + \sigma_1 \Delta p_{t-1} + \delta_1 p_{t-1} & \text{if } -\infty < p_{t-1} \leq \tau_1 \\ \mu_2 + \sigma_2 \Delta p_{t-1} + \delta_2 p_{t-1} & \text{if } \tau_1 < p_{t-1} \leq \tau_2 \\ \mu_3 + \sigma_3 \Delta p_{t-1} + \delta_3 p_{t-1} & \text{if } \tau_2 < p_{t-1} \leq \infty \end{cases}, \quad (8)$$

where σ_i are the regression coefficients and the threshold, τ , is defined such that $\tau_2 = -\tau_1 = \tau$. Restrictions of $\sigma_i \leq 1$ are imposed on the regression coefficients to ensure that nonstationarity can only be detected in the corridor regime of the three-regime process. The unit root testing procedure is based upon the statistical significance of the regression parameters, σ_i . Under the null hypothesis, a unit root process (i.e. $H_0: \sigma_1 = \sigma_2 = \sigma_3; \delta_1 = \delta_2 = \delta_3 = 0$) is tested against the alternative of a stationary three-regime TAR process (i.e. $H_1: |\sigma_1| < 1, |\sigma_2| < 0, |\sigma_3| \leq 0$).

However, prior to the testing of these hypotheses there must exist a singular threshold estimate value of $\hat{\tau}$, which is to be plugged into the unit root test regression. Bec, Salem, and Carrasco (2004) suggest that the threshold value can be selected a priori by the statistician in testing for the unit root hypothesis. Thereafter, the asymptotic distributions of

TABLE 1 Descriptive Statistics of JSE Share Indices

	<i>ALSI</i>	<i>Top40</i>	<i>Ind</i>	<i>Fin</i>	<i>Min</i>	<i>Gold</i>
Mean	20877.94	18919.31	19510.73	16729.89	23295.43	2174.5
Median	20875.63	18976.45	20642.36	17002.6	24597.7	2364.78
Maximum	43132.75	38683.17	42443.24	31566	48258.56	3360.39
Minimum	7243.08	6780.72	5496.68	7397.84	5681.71	685.29
Std. dev.	818.77	720.14	10558.83	6779.16	858.44	653.25
Skewness	0.23	0.21	0.22	0.29	0.06	-0.74
Kurtosis	-1.28	-1.30	-1.12	-1.01	-1.28	-0.45
JB	127.39	128.339	118.03	112.86	126.04	96.89
Probability	0.00	0.00	0.00	0.00	0.00	0.00

these unit root tests are derived from Supremum based tests on the Wald, Lagrange Multiplier and Likelihood Ratio statistics. From the these unit root connotations, a time series can only be rendered as being a stationary three-regime TAR process if the above test statistics are of smaller value in comparison to their computed critical values.

Data and Empirical Analysis

DATA DESCRIPTION

All data used in our study consists of daily closing indices of the all share index (*ALSI*); the JSE top 40 companies index (*top40*); the industrials index (*ind*), the financial index (*fin*), the mining index (*min*) and the gold index (*gold*) and has been collected from the McGregor statistical database. Our collected data covers a weekly sample period from 31st January 2000 to 16th September 2014. From our summary statistics of the time series data, as reported in table 1, we conclude that the data under observation are normally distributed. We base these conclusions since the Jarque-Bera (JB) statistic exceeds the critical *p*-values for all significance levels.

Furthermore, we detect skewness and kurtosis in the data, which may be caused from a pattern of volatility in financial markets, were periods of volatility are followed by periods of relative stability. A plausible explanation for these patterns may be underlying nonlinear trends in the data generating process (DGP) of the observed time series. The time series plot of the stock indices used in our study, as shown in figure 1, verifies this assumption of non-normality and non-linearity in the data.

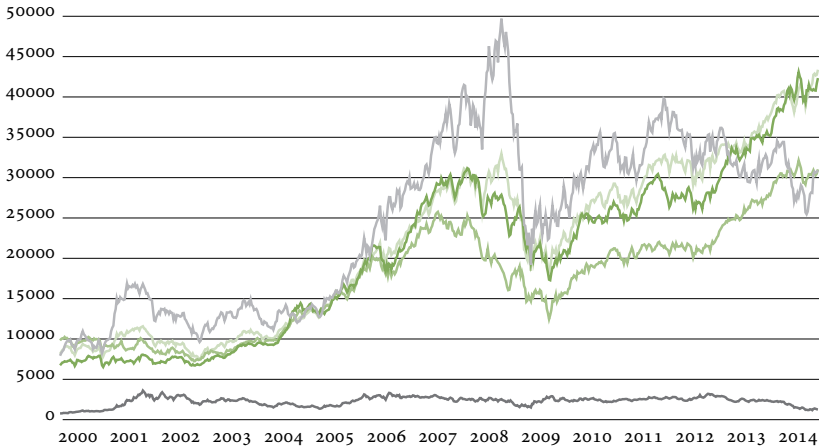


FIGURE 1 Time Series Plots of JSE Share Indices (light green – *ALSI*, green – *fin*, dark green – *ind*, light gray – *min*, dark gray – *gold*)

EMPIRICAL RESULTS

We begin our empirical analysis by investigating the integration properties of the JSE stock price indices using the linear ADF unit root tests. In particular, we perform the ADF under three empirical settings, namely: (1) with a constant or drift, (2) with a trend, and (3) with neither a constant nor a trend. On deciding on the optimal lag for the time series under the ADF unit root test, we account for a maximum of eight lags and thereafter select the optimal lag length based upon the lag, which minimizes the residual variance of the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). The results of the linear ADF unit root tests are reported in table 2.

Starting with the model including no trend and no intercept, we observe that the all share index, the financial index, the industrial index and the JSE top 40 companies index manage to successfully reject the null hypothesis of a unit root in favour of a stationary process at significance levels of at least 5 percent. The remaining stock price indices, namely; the gold index and the mining index; all fail to reject the null hypothesis of a unit root and only retain their stationarity in their first differences at all levels of significance. Given the overall ambiguity associated with the results obtained from the ADF unit root test with no trend and no intercept, we discard these results and proclaim that the model is misspecified for South African data. On the other end of the spectrum, when a trend or a constant are included within the unit root test regression, we find

TABLE 2 ADF Unit Root Test Results

Variable	Test statistics		
	None	Drift	Trend
<i>ALSI</i>	-2.62***	1.51 (-5.72)***	-1.95 (-5.77)***
<i>Top40</i>	-2.41**	-4.15 (-5.63)***	-2.06 (-5.66)***
<i>Ind</i>	-2.90***	-1.77 (-7.90)***	-2.15 (-7.96)***
<i>Fin</i>	-2.26**	-1.85 (-8.27)***	-1.75 (-8.37)***
<i>Gold</i>	0.63 (-8.15)***	-1.91 (-8.12)***	-2.93 (-8.24)***
<i>Min</i>	-0.95 (-5.46)***	-0.90 (-5.47)***	-2.99 (-5.49)***

NOTES ***, **, and * denote the 1%, 5% and 10% significance levels respectively. The test statistics for the first difference of the time series are reported in parentheses. The lag length for the time series under the ADF test is selected through the minimization of the AIC and BIC.

that all the time series fail to reject the null hypothesis of a unit root and only favour stationarity of the time series in their first differences. Therefore, in generalizing these results, we conclude that each of the time series is integrated of order $I(1)$ when subjected to linear ADF unit root tests. And yet caution is taken in interpreting the obtained results, since the ADF unit root tests are notoriously known for being sensitive to possible structural breaks, which may be manifested in the form nonlinearities in the time series. Bearing this in mind, we thus proceed to apply nonlinear unit root testing procedures of Enders and Granger (1998) to the JSE stock price indices and report the results in table 3.

In screening through our obtained results, we are able to pinpoint a couple of intriguing observations. We firstly note that all observed time series reject the null hypothesis of linearity at all levels of significance for all model specifications. This result is worth highlighting since, as previously mentioned, the linear ADF unit root tests have difficulty in distinguishing between pure unit root processes and nonlinearity in the data. However, in turning to the results of the unit root tests performed for the time series, our results becomes less conclusive. In particular, we find that for the TAR model specification with a zero threshold, we can reject the unit root hypothesis in favour of threshold stationarity for half of the stock indices (i.e. the all share index, the mining index and the JSE top 40 companies index). For the TAR specification with a consistently estimated threshold (i.e. c-TAR model) the unit root hypothesis is rejected for two-thirds of the stock indices (i.e.; the all share index, the JSE top 40 companies index; the mining index and the gold index). Meanwhile, un-

TABLE 3 Enders and Granger (1998) Root Test Results

Variable/test type	TAR	c-TAR	MTAR	c-MTAR	
<i>ALSI</i>	(1)	33.33***	37.03***	32.58***	0.00***
	(2)	3.03*	8.35*	1.95	3.14*
<i>Top40</i>	(1)	33.17***	36.06***	31.36***	33.87***
	(2)	4.33*	8.52***	1.70	5.34*
<i>Ind</i>	(1)	31.85***	32.09***	31.84***	33.81***
	(2)	0.04	0.38	0.02	2.84*
<i>Fin</i>	(1)	35.35***	35.86***	37.18***	41.47***
	(2)	0.22	0.92	2.76*	8.72*
<i>Gold</i>	(1)	32.18***	33.89***	31.60***	32.55***
	(2)	0.82	3.28*	0.03	1.35
<i>Min</i>	(1)	28.78***	31.67***	25.7***	27.86***
	(2)	4.66*	9.04**	0.02	3.26*

NOTES Test type: (1) linearity test, (2) unit root test. ***, **, and * denote the 1%, 5% and 10% significance levels respectively. The test statistics for the first difference of the time series are reported in parentheses. The lag length for the time series under the ADF test is selected through the minimization of the AIC and BIC.

der the MTAR model with a zero threshold, only the financial index manages to reject the unit root hypothesis whereas under the MTAR model with a consistently estimated threshold (i.e. c-MTAR model) all observed time series reject the unit root hypothesis with the exception of the gold index. Generally these results present a reversal of those previously obtained for the linear ADF tests previously performed, in the sense that under the Enders and Granger (1998) nonlinear unit root tests, only half of the estimated regressions conform to the weak form EMH for the JSE indices. We do not considered these obtained results as being conclusive since, as pointed out by Narayan and Smyth (2007), a loss of power in unit root tests may occur when ignoring two-or more breaks in unit root testing procedures that only account for one threshold point. Henceforth, we are encouraged to further conduct nonlinear unit root tests under the context of a three-regime TAR model as described in Bec, Salem, and Carrasco (2004).

Given that the implementation of Bec, Salem, and Carrasco (2004) nonlinear unit root testing procedure requires the identification of a pre-determined threshold value; we began our empirical procedure by firstly performing our grid search across the possible values of the threshold

TABLE 4 Threshold Regression Estimates and Tests of Linearity

Variable	<i>ALSI</i>	<i>Top40</i>	<i>Ind</i>	<i>Fin</i>	<i>Min</i>	<i>Gold</i>
τ	25784	26028	22582	14534	23948	2481
LR(τ)	25.01 (0.00)***	32.87 (0.00)***	38.75 (0.00)***	33.74 (0.00)***	26.64 (0.00)***	25.78 (0.00)***
c(τ)	18.42	29.39	24.79	23.45	17.16	13.94

NOTES ***, **, and * denote the 1%, 5% and 10% significance levels respectively. The test statistics for the first difference of the time series are reported in parentheses.

variable i.e. $\psi = [\underline{\tau}, \bar{\tau}]$. In the spirit of Hansen (2000), we restrict our grid search to values of τ to specific quantiles by eliminating the smallest and largest 15 percent of the observational data. The remaining values consist of the potential values of τ which can be search over for the true estimate $\hat{\tau}$. Our estimates from the TAR model, as reported in table 2, depict threshold values of price indexes of 25784 for the all share index, 26028 for top 40 companies, and 22582 for industrials, 41534 for financials, 23948 for mining and 2481 for gold. Interestingly enough, each of these estimated break points for all estimated indexes points to two separate periods, the first being between the months of January and May 2007, whereas the second period corresponds to that of between August and November 2009. Coincidentally, we find that we can attribute these periods to the significant supply shocks caused by the financial crisis of 2007–2008 caused by the closing down of major banks in the USA, which affected a majority of financial sectors worldwide.

Subsequent to the estimation of the optimal threshold values for each of the time series, we proceed to perform the LR tests for the threshold estimates and derive the associated bootstrap p -values using Hansen (2000) bootstrap procedure. In particular, we estimate the TAR regression given at the optimal threshold value, $\hat{\tau}$, at lag length (p) and extract the regression residuals to be used as an empirical distribution for the bootstrapping procedure i.e. $\varepsilon^* = \varepsilon_1^*, \varepsilon_2^*, \dots, \varepsilon_n^*$. We then draw a sample from the empirical distribution in order to create a bootstrap sample, which used to calculate the LR statistic of the estimated TAR model under the null and alternative hypothesis, respectively. By replicating this procedure 1000 times and calculating the percentage in which the simulated statistic exceeds the actual we are able to provide the bootstrap estimate of the asymptotic p -values under the null hypothesis of linearity. Furthermore, we form asymptotic confidence intervals for based upon non-rejection

TABLE 5 Bec, Salem, and Carrasco (2004) Unit Root Test

Variable		$W_T(\tau)$	$LM_T(\tau)$	$LR_T(\tau)$
<i>ALSI</i>		9.12	8.63	8.87
<i>Top40</i>		8.55	8.12	8.33
<i>Ind</i>		11.12	10.41	10.76
<i>Fin</i>		6.58	6.32	6.45
<i>Gold</i>		19.75**	17.60*	18.64**
<i>Min</i>		16.64*	15.86	15.84**
Critical values	10%	16.181	15.87	15.77
	5%	18.4	17.63	17.89
	1%	23.01	21.75	22.23

NOTES ***, **, and * denote the 1%, 5% and 10% significance levels respectively. *P*-values are reported in parentheses.

region of confidence level of the LR statistic. The estimated LR test statistics and their asymptotic confidence intervals, as reported in table 5, confirm that the null hypothesis of linearity can be rejected for all indices at a one percent significance level. In other words, the linear AR model can be strongly rejected in favour of a nonlinear TAR model thus permitting us to proceed with implementation of Bec, Salem, and Carrasco (2004) nonlinear unit root testing procedures. The results of the aforementioned unit root tests are reported in table 5.

As a first step towards examining the stationary properties of the time series variables, we compute the threshold unit root test statistics (i.e. $W_T(\tau)$, $LM_T(\tau)$ and $LR_T(\tau)$) together with the associated bootstrap critical *p*-values values at significance values of 1 percent, 5 percent and 10 percent using 1000 bootstrap replications. Our estimation results show that a majority of the JSE stock indices significantly reject the unit root hypothesis in favour of a stationary nonlinear process. In particular, 4 price indices (i.e. all share index; the JSE top 40 companies index; the industrials index and the financial index) reject the unit root hypothesis whereas the remaining two indices (i.e. the mining index and the gold index) reject the threshold stationary hypothesis. Even though not completely definitive, the obtained results present an element of clarity to the issue of nonlinearities and unit roots existing within the observed time series. The results particularly prove that most stock indices in the JSE evolve as both nonlinear and non-stationary processes thus violating the weak form hypothesis.

Conclusions

The presented paper sought to investigate the efficient market hypothesis for five generalized stock price indices under the JSE (i.e. all share index, top 40 companies, industrial sector, financial sector, mining sector and gold stock prices) using weekly data collected between the period of 31st January 2000 and 16th December 2014. To this end, we carried out conventional linear ADF unit root tests as well as the nonlinear unit root testing procedures as proposed by Enders and Granger (1998) and Bec, Salem, and Carrasco (2004). The overall empirical results obtained in our study bridge two opposing contentions obtained from previous studies by suggesting that when linear unit root tests are employed then the time series are unable to reject the unit root hypothesis, thus offering support for the weak-form EMH. Conversely, when nonlinearities are accounted for in the unit root testing procedures, the empirical evidence appears to offer more support for threshold stationarity thus failing to support the weak-form EMH for the JSE stock prices. With special reference to the results obtained from Bec, Salem, and Carrasco (2004) nonlinear unit root test results, we particularly observe that the stock indices associated with the primary sectors (i.e. mining sector and gold prices) evolve as unit root processes whereas the indices associated with secondary sectors (i.e. all share index, top 40, financial sector, industrial sector) evolve as nonlinear yet stationary processes. In other words, our empirical analysis demonstrates on how the primary sector stock indices are more indicative of being weak-form market efficient whereas secondary sector indices prove to reject the EMH.

Seeing that the efficiency of stock markets are directly linked to the decision-making of investors as well as to the enhancement of the role of stock market development process, the empirical results obtained in our study bear important implications for both individual and institutional investors as well as for South African regulatory policymakers. In particular, our findings of weak-form market efficiency associated with the stock indices of the primary sector implies that investors in the primary sector of the JSE trade like noise traders, who purely speculate and treat the market like a burgeoning casinos. Therefore the primary sector of the JSE can provide as an efficient outlet for potential investors who would have previously considered directing their investments towards more developed stock markets. On the other end of the spectrum, the rejection of the weak-form EMH for the stock indices in the secondary sector of

the JSE primarily implies that stock price movements could be exploited using technical analysis. As discussed in Magnusson and Wydick (2002), such market inefficiency may be caused by some sort of consensus between traders in condition of their prices on the trading patterns of other traders or in the previous day's trading volume as a measure of market consensus. Nonetheless, our empirical analysis place strong emphasis on the significance of institutional and regulatory mechanisms in monitoring the market activities within the primary sector of the JSE in order to minimize possible abnormal profitable arbitrage opportunities within the stock market.

Notwithstanding some of the useful inferences derived from our study, we do not discard the fact that our current empirical analysis does present its own shortcomings. For instance, the unit root testing procedures are only able to account for weak-form market efficiency in the stock market data without direct evaluating semi-strong form as well as strong form stock market efficiency. It is very possible that emerging African economies such as South Africa will be able to pass tests for semi-strong form efficiency, which dictates that public information cannot be utilized to earn supra-abnormal returns. Hence at this juncture, it would be pre-mature to completely reject the possibility of semi-strong form EMH based on the rejection of the weak-form EMH as has been established for most stock indices in our current study. Moreover, it is unlikely that South Africa would be subject to strong-form efficiency since private information exploited by insiders is highly likely to yield abnormal returns on the stock market. Therefore, a convenient guideline for future research would be to focus on investigating the validity of semi-strong form market efficiency for stock prices within the JSE.

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Correlates of Tax Compliance of Small and Medium Size Businesses in Cameroon

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Taxation provides a predictable and stable flow of revenue to finance development objectives. This is important in a country like Cameroon that has serious challenges with meeting its development objectives. Small and medium enterprises (SMEs) are significant for economic growth in the country, contributing as much as about 22 percent of the gross domestic product. SMEs generate taxable incomes. They also collect employment and value added taxes on behalf of the government. Taxation, however, imposes high cost to small businesses. SMEs are less tax compliant in comparison to large businesses. SMEs are considered the 'hard to tax group from the informal sector.' As such, the literature suggests that only a fraction of their taxable incomes is reported to tax authorities. Against this background, factors that correlate with tax compliance of 575 small and medium size companies in Cameroon are discussed from a survey of companies in the manufacturing and wholesale sectors. High registration cost and time-consuming processes promote tax non-compliance. The perception that tax system is corrupt discourages registration and filing compliance. When there are too many compliance hurdles, the probability of filing compliance is reduced. However, a fair and static system encourages filing and registration compliance. A clear and consistent tax system promotes filing compliance. Authorities that understand their responsibilities and are willing to respond to enquiries during the registration process promote tax compliance in general.

Key Words: tax compliance, small and medium size enterprises, tax administration, Cameroon

JEL Classification: D73, H26, M48, H83

Economic Importance of SME in Cameroon

Studies by Beck, Demirgüç-Kunt, and Levine (2005), Ayyagari, Beck, and Demirgüç-Kunt (2005), Sackey (2007), and Beyene (2002) have shown that small and medium enterprises (SMEs) are significant for economic growth in Cameroon. The Ministry of Small and Medium Enterprises and Craft suggests that SMEs accounted for about 22 percent of the gross

domestic product (GDP) in 2004. SMES employ a substantial proportion of the country's labour force and constitute a very important avenue for achieving poverty alleviation and reducing unemployment. CRETES (2003) finds that 87.2 percent of SMES in Cameroon usually employ fewer than 20 employees, and only 1.7 percent employ more than 100 employees. Of the total of 2800 SMES in the country, 71 percent are operating in the secondary and tertiary sectors (wholesale and retail trade, hotels, restaurants, and manufacturing). Thus, trade (commerce) only accounts for 22 percent of the total SME's employment in the country. Either the manufacturing sector, in contrast, is in general publicly or foreign owned. There are few formal manufacturing enterprises owned by local people in the country.

IMPORTANCE OF TAXATION IN AFRICA'S DEVELOPMENT

Taxation provides a predictable and stable flow of revenue to finance development objectives. As such, the 2002 Monterrey Consensus recognised taxation's key role in domestic resource mobilisation, an acknowledgement of the sentiment echoed at the 2008 United Nations Doha conference on Financing for Development (Pfister 2009). Taxation plays a key role in helping African countries to reach their Millennium Development Goals (MDGs). African governments aim to use taxation to: (1) finance their social and physical infrastructure needs; (2) provide a stable and predictable fiscal environment to promote economic growth and investment; (3) promote good governance and accountability by strengthening the relationship between government and citizens; and (4) ensure that the costs and benefits of development are fairly shared.

The role of taxation goes further than promoting economic growth. Taxation shapes the environment in which international trade and investment takes place. Certainty and consistency of tax treatment, the avoidance of double taxation, and efficient tax administration are all important considerations for international businesses. Its political importance also goes far beyond providing income to finance public sector investments, and the basic needs of the population. Historically, state building has been closely connected to the development of the tax system (Tilly 1992; Weber and Wildavsky 1986).

In Mauritius, the tax system has been a key factor for the development of an accountable and functioning state. When the state depends on tax income from wide sections of citizens and businesses, the authorities have incentives to expand their presence also in rural and peripheral areas. Tax

evasion and the siphoning of funds to tax havens deprive African countries of the fiscal benefits of growth. The development of effective tax responses to counter these challenges is also central to Africa's development agenda (Pfister 2009).

TAXATION ISSUES AS THEY AFFECT SME OPERATORS

James and Alley (2002) define tax compliance as the willingness of individuals and other taxable entities to act in accordance within the spirit as well as the letter of the tax law and administration without the application of enforcement activities. Otherwise, it can be construed as the degree to which a taxpayer obliges to tax rules and regulations. Franzoni (2000) and Chatopadhyay and Das-Gupta (2002) see tax compliance as involving the true reporting of the tax base; correct computation of tax liabilities; timely filling of tax returns and timely payment of the amount due as tax. Any behaviour by the taxpayer, contrary to the above constitutes non-compliance. Tax non-compliance is the failure of the taxpayer to meet tax obligations, irrespective of whether this is committed intentionally or not (James and Alley 2002).

There are a number of reasons why studying tax compliance of SMEs is important. First, SMEs are less tax compliant in comparison to large businesses (Giles and Caragata 1999). They collect employment and value added taxes on behalf of the government. Therefore, SME operators' tax compliance affects the amount of tax revenue collected which affects the government's ability to fulfil its fiscal, economic and social objectives (Alley et al. 2004; Chittenden, Kauser, and Poutziouris 2003). Second, SMEs are known to participate in the cash economy due to the greater opportunity available to them (Ashby and Webley 2008; Bajada 2002; Morse, Karlinsky, and Bankman 2009; Noble 2000). They have 'unregistered income with no third party reporting' (Gerxhani and Schram 2006) and consequently, they are considered the 'hard to tax group from the informal sector' (McGee, Ho, and Li 2008). Value-Added Tax (VAT) 'gaps' have been put at 50–60% in some developing countries, compared to 7–13% in developed countries. About three percent (2.7% of the Rwf3.75 billion) collected in 2011 was spent in the course of collecting income tax from small taxpayers in Uganda (Rwahigi 2012).

Entrepreneurship, unlike wage work, offers an uncertain return. A system of differential taxation across sectors can make investment in the risky sector more or less attractive. In most countries, business income is taxed differently from wage earnings on a paid job. Various business

expenses are typically tax deductible and often include the costs of items such as vehicles and housing that provide non-business consumption benefits. Therefore, taxation issues affect SMES operators' decisions regarding business structures, wages paid, charitable contributions made, and profits declared for the period. Taxation issues constitute one of their main concerns (Massey and Quin 2001) and researchers find that business failures are associated with poor record keeping for taxation purposes (Evans, Carlon, and Massey 2005; Prescott and Hooper 2009).

Brautigam, Fjeldstad, and Moore (2006) find that regulations, such as licences and permits, high taxes, as well as corruption, are the third, fourth and sixth most important constraints facing SMES. Corruption indicators are strongly associated with low revenue (indeed corruption functions like a tax itself, and is likely to be a particularly regressive and inefficient form of taxation). In addition, taxpayers may be unwilling to pay taxes, because they perceive that officials themselves may be corrupt, that governments consistently misuse public funds and that expenditure patterns may not reflect their wishes. Everest-Phillips (2009) reports that in Nigeria, the federal government estimated in 2004 that it collected only around 10% of taxes due, and *half* the revenue collected is believed to be then lost or embezzled. Corruption increases the costs of doing business, and imposes a tax on entrepreneurial activity. Svensson (2003) finds that a majority of Ugandan firms pay bribes, and the amounts are on average large (8% of total costs), depending on the extent to which a firm has to deal with public officials. Everest-Phillips (2009) reports that evidence from taxpayer surveys indicate that bribe ranges between 25%-40% of the total assessed tax amount, and that paying a bribe can lower the tax assessment by 50%.

Liedholm and Mead (1999) find that business start-ups are considerably more constrained by licences and registration requirements than more mature firms are. They find that taxes and access to inputs, by business location, are bigger problems for firms in secondary cities than for those located in major cities. Regulation in general and transport are larger problems for firms in major cities. Brautigam, Fjeldstad, and Moore (2006) find that taxes are consistently rated as more important constraints as the education of the business owner increases, and corruption follows the same pattern. The impact of regulations varies according to the type of regulations. Licence and permit requirement are perceived to be more of a constraint by owners with primary and secondary education. Brautigam, Fjeldstad, and Moore (2006) also find that female own-

ers are more restricted by regulations than male owners, directly contradicting the result of Liedholm and Mead (1999).

The literature suggests that SMES evade VAT or Goods and Services Tax (GST) in France and Netherlands (Agha and Haughton 1996), the United Kingdom (Adams and Webley 2001), the United States (Joulfaian and Rider 1998) New Zealand (Noble 2000) and Australia (Bajada 2002). They also evade income taxes from cash jobs in the hairdressing industry (Ashby and Webley 2008), the building industry (Sigala, Burgoyne, and Webley, 1999), home maintenance, home-based services, teaching, entertainment (Noble 2000) and in the food industry (Adams and Webley 2001). In Tanzania, micro and small business represent 69% of all private sector taxpayers, but pay only 0.28% of taxes raised (Tanzania Revenue Authority 2009).

Fischer, Wartick, and Mark (1992) categorise tax compliance determinants into four groups: (1) tax system structure (tax rate, penalty, and probability of detection, complexity of tax system); (2) attitude and perception (fairness, ethics, and peer influence); (3) non-compliance opportunity (income level, income sources and occupation) and demographic factors (age, gender and education).

Taxpayers are less compliant when they perceive the tax system as unfair (Spicer and Baker 1980). Older taxpayers are reported to be unwilling to take risks and are more sensitive to sanctions. Female taxpayers are posited to be more conforming, conservative and bound by moral restraints (Jackson and Jaouen 1989). Some tax regimes may systematically, even if inadvertently, disadvantage certain groups in society, particularly women. An unintended gender bias may arise from generally accepted tax exemptions made available to owners of businesses or properties—who are more often men than women (Organisation for Economic Cooperation and Development 2009). In addition, if the government fails to provide basic public goods and services or provides them insufficiently, citizens may not be willing to pay taxes (Brautigam, Fjeldstad, and Moore 2008).

High compliance costs, i.e., the costs the taxpayer has to bear to gather the necessary information, fill out tax forms etc, can be an additional reason for tax evasion and avoidance. The complexity of procedures needed to pay taxes and the rates applied to businesses may be a proxy for formal enterprises' incentive to undervalue business transactions. The number of payments to be made by SMES can also have an impact on their administrative burden. It takes about 654 hours to comply and make 46 tax pay-

TABLE 1 The Bottom 10 Performers in Terms of the Ease of Paying Taxes in Africa

Country	(1)	(2)	(3)	(4)
Congo, Democratic Republic	171	32	336	339.7
Equatorial Guinea	173	46	492	46.0
Cameroon	176	44	654	49.1
Mauritania	177	37	696	68.2
Senegal	178	59	666	46.0
Gambia	179	50	376	283.5
Central African Republic	181	55	504	65.2
Congo, Republic	182	61	606	62.9
Guinea	183	58	416	73.2
Chad	184	54	732	65.4

NOTES Column headings are as follows: (1) overall global ranking, (2) number of payments, (3) time to comply (hours), (4) total tax rate (%). Adapted from PricewaterhouseCoopers (2013).

ments in Cameroon. With this record, Cameroon occupies the bottom 8th position in Africa. Payments consist of 13 of profit, 12 of labour and 19 others (PricewaterhouseCoopers 2013). Doing Business (2008) suggest that total taxes in Gambia, the Democratic Republic of Congo, Central African Republic and Sierra Leone would amount to over 200% of a company's profits. With such prohibitive tax rates, companies have a high incentive to do business fraudulently as operating in line with regulations can make it difficult to survive.

Small and medium sized enterprises (SME), in particular, suffer from high compliance costs, with value added tax (VAT) being perceived as the most problematic in South Africa. As a coping strategy in South Africa, about 18 percent of SMEs simply try to avoid or evade taxes (Small Business Project 2005). The main reasons for high tax compliance costs of small businesses are: (1) Frequent changes of tax laws; (2) Complexity of tax systems (tax systems are more geared to large enterprises); (3) Existence of different tax administrations; (4) Incomprehensible language of tax laws, including incomprehensible forms; (5) Short and inflexible deadlines for tax payments (resulting in cash flow problems); (6) Costs of tax consultants; (7) Registration procedures (European Commission 2007).

In addition, tax laws in many developing countries, change rapidly, thus producing instability and low transparency of the tax code. As a

result, complicated tax legislation and ongoing changes of the tax code confuse tax administrators and taxpayers alike. This produces many opportunities for tax avoidance (Mo 2003).

STATEMENT OF THE PROBLEM

About half of sub-Saharan African countries mobilise less than 17% of their GDP in tax revenues, as against an average of around 35% in OECD countries (Organisation for Economic Cooperation and Development 2009). As such, African countries are facing a series of challenges when it comes to optimising taxation while aiming to reach development targets. Perhaps the most inherently difficult challenge is how to find the optimal balance between a tax regime that is business and investment friendly, while at the same time leveraging enough revenue for public service delivery (which, in turn, makes economies more attractive to investors) (Pfister 2009).

African policymakers are hence challenged by the need to mobilise domestic resources and broadening the tax base to secure steady revenue streams for development financing and to diversify the revenue sources and fighting tax evasion, spurred by tax havens, regulatory weaknesses, and some corporate practices (Pfister 2009).

Internal revenue collection is a particular challenge in Cameroon. During the period 1963–1977, tax revenue as a proportion of GDP was 16.6% in Cameroon. This fell to 13.2% during 1994–2000 period. It is estimated that the Cameroon Government is losing between US\$5 and 10 million per year in revenue from the tree felling tax alone due to illegal activities (World Bank/WWF Alliance 2002).

Cameroon is not particularly business friendly. The country was ranked 168th in 2014 in terms of the ease of doing business, and 175th regarding contract enforcement (Doing Business 2014). There are numerous obstacles to creating and operating businesses. The process of compliance is also confusing! Business registration takes time, about 15 days and involves 5 procedures. Completing the process is also costly. It can cost about 36.2 percent of income per capita (Doing Business 2014). Tax rates are prohibitive with high compliance costs and going through the process is discouraging to small businesses (PricewaterhouseCoopers 2013).

SMES have taxable incomes, which they are obliged to pay to the government. They also collect employment and value added taxes on behalf of the government. Taxation, however, imposes high cost to small businesses. SMES are less tax compliant in comparison to large businesses.

SMES are considered the 'hard to tax group from the informal sector.' They also largely operate in the cash economy, where they have 'unregistered income with no third party reporting.' As such, the literature suggests that only a fraction of their taxable incomes is reported to tax authorities. The cost of administering SME taxation is very high. Therefore, in order to meet its development objectives, the Cameroon government is seeking innovative ways to target SMES in the process of improving its tax collection effort.

OBJECTIVE OF THE STUDY

There has been very little research undertaken on the tax compliance behaviour of SMES in Cameroon. Hence, an analysis of small and medium size business tax compliance is necessary in order to evaluate and to ensure increased tax compliance by these organizations, and hence increase internal revenue collection by the Government of Cameroon. Therefore, the principal objective of this study is to assess tax compliance by small and medium size businesses in Cameroon.

It is hypothesised that tax compliance by SME owners is positively correlated to: (1) demographic factors; and negatively to (2) perception of the tax system in the country; (3) the cost of tax compliance; and (4) service encounter experience of the taxpayer with the revenue authority.

The knowledge gained from this research could inform the efforts of Cameroon's Internal Revenue Service (Direction General des Impôts (DGI)) to more effectively target their regulatory measures and assistance programmes towards SMES. This paper is organised as follows: section one is essentially introductory and points to the importance of SMES and taxation to the attainment of millennium development goals. In section 2, public organisations' understanding of client services is discussed with the expanded paradigm shift of revenue authorities to be more client focus. Section 3 presents the research method, data collection technique and the classification of SMES while section 4 highlights the results of this study. The last section concludes the paper.

Public Sector Organizations Understanding of Client Services

Public sector organizations lack a detailed understanding of the meaning of client service and its implications (Fountain 2001, 65), and require knowledge about 'how' to improve public services (Hodgson, Farrell and Connolly 2007, 362–3). In particular, the public sector in most developing nations hardly has any performance measure of the services they provide

(Kloot 1999). This leads to public officials believing that they are largely responsible and accountable to the State rather than the people they serve (Kuppusamy 2006). Although services provided are likely to be beneficial for the public, public officials, however, do not attract a strong package of significant satisfaction in the manner in which they meet the needs of the wider community. The lack of knowledge about inter-relatedness of one department with another, method of operation, styles of negotiation and the execution of service delivery are reported to be frequent causes of public dissatisfaction. Dissemination of information, exchange of views and ideas, and the analysis of potential solution to cases could therefore be essential to improved satisfaction with public service delivery.

Surveys and opinion polls confirm that citizens want improvements in the ways in which governments serve them, that is, a public administration that delivers better services and extends their reach and coverage more effectively and efficiently (Rondinelli 2007).

TAXPAYER EXPANDED SERVICE PARADIGM OF REVENUE AUTHORITIES

Some authors opine that tax payments are commonly associated with emotions such as hope, despair, anger, outrage, defiance, frustration, disdain, suspicion, and deference (Rawlings and Braithwaite 2003). These emotions could motivate some to evade taxes by understating their taxable incomes and/or overstating their deductible expenses. It is therefore important that SME operator's tax compliance service encounters with Cameroon's internal revenue authority be helpful in assisting them to achieve tax compliance.

Tax agencies need processes that do not just make it easy for citizens to understand their obligations and comply with the rules, but also make it difficult for them not to comply. Above all, systems must be flexible enough to allow prevention and detection strategies and business rules to change regularly, so that agencies are not outmanoeuvred by the constantly evolving tactics of tax evaders (Pretty and Negadi 2012).

The issue of service quality is also quite central to tax administrations since they provide numerous services to taxpayers. Organisation for Economic Cooperation and Development (2007) identifies services commonly provided by revenue offices as (1) information, (2) interaction and (3) transaction and describes transaction as the core service while information and interaction services provide support to transaction. Table 2 provides an example of services provided by revenue authorities across

TABLE 2 Revenue Agencies Service Categories

Service category	Description	Examples of services	Characteristics
Information	Information services and products which are one way communication and do not result in a change to account status.	Education; publications (paper and web); campaigns; mass distribution of different types of information; instructions.	Timing volume: partly predictable; size volume: flexible, can be influenced, revenue body initiate; standardisation/automation: possible in many cases.
Interaction	Two-way communication, which in itself does not result in any change in account status.	Enquiry; audit; guidance; debt collection.	Timing volume: partly predictable; size volume: flexible, can be influenced; standardisation/automation: difficult.
Transaction	Activity or services that result in a change in account status or account information.	Filing of tax returns, VAT etc.; payment/refund.	Timing volume: very predictable; size volume: can to a very little degree be influenced; standardisation/automation: great potential.

NOTES Adapted from Organisation for Economic Cooperation and Development (2007).

the world. A combination of process change and technology evolution is evident in the most effective tax agencies. Their systems and processes have already been modernised to maximise yield by improving compliance (Pretty and Negadi 2012). Recently, many internal revenue authorities are shifting from the traditional 'enforcement' paradigm often used to analyze tax compliance behaviour, in which taxpayers are viewed and treated as potential criminals, and the emphasis is on repression of illegal behaviour through frequent audits and stiff penalties (Allingham and Sandmo 1972; Yitzhaki 1974).

An expanded 'service' paradigm is now being embraced which recognizes the role of enforcement, but also emphasizes the role of tax administration as a facilitator and a provider of services to taxpayer-citizens. Measures to simplify the taxpaying process and promoting service oriented tax administration include a reduction of the number of tax forms

and officers assisting clients in filling out documents or the introduction of online services. This is having significantly positive effects on citizen perception of tax administration.

Coleman and Freeman (1997) report that taxpayers would respond more favourably to messages and strategies, that explicitly take into account cultural, economic and even gender differences. Their views are supported by a similar study carried out by Lin and Carrol (2000). Past studies have shown that women are more responsive to conscience appeal than sanction threat, both of which are designed to improve tax compliance (Jackson and Jaouen 1989; Hite 1997). These findings imply that targeting groups that require tax education programmes will increase voluntary tax compliance.

Alm et al. (2011) utilize laboratory experiments to test the effectiveness of taxpayer service programmes both in encouraging an individual to file a return ('filing' compliance) and in increasing the individual's subsequent level of reported income ('reporting' compliance). They find that uncertainty reduces both the filing and the reporting compliance of an individual. However, they also find that agency-provided information has a positive and significant impact on the tendency of an individual to file a tax return, and also on reporting for individuals who choose to file a return.

In Singapore, the main tenet of tax reform has been an increased service-orientation: the conversion from a hard-copy filing system to a paperless imaging system, the extensive use of electronic filing, a one-stop service to answer inquires about any type of tax, the ability for filers to see the entire tax form with any corrections before it is submitted, the use of interest-free instalment plans for paying taxes with direct deduction from bank accounts, separate functional areas within the tax administration with little opportunity for corruption, and a changed attitude of officials toward taxpayers. During the last decade, the tax administration service of Singapore has gone from being the lowest rated government agency in public satisfaction to one that ninety percent of the taxpayers found to provide courteous, competent, and convenient services (Alm et al. 2011).

The Kenya Revenue Authority has recently started to organize an event aimed at recognizing the top ranked institutions based on tax remittance. In the 2011/12 financial year rankings, the giant mobile operator company Safaricom, topped the list followed by the East African Breweries Limited (EABL) and the Kenya Teachers Service Commission (KTSC). Oth-

ers in the list included British American Tobacco (BAT), Kenya Commercial Bank (KCB), Barclays Bank, Kenya Ports Authority (KPA), Equity Bank, Standard Chartered Bank and KenGen. Kenya Revenue Authority applauded all the top-listed institutions for having followed all the stipulated tax regulations (NewstimeAfrica 2012).

Mantra Tanzania Limited has scooped the award for the overall winner of compliant large taxpayers in Kinondoni Tax Division for the 2011/2012 financial year. Tanzania Revenue Authority (TRA) initiated the award to recognise and honour taxpayers for their invaluable contribution in revenue collection. According to the tax body, Mantra Tanzania met all the tax requirements and continued to pay taxes voluntarily even before starting active production. In 2012, there were 100,033 taxpayers in the country and tax collected and submitted to the Treasury as at September 2012 was Tsh754 billion (AllAfrica 2012).

Research Method

Primary data used in the study were collected from 700 randomly selected SMES, which have identifiable business location in Cameroon. This was to address the lack of database of SMES in Cameroon and to improve the coverage of formal sector SMES. From the survey, only data from 575 enterprises were retained for analysis after performing the coherence test. The survey was conducted in the central and littoral regions, the location of almost 70% of the SMES in Cameroon. The survey questionnaire administered consisted of questions covering the profile of the business owner, perception of tax system in Cameroon, the cost of tax compliance, the importance of customer service experience of SME owners with Cameroon's Internal Revenue Service (Direction General des Impôts, DGI) and the effect of enforcement and audit on tax compliance.

Quantitative survey questionnaires are unable to fully 'reflect the cognitive processes required to assess complex phenomena' (Popper and Sleman 2001, 230) such as tax compliance. Therefore, questionnaire administered included open and closed questions. Open questions allowed respondents to give answers in their own way, while closed questions were chosen in order to produce standardized data that can be analysed.

The full sample consists mainly of enterprises in the tertiary and secondary sectors. They were mostly retails and wholesales. Although, the secondary sector contributes 31% of Cameroon's GDP and employs 15% of the population (see <http://www.iss.co.za/af/profiles/Cameroon/Econ>

.html), they are mostly large enterprises, with very few SMES. Hence, few businesses were interviewed in this sector.

CLASSIFICATION OF SMES

We classify enterprises interviewed according to the definition of SMES given by the Economic and Social Concern (ESC) in Cameroon. A *small enterprise* is an enterprise: (1) with the majority of shares owned by Cameroonians; (2) the majority of managers are Cameroonians; (3) has limited income; (4) employing less than 10 persons; (5) whose total investment is less than or equal to 20 million FCFA. A *medium enterprise* is an enterprise with: (1) a capital turnover of less than or equal to 1, 5 billion FCFA; (2) employing between 10 and 100 workers; (3) with own participation being less than or equal to 100 million FCFA. We have distinguished between two levels of tax compliance, registration and filing compliance. Enterprises are classified as being compliant if they have completed all the required tax registration and filing processes, otherwise they are not.

DATA ANALYSIS

Data collected have been analyzed using a regression-based method. The regression-based method enables us to examine the determinants of tax registration and filing compliance of SMES interviewed. Tax compliance is measured as a binary variable. SME taxpayers that are registered with the revenue authority, and have filed returns within deadlines are assigned with a score of 1 in each case, otherwise 0. An SME scoring 1 in each case is both registration and filing compliant; while scoring 0 means being non-compliant in both cases.

DESCRIPTIVE ANALYSIS

A total of 137 manufacturing (24%) and 438 wholesale (76%) enterprises were included in the survey, most of which are located in the Littoral region, the economic capital of the country. Thus, 37% of the enterprises interviewed is located in the Central, and 63% in the Littoral regions. Most of the respondents were either the manager and/or the business owner.

In most of the enterprises interviewed, the respondent was either the manager and or the business owner. Some 69 medium and 402 small size enterprises were covered. The category of 'other enterprises' represents those that do not properly fall within the SME definition by ESC. They are simultaneously medium sized by level of their total investment and small sized by employment level or vice versa. Their investment levels

TABLE 3 The Number of Enterprises Interviewed by Region

Sector	Province			
	Central		Littoral	
	(1)	(2)	(1)	(2)
Number	47	163	90	275
Percentage	34.30	37.21	65.69	62.78
Total	210		365	
% of the total enterprises interviewed	36.52		63.47	

NOTES Column headings are as follows: (1) manufacturing, (2) wholesale.

TABLE 4 The Number of Small and Medium Enterprises Interviewed

Region	Small	Medium	Others
Total	402	69	104
Central	145	19	46
Littoral	257	50	58

TABLE 5 Selected Characteristics of SMES Surveyed

Item	Small	Medium	Others
Age of enterprise in years	6	10.76	8.37
Age owner in years	38	48	42
Number of shareholders	1	1.65	1.5
Male	288	61	80
Female	114	8	24

are greater than those of small firms even though they employ about the same number of workers. Eighty eight percent of SMES interviewed employ between 1 and 10 workers with very few employing more than 50. They largely operate in the wholesale and retail trade sectors.

Most of the SMES covered are owned by men especially medium size enterprises. As for small enterprises, most often the shareholder is the owner, whereas the owner of a medium enterprise is not always the only shareholder of the company. The owners of medium enterprises are a little bit older than owners of small ones and this is also the case with the category of other companies. Similarly, the average age of enterprise is lowest among small firms.

Overall, more than 88% and 36% of the enterprises interviewed are registration and filing compliant for tax, though the proportion of business

TABLE 6 Descriptive Statistics of SMES Tax Compliance in Cameroon

Descriptive Statistics	Tax Registration Compliance	Tax Filing Compliance
Mean	0.881739	0.361739
Median	1.000000	0.000000
Maximum	1.000000	1.000000
Minimum	0.000000	0.000000
Std. Dev.	0.323198	0.480922
Skewness	-2.364319	0.575483
Kurtosis	6.590005	1.331181
Jarque-Bera	844.4870	98.4611
Probability	0.0000	0.0000
Sum	507.0000	208.0000
Sum Sq. Dev.	59.9583	132.7583
Total Number of Observations	575	575
Percent Overall Tax Compliant	88.2	36.2
Percent Tax Compliant in Littoral	340 /365 (93.2%)	143/365 (39.2%)
Percent Tax compliance in Central	167/210 (79.5%)	65/210(31%)

that are tax compliant are higher in Littoral than in the Central province. These are shown in table 6.

Results: Registration and Filing Compliance by SMES in Cameroon

Correlation analysis in logistic regression (e.g., logit model) is used to analyse data, since tax compliance is measured as a binary variable. In logit models, estimated coefficients can be interpreted either as logit or as odds value (Menard 2009). A logistic regression model identifies the effects of a number of independent variables on one or two dependent variables. It caters for non-continuous dependent variables, especially when it has only two outcomes, zero or one (Baddeley and Barrowclough 2009, 121). It aims to estimate the odds of an occurrence of an event and to predict the effects of the explanatory variables on these odds. The event of the odds denotes the probability that an event will be a success and the probability that an event will be a failure (O’Connell 2006, 11). The probability is represented as follows:

- 1, if *p* is success,
- 0, if *p* is failure.

Thus, we specify the relationship between tax compliance and firm related variables as follows:

$$TC_i = \alpha_i + \gamma_i age + \lambda_i F_i X_{g,i} \delta_i + \nu', \quad (1)$$

where TC_i is tax compliance of the i th firm (taking a value of 0 or 1), age denotes the age of firm, F_i are a set of firm specific variables (sector of operation, location, age of owner etc), X_i is a set of tax regulatory variables, and finally ν is the error term with the usual statistical properties. TC covers registration and filing compliance.

BUSINESS PROFILE, OWNER DEMOGRAPHICS AND TAX COMPLIANCE

Table 9 presents results of our logistic regression analysis. Business location in Littoral province is correlated with registration and filing compliance. This result is highly significant at the 1% level. However, operating in the manufacturing sector is negatively correlated with registration compliance even though it has no effect on filing compliance. Age and gender of business owner, awareness of their SME status have no impact on tax compliance. As the business owner becomes more educated, the probability of being tax registration compliant increases! Older businesses are less likely to be filing compliant.

TAX COMPLIANCE IN RELATION TO PERCEPTION OF CAMEROON'S TAX SYSTEM

The perception that the Cameroon tax system is quite complex, results in a negative probability that the taxpayer will be registration compliant! Similarly, perceiving that the taxpayer has to go through many departments in the process, reduces the probability of filing compliance by SME owners. However, those who perceive the system to be fair and static are likely to be filing and registration compliant respectively. Perceiving the tax system as consistent and achieving its objectives promotes filing compliance. When the registration process is considered inflexible and inconsistent, it is likely to result in registration non-compliance.

THE INFLUENCE OF COST ON TAX COMPLIANCE

High registration costs and time-consuming processes promote non-compliance by SME operators. High tax rates increase the tax burden and, hence, lower the disposable income of the taxpayer, discouraging

TABLE 7 The Impact of Taxes on SME’s Investment Decision

Item	(1)	(2)	(3)	(4)
Company Income Tax	21.7	11.7	23.0	39.1
Value Added Tax	26.8	11.7	18.9	35.8

NOTES Column headings are as follows: (1) no impact, (2) low impact, (3) moderate impact, (4) high impact.

TABLE 8 Opinion About Competitors’ Tax Burden Coping Strategy

Item	No of respondents	Percentage of total
Avoid paying VAT and other taxes	260	45.2
Avoid duties and levies	91	15.8
Avoid labour taxes	151	26.3
Total Number of noncompliant firms	502	87.3

filing compliance. This is consistent with the findings of Alligham and Sandmo (1972) and Chipeta (2002).

THE IMPACT OF TAXES ON SME’S INVESTMENT DECISION

About 62% of SMES interviewed are of the opinion that company income tax has between moderate to high impact on their investment decisions. About 56% of them feel that value added tax also exerts between moderate to high impact on their investment decisions. In these circumstances, SME owners scale back on investments. These are reported in table 7.

OPINION ABOUT COMPETITORS’ TAX BURDEN COPING STRATEGY

Most of the SMES opine that, under the circumstance, some of their competitors actually avoid paying taxes altogether with about 87% of them being tax non-compliant. About 45% of them skip paying VAT and other taxes. This is consistent with the findings of SBP (2005) for South Africa.

CUSTOMER SERVICE EXPERIENCE WITH THE CAMEROON INTERNAL REVENUE SERVICE

When tax authorities appear to understand their responsibilities, are willing to respond to enquiries during the registration process, and are non-bureaucratic, these customer service encounter experiences promote tax compliance. Non-responsive tax official put off willing taxpayers in Cameroon.

TABLE 9 Correlates of registration and filing compliance by SMEs in Cameroon

Variable	Registration Compliance	Filing Compliance
<i>Business Profile</i>		
Province where located (Littoral = 1, Central = 0)	0.22 (0.00)***	0.09 (0.04)**
Sector of operation (Manufacturing = 1, Wholesale = 0)	-0.09 (0.04)**	-0.01 (0.29)
Age of Owner	-0.01 (0.83)	0.01 (0.86)
Age of Business	0.03 (0.49)	0.04 (0.33)
Awareness of Status as SME	0.02 (0.59)	0.01 (0.73)
Education level of business owner	-0.10 (0.02)**	-0.01 (0.78)
Gender of business owner	-0.03 (0.52)	0.04 (0.29)
<i>Perception of the tax system in Cameroon</i>		
Corruption	-0.08 (0.07)*	-0.08 (0.06)*
Complexity of tax registration process	-0.06 (0.15)	0.05 (0.24)
Tax registration involves many departments	0.04 (0.35)	-0.10 (0.01)**
Tax Registration Process is fair	0.00 (0.92)	0.13 (0.00)***
Tax regulation process is consistent	0.18 (0.00)***	0.05 (0.28)
Tax regulation processes are clear	0.00 (0.96)	0.03 (0.52)
Taxation achieves its objectives	0.13 (0.00)***	-0.05 (0.22)
Tax Regulation is easy to understand	0.04 (0.36)	0.07 (0.08)*
Tax regulation is appropriately enforced	0.01 (0.70)	0.05 (0.21)
Tax regulation is inconsistent	-0.18 (0.00)***	0.20 (0.00)***
Tax Registration Process is Static	0.08 (0.07)*	-0.00 (0.96)
Registration Process is not flexible	-0.12 (0.00)***	0.03 (0.45)
Tax decisions are consistent	0.03 (0.49)	0.20 (0.00)***

Continued on the next page

ENFORCEMENT OF TAX COMPLIANCE

Enforcement of compliance as might be reflected in intrusive audits and frequent requirements for SME operators to provide details of their operations will likely discourage registration compliance though it will promote filing compliance.

Concluding Remarks

Taxation provides a predictable and stable flow of revenue to finance development objectives and is important in a country like Cameroon, which

TABLE 9 *Continued from the previous page*

Variable	Registration Compliance	Filing Compliance
<i>Cost of tax compliance</i>		
Tax Registration Process is time consuming (no. of days to register)	-0.12 (0.00)***	-0.06 (0.16)
Total cost of business registration	-0.00 (0.58)	0.10 (0.02)**
Cost of registering enterprise	-0.00 (0.95)	0.28 (0.00)***
Cost of registering for tax	-0.14 (0.00)***	0.12 (0.00)***
Overall high tax incidence in the country	-0.02 (0.63)	-0.06 (0.19)
Enforcement/Audit	-0.08 (0.06)*	0.13 (0.00)***
<i>SMES customer services of the Cameroon Internal Revenue Agency (DGI)</i>		
Taxation authorities understand their responsibilities	0.06 (0.60)*	0.07 (0.09)*
Receiving answers to queries during registration process	0.12 (0.00)***	-0.01 (0.79)
Tax Regulators lack of response to compliance queries	0.03 (0.46)	0.24 (0.00)***
Non-bureaucratic tax regulator	0.02 (0.58)	0.04 (0.32)

is experiencing serious challenges with meeting its development objectives. Due to the fact that SMES are the majority business taxpayers in most developing countries, their compliance levels directly impact on government tax revenue collections (Bodin 2008). Since, SMES have taxable incomes, and also collect employment and value added taxes on behalf of the government, their tax compliance levels affect the amount of tax revenue that government can collect in order to meet fiscal, economic and social objectives. However, the high burden of taxation makes it unpopular especially among small businesses, despite contributing as much as 22% of the gross domestic product. As such, the literature suggests that only a fraction of their taxable incomes is reported to tax authorities. Bahl and Wallace (2007) estimate that only about 17% of business income in Jamaica is properly reported to the taxing authorities. SMES are considered the ‘hard to tax group from the informal sector.’

Improving tax compliance of small and medium enterprises is important to the tax authorities as the country struggles to meet its millennium development goals. In this context, this study has sought to examine tax compliance among SME operators in Cameroon. A survey of 575 SME

owners has been conducted in the Littoral and Central provinces operating in the manufacturing and wholesale sectors.

High registration cost and time-consuming processes promote non-compliance of SME operators. The perception that the taxpayer has to go through many departments in the process reduces the probability of filing compliance. However, those who perceive the system to be fair and static are likely to be registration compliant. Perceiving the tax system as easy to understand and consistent promotes filing compliance.

When tax authorities appear to understand their responsibilities, are willing to respond to enquiries during the registration process, these customer service encounter experiences promote tax compliance.

The knowledge gained from this research could inform the efforts of Cameroon's *Direction General des Impôts* (DGI) to more effectively target their regulatory measures and assistance programs towards SMEs. Small and Medium size businesses need information and assistance on changes in tax laws. Tax forms and reporting requirements can be simplified and adjusted to the business reality of small enterprises. The Indonesian government has excluded small and medium enterprise (SMEs) with turnovers not exceeding IDR4.8b (US\$395 000) a year, from paying value added tax, in order to simplify tax filling for SMEs and improve their efficiency (Binarso 2014).

Special tax regimes for SMEs may be appropriate policy instruments for minimizing the cost of collection. The electronic filing of tax returns can speed up procedures and reduce compliance costs. It is encouraging that the Ministry of Small- and Medium-Sized Enterprises, Social Economy and Handicrafts announced a two-year tax exemption for start-up businesses in 2010. This resulted in the creation of 1,863 businesses in 2011, followed by 2,062 businesses in 2012 and 913 during the first half of 2013 (Fon 2013).

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Vključujoča družba kot nujni pogoj za na znanju temelječo konkurenčnost v Evropski uniji

Anita Pelle in Renáta Laczi

Najnovejša strategija gospodarske rasti Evropske unije, imenovana Evropa 2020, predstavlja nov pristop h gospodarski rasti. Z najinega vidika je najpomembnejša inovacija strategija, ki – seveda poleg pametne in trajnostne rasti, opredeljuje ustanovitev vključujočih družb za eno svojih prednostnih nalog. Verjameva, da je konkurenčnost držav članic ključni dejavnik njihove gospodarske rasti. Zato sva v najino analizo vključili indeks svetovnega gospodarskega foruma o globalni konkurenčnosti (World Economic Forum's Global Competitiveness Index), da bi našli povezavo med konkurenčnostjo in vključujočo družbo. Raziskovali sva uspešnost članic Evropske unije na nivoju skupin držav, potem pa opredelili vključujoči kazalnik, ki temelji na glavnih sestavnih delih vključujočega stebra Evropa 2020. Iz najinih ugotovitev je razvidno, da je vključujoča družba eden izmed nujno potrebnih pogojev za gospodarsko blaginjo.

Ključne besede: družba, izobraževanje, gospodarstvo, znanje

Klasifikacija JEL: I25, I32, J24

Managing Global Transitions 13 (4): 307–329

Prakse tehnoloških parkov pri podpiranju inovativnih dejavnosti: dokazi s Poljske

Anna Wójcik-Karpacz in Szymon Mazurkiewicz

Namen dela je predstaviti vlogo tehnoloških parkov (Technology Parks – TP) pri oblikovanju novih podjetij in širjenju že obstoječih. Ta izdaja je del študije, namenjene iskanju odgovora na vprašanje ali obstaja povezava med ustvarjanjem novih podjetij in razvojem že obstoječih ter regionalnimi okoljskimi dejavniki. Analiza je bila izvedena z opredelitvijo dejavnosti tehnoloških parkov (TPs), ki delujejo na Poljskem. Rezultati študije bi lahko bili tudi izhodiščna točka za diagnosticiranje vedenja tehnoloških parkov (TPs) kot okoljskih dejavnikov v določeni regiji in pokazatelj zaželenih smeri sprememb. Obdelana tematika opozarja na dejstvo, da upravljanje obstoječih sposobnosti in ustvarjanje novih lahko omogoči tehnološkemu parkom (TPs) da postanejo konkurenčni tudi izven svojih običajnih področij dejavnosti.

Ključne besede: tehnološki parki, podjetništvo, inovacije, inovativne dejavnosti

Klasifikacija JEL: L53, M13, O32

Managing Global Transitions 13 (4): 331–354

Ocena Neo-Keynesianske Phillipsove krivulje: primer Madžarske (1981–2006)

Aleksandar Vasilev

Ta članek raziskuje prisotnost Neo-Keynesianske Phillipsove krivulje (New Keynesian Phillips Curve – NKPC) na Madžarskem v obdobju 1981:3–2006:2. Empirični model, ki smo ga testirali, predstavlja v prihodnost usmerjena podjetja ki so vnaprej določila cene za daljše časovno obdobje z uporabo Calvo (1983) pravila za oblikovanje cen. Ocenili smo tudi hibridno verzijo NKPC, v kateri so nekatera podjetja oblikovala cene glede na preteklo obdobje, nekatera pa na podlagi predvidevanj za prihodnost. Realni mejni stroški v prihodnost usmerjenega vedenja so v NKPC statistično in količinsko pomembni. Je pa potrebno upoštevati tudi nekatera ekonometrična vprašanja, kot na primer šibko identifikacijo parametrov strukturne NKPC, kot tudi tista, povezana s hibridno NKPC.

Ključne besede: Neo-Keynesianska Phillipsova krivulja, Madžarska, ocena instrumentalnih nelinearnih GSM (gensko spremenjeni mikro-organizmi), šibka identifikacija

Klasifikacija JEL: C22, C2, E24

Managing Global Transitions 13 (4): 355–367

Učinkovita tržna hipoteza v južni Afriki: dokazi linearnih in nelinearnih enotnih korenskih testov

Andrew Phiri

Ta študija raziskuje šibko obliko učinkovite tržne domneve (Efficient Market Hypothesis – EMH) za pet splošnih borznih indeksov na Borzi v Johannesburgu (Johannesburg Stock Exchange – JSE) z uporabo tedenskih podatkov zbranih v obdobju od 31. januarja 2000 do 16. decembra 2014. Natančneje, testirali smo šibko obliko tržne učinkovitosti s pomočjo zbranih linearnih in nelinearnih enotnih korenskih testnih postopkov, med drugim s klasičnim razširjenim Dickey-Fullerjevim (Augmented Dickey-Fuller – ADF) testom, dvorežimskim mejnim avtoregresivnim (Two-Regime Threshold Autoregressive – TAR) enotnim korenskim testom, kot sta ga opisala Enders in Granger (1998) kot tudi

trirežimskim enotnim korenskim testom, o katerem so pisali Bec, Salem in Carrasco (2004). Na temelju naše empirične analize lahko prikazemo da linearni enotni korenski testi govorijo v prid enotnih korenov znotraj časovne serije, nelinearni enotni korenski testi pa kažejo, da je večina borznih indeksov mejnih stacionarnih procesov. Ti rezultati povezujejo dve nasprotujoči si skupini podatkov, pridobljenih v preteklih raziskavah z zaključkom, da pod linearnim okvirjem JSE borzni indeksi nudijo podporo šibki obliki tržne učinkovitosti, med tem ko v primerih, ko je nelinearnost obračunana, glavnina indeksov ni v skladu šibko obliko EMH.

Ključne besede: učinkovita tržna domneva (Efficient Market Hypothesis – EMH), Borza v Johannesburgu (Johannesburg Stock Exchange – JSE), Južna Afrika, mejni avtoregresivni (TAR) model, enotni koreni
Klasifikacija JEL: C22, C51, G14
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Korelati davčne usklajenosti malih in srednje velikih podjetij v Kamerunu

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Obdavčevanje zagotavlja predvidljiv in stabilen dotok prihodkov namenjenih financiranju razvojnih ciljev. To je za državo kot je Kamerun zelo pomembno, saj se na področju doseganja svojih razvojnih ciljev srečuje z mnogimi izzivi. Mala in srednje velika podjetja (Small and Medium Enterprises – SMEs) so pomembna za gospodarsko rast v državi, saj prispevajo približno 22 odstotkov bruto domačega proizvoda. SME ustvarjajo obdavčljive dohodke. Poleg tega tudi prispevajo k zaposlovanju in ustvarjajo davek na dodano vrednost v imenu vlade. Obdavčevanje seveda majhnim podjetjem nalaga visoke stroške. SME so v primerjavi z velikimi podjetji manj usklajena z davčno zakonodajo in mnogokrat obravnavana kot »težko obdavčljiva skupina iz neformalnega sektorja«. Pisni viri pravijo, da so davčni organi obveščeni le o majhnem odstotku njihovih obdavčljivih dohodkov. Glede na tovrstno ozadje so dejavniki, ki sovpadajo z izpolnjevanjem davčnih obveznosti 575 malih in srednjih podjetij v Kamerunu obravnavani v raziskavi sektorja proizvodnje in trgovine na debelo. Visoki stroški registracije in zamudni postopki vzpodbujajo davčno neusklajenost. Prepričanje, da je davčni sistem nepošten, odvrča od registracije in skladnosti vlaganja. Kadar obstaja preveč ovir, se zmanjša tudi možnost za skladno delovanje. Vendar pa pravičen in statičen sistem to vzpodbuja. Jasen in dosleden davčni sistem reklamira skladnost vlaganja. Oblasti, ki razumejo svoje odgovornosti in so se pripravljene odzvati na vprašanja med regi-

stracijskim procesom vzpodbujajo izpolnjevanje davčnih obveznosti na splošno.

Ključne besede: davčne obveznosti, mala in srednje velika podjetja, davčna administracija, Kamerun

Klasifikacija JEL: D73, H26, M48, H83

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