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Content

From the Editor

Dear readers and contributors,

We are pleased to inform you that second issue of Volume 6 has been just released.
This issue brings ten articles on a wide variety of areas wihin the scope of the SEE Journal of Economics and Business.

Wolz, Buchenrieder and Markus focused on the use and expansion of biomass production for bio-energy, particularly in its "modern" forms, i.e. wood pellets and briquettes, municipal solid waste, biogas and biofuels and their impact on agricultural and rural development in the region. The paper concentrates on two sub-regions, the new member states (NMS) of the EU and the Balkan states and Turkey. The paper is based on the 20 country reports that were prepared in 2009 within the "agripolicy project" with statistical data refered to 2007.

Brahmana and Asmar considered the intersection between market integration and so-called "Weekend Effect" by investigating the possibility of integration to occur on a certain day over the period of 1 January 1990 until 31 December 2010. The Weekend effect is captured by the intercept time varying rolling regression of French's (1980) "Monday Effect Model". The authors modified the French's Model to examine the seasonality inside market integration with Exchange Rate and Oil Prices as the control variable. Their research remarks the seasonality of Lithuanian stock market integration.

Vadnjal and Zupan explored the role of women as managers and/or key people in family businesses by analyzing the differences in the views of men and women on issues in managing a small family-run business. They analyzed their attitudes on the roles of women and general managerial and ownership issues. The findings supported the paradigm of a feminine style of management. They explored the question whether businesses would be managed very differently if they were run by women.

Hasanbegovic argues that for organizations with a branded identity structure investing in corporate reputation is a wise strategic investment that may earn significant present and future economic and non-economic returns for a company. Corporate reputation provides a number of intangible benefits: it permits stakeholders to asses a firm's ability to deliver valued products; it indicates past interactions with a firm's stakeholders; it improves a firm's ability to recruit and preserve its primary stakeholders; along with delivering tangible (financial) benefits by enhancing a firm's ability to do better than its competitors, thus expanding its profits and revenues. As shown in this paper, persistent investment in corporate reputation should be performed regardless of the company's brand architecture.

Ali Murat İLHAN, in his paper "The Humanitarian Relief Chain" discussed the humanitarian relief chain as an application of Supply Chain Management within the perspective of Disaster Management. He tried to identify the differences between humanitarian relief chain and commercial supply chain systems. The Humanitarian Relief Chain is identified as being of crucial importance for the effectiveness and efficiency of humanitarian operations. The concept brings an opportunity to increase its contribution to disaster relief, as well as to be recognized for this contribution by implementing initiatives in the areas of logistics, knowledge

management, performance measurements, community and positioning.

In their work entitled "Fiscal Policy Stance and Debt Sustainability in SEE countries: a comparative analysis", Kapopoulos and Lazaretou focused on the SEE countries' fiscal structure from a comparative perspective. The macroeconomic data series show that all countries in the sample have made efforts towards a successful fiscal consolidation over the last decade – largely supported by strong output growth and low real interest rates. However, the empirical evidence is suggestive of a weak link between public debt sustainability and the short-run conduct of fiscal policy. By examining the 'sovereign risk quality', the authors concluded that all SEE countries have recently made significant efforts towards successful fiscal consolidation that was largely supported by strong output growth and low real interest rates over the last few years.

Altintas, Cetin and Oz in their paper entitled "The Impact of Exchange Rate Volatility on Turkish Exports: 1993-2009" investigated the long-run and short-run relationships between Turkish exports, exchange rate volatility, foreign income, and relative prices by employing quarterly data for the period 1993Q3-2009Q4. Towards this purpose, multivariate cointegration and error correction model (ECM) techniques were used in this study. The long-run estimation results suggest that foreign income and real exchange rate volatility exert positive and statistically significant impacts on Turkish exports, while relative prices affect Turkish exports negatively and significantly. In addition, the results of the ECM model indicate that relative prices have a negative and significant effect, foreign income has an insignificant effect, and nominal exchange rate volatility has a positive and significant effect on Turkish exports.

In his work entitled "Insurance and management of political risk exposure in developed economies and Serbia" Ostojić analyzed the political risk management in Serbia and defined insurance management in relation to the practice of developed countries (USA, UK, France and Germany). The paper explores the risk associated with government actions, which reduce the value of the company, in other words, a political risk. The need for research lies in the effort to determine where the state of Serbia is and to define the institutional, theoretical and legislative framework and measures that are to be taken towards the development of case studies in the context of European integration. The paper concludes with an overview of political risk insurance and the amount of insurance in selected countries, and how political risk is underwritten and priced.

In the paper entitled "Primary Energy Consumption, CO2 Emissions and Economic Growth: Evidence from India", Tiwari examined static and dynamic causal relationships between primary energy consumption, gross domestic product, and CO2 emissions for India during the period 1970-2007. The causality was examined between test variables using Granger's approach (in VAR framework), and Dolado and Lütkepohl's approach. The author found evidence of no cointegration relationship among the test variables in the presence of structural breaks. Further, static analysis shows that primary energy consumption does not granger-cause GDP, whereas GDP granger-causes primary energy consumption. The dynamic

analysis shows conflicting results on the causal relationship between energy consumption and GDP. Since GDP explains 75.9% of the forecast error variance of primary energy consumption, whereas primary energy consumption explains only 0.96% of the forecast error variance of GDP, we can suggest that India should adopt policies that reduce energy consumption.

The paper by Kumar and Singh deals with the inter-temporal variations of technical efficiency in the small scale industrial sector of Punjab and Haryana and compares the performance of both states with the small scale industrial sector of India. Data spanning over the period 1972-73 to 2006-07 has been utilized to estimate technical efficiency with the help of data envelopment analysis (DEA) based upon efficiency scores. The empirical analysis confirmed that there exists 0.176 percent and 0.470 percent technical inefficiency in the small scale industrial sectors of Punjab and Haryana, respectively. However, at the aggregated All-India level, the technical inefficiency score is 0.449. Thus, the small scale industrial sector of Punjab is comparatively more efficient than that of Haryana and All-India.

We would like to thank to all authors for submitting their manuscripts. We thank the reviewers for their kind help in selecting and reviewing the papers for this issue.

We look forward to the continued submission of high-quality research manuscripts as well as the opinions of readers.

On behalf of the Editorial Board
Nijaz Bajgoric
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Bio-energy and Rural Development: Findings from a Comparative Study in Central, Eastern and Southern Europe

Axel Wolz, Gertrud Buchenrieder, Richard Márkus*

Abstract:

Rising energy prices for fossil fuels, the unreliable supply of energy imports during recent winters, and European Union (EU) policies have stimulated national awareness and political action on renewable bio-energy among all of the European countries. In discussions on agricultural policy, renewable energy has been advocated as a way to more rural prosperity. In this paper, we assess whether there is any impact on agricultural and rural employment and income as anticipated. Among the new member states (NMS) of the EU, the share of bio-energy is slowly increasing. Yet among the Balkan states and Turkey this process has just started. In both sub-regions an expansion of rape seed cultivation, and to a smaller extent of the production of wood pellets, could be observed. Similarly, the build-up of processing facilities is in its infancy. Up to now, however, its overall impact on agricultural and rural income and employment seems to have been marginal.

Keywords: bio-energy, agricultural development, rural development, Central, Eastern and Southern Europe

JEL: Q10, Q28, Q42, R11

DOI: 10.2478/v10033-011-0011-1

1. Introduction

Since the earliest history of mankind, people have relied on bio- and renewable energy to facilitate life. People made use of wood and, later on, of wind and water. However, in our times, the interest in renewable energy became more serious when the limits and environmental risks of fossil and nuclear energy became evident. Renewable energy was advertised not only as a way out of the limitations of fossil and nuclear energy, but also as a driver of rural prosperity, particularly for European farmers.

In our analysis we follow the definition of EUROSTAT, which defines renewable energy as the sum of specific forms of energies, i.e. hydropower, wind energy, solar energy, biomass and wastes and geothermal energy. Biomass and wastes cover organic, non-fossil material of biological origin that may be used for heat production, electricity generation and/or as a source of fuel. They comprise wood and wood waste, biogas, municipal solid waste and biofuels. Liquid biofuels mainly cover bioethanol (ethanol produced from biomass) and biodiesel (diesel produced from biomass or used fry oil) (Eurostat, 2009a).

We will focus on the use and expansion of biomass production for bio-energy, particularly in its "modern" forms, i.e. wood pellets and briquettes, municipal solid

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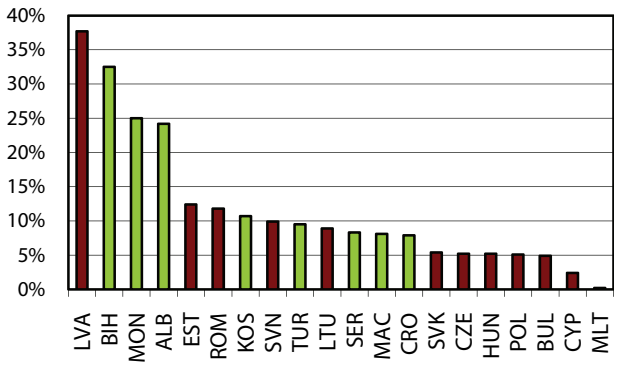
waste, biogas and biofuels and their impact on agricultural and rural development in the region. The more "traditional" forms of bio-energy, i.e. the use of firewood, although still of high importance, will be touched on only briefly in this analysis. Regionally, the paper concentrates on two sub-regions, i.e. the new member states (NMS)[1] of the EU and the Balkan states[2] and Turkey, which might join the EU over time. The paper is based on 20 country reports that were prepared in 2009 within the "agripolicy project". The comparative statistical data refer to 2007.

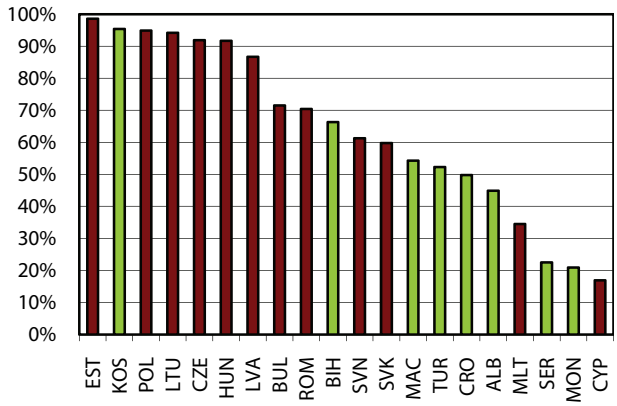
2. Role of Renewable Energy and Bio-energy in Total Energy Supply

The use of renewable energy with respect to total energy demand in 2007 varies notably in the study region (Figure 1). Among the NMS, Malta and Cyprus have a very small share while in Latvia renewable energy constitutes more than a third of its total energy demand. All the other countries rely on this form of energy to some extent; for instance, Bulgaria, with a share of 4.9 percent, and Estonia with 12.4 percent. Hence the reliance on fossil fuels and nuclear energy is quite high. With respect to the Balkan states and Turkey, the picture looks quite different. For three countries, namely Bosnia & Herzegovina, Montenegro and Albania, the share of renewable energy amounts to one fourth, or even one third of total energy demand. With respect to the other five countries the shares range from 8 to 11 percent. Subsequently, a first conclusion can be drawn: renewable energy has a certain share in the total energy demand, but in most countries of the study region it is not yet very important. In addition, renewable energy is a more important source of energy in the Balkan states and Turkey than in the NMS.



Source: EUROSTAT, 2009b and Country Reports, 2009
Figure 1: Share of renewable energy in total energy demand (%), 2007

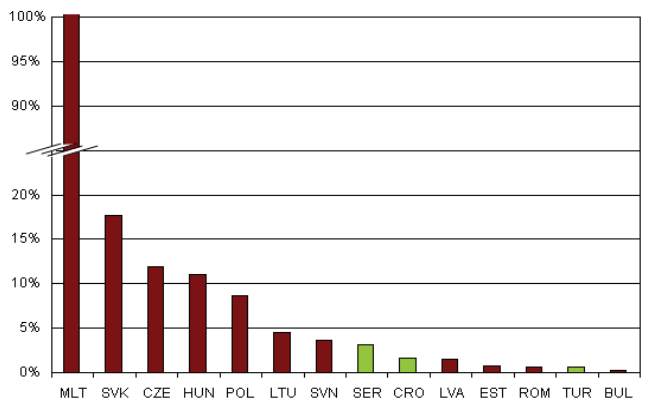
When looking at the share of bio-energy compared to total renewable energy, i.e. "traditional" (fire wood) plus "modern" forms (wood pellets and briquettes, biogas and biofuel), it becomes evident that in most countries of the region, "traditional" bio-energy is the most dominant source of renewable energy (Figure 2). In particular, among the NMS this source is very important. Only the small states of Malta and Cyprus cannot rely on bio-energy significantly for climatic reasons. In these two countries, solar power has become the major source of renewable energy. In the Balkan states and Turkey the use of bio-energy is important, but not as dominant as in the NMS. In most of the latter countries, (large-scale) hydropower dominates in the renewable energy sector.



Source: EUROSTAT, 2009b and Country Reports, 2009
Notes: Bio-energy comprises traditionally wood and the modern forms which comprise wood pellets and briquettes, municipal solid waste, biogas and biofuels.
Figure 2: Share of bio-energy of total supply of renewable energy (%), 2007

[1] The NMS comprise Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Malta, Cyprus, Bulgaria and Romania.
[2] The Balkan states comprise Croatia, Serbia, Macedonia, Bosnia & Herzegovina, Montenegro, Kosovo and Albania.

As discussed above, the "traditional" forms of biomass have been used as a source of bio-energy since the earliest history of mankind. At this stage, we seek to deduce the share of "modern" forms of bio-energy within the total supply of bio-energy, i.e. the share of biofuel, biogas and municipal solid waste. Here, a sharp differentiation between the countries of the region can be made (Figure 3). In some countries it takes up a relatively high share, while in others it thusfar plays no role at all. While Malta is a special case (here mostly used cooking oil is refined to biodiesel), some Central European states show shares amounting to 10% or more. However, these states focus on different sources. Slovakia focuses on biofuel, while the Czech Republic has diversified its sources relatively equally on biofuel, municipal solid wastes and biogas. Hungary predominantly makes use of municipal solid wastes and Poland has focused on biofuel and biogas, so far. Among the other NMS, only in Lithuania (biofuel) and Slovenia (biogas) do the modern forms of bio-energy have some marginal relevance. With respect to the Balkan states and Turkey the "modern" forms of bio-energy are of no or only very modest relevance thusfar. Only Serbia (biofuel), Croatia (biofuel and biogas) and, to a very small extent, Turkey (biogas) have started to produce these "modern" forms of bio-energy. All other states within this sub-group are still in the planning phase of taking up the production of "modern" forms of bio-energy.



Source: EUROSTAT (2009b) and Country Reports 2009
Notes: The "modern" forms of bio-energy comprise wood pellets and briquettes, municipal solid waste, biogas and biofuels.
Figure 3: Share of "modern" forms to total supply of bio-energy (%), 2007

In conclusion, it can be stated that, at this stage, the "modern" forms of bio-energy as portions of total national energy demand are still marginal. A few countries, i.e. Slovakia, the Czech Republic, Hungary and Latvia, meet about a half percent of total demand. In another group of countries the share of "modern" forms of bio-energy is between 0.2 and 0.4 percent, i.e. Lithuania, Poland, Slovenia and Malta. In the remaining countries which have taken up "modern" forms of bio-energy production, the share just reaches maximally 0.1 percent, i.e. Estonia, Romania, Bulgaria, Serbia, Croatia and Turkey. In comparison, within the EU-15 the share of bio-energy in total energy demand is higher, e.g. in Germany it stood at 5.4 percent in 2007, while the share of renewable energy in total amounted to a relatively modest 7.2 percent (Ostermeyer and Pirscher, 2010).

3. Impact of Bio-energy Production on Agricultural and Rural Development

The expansion of bio-energy production as an important form of renewable energy is now actively promoted by all of the governments in the region, with three major objectives being pursued. First, the governments aim to decrease dependency on imports of fossil fuels and gas. Second, proponents of bio-energy expansion stress the positive energy balance of bio-energy production and the potential for cutting greenhouse gas emissions, particularly by reducing the need for lignite and coal. Third, an expansion of bio-energy production is seen as a potential source of employment and income for the agricultural sector in specific and rural areas in general (Zeller and Grass, 2008). This is an important policy goal as, for instance, 53 percent of all employment is rural among the NMS. However, there are counter-arguments claiming that bio-energy production actually yields less energy than it consumes in production and leads to higher greenhouse gas emissions. Similarly, it is doubtful whether any employment and income effects, particularly for small-scale farmers, will materialise at all (White and Dasgupta, 2010).

While national statistics show that modern forms of bio-energy are in their infancy, this article analyses whether there is already an observable impact on agricultural and rural development. However, it is difficult to measure and quantify the impact of bio-energy production with one indicator. Therefore, we will look at three sources of evidence. First, we assess whether the rising demand for bio-energy has led to changing cropping patterns and modern forms of wood production. Second, we look at whether the number of bio-energy processing plants has increased during recent

years. Third, we will discuss experts' opinions about the possible impact of bio-energy production on agricultural and rural incomes and employment. While the first and second indicators rely on data for the period of 2000-2007 with a special emphasis on 2007, the third indicator is the outcome of expert interviews conducted during the spring of 2009 in the study region.

3.1 Statistical Evidence on Production

If the cropping patterns have changed towards so-called energy crops, this could be a first indication that bio-energy production is increasing. However, it is difficult to assess statistically the size of the area where energy crops are cultivated as, in general, they can mostly be used for human consumption and animal feed as well. Concerning the cropping patterns, not many changes could be observed up to now. Hence, we will rely on two proxy indicators. First, changes in agricultural production will be reported. Second, changes with respect to wood production are identified.

(1) In many countries, the area under rape seed cultivation has expanded rapidly during recent years (Table 1). While rape seed is also used in human consumption, we understand this rapid expansion also as an (indirect) indicator for the growing importance of bio-energy among farmers. Other crops are also used for bio-energy production, e.g. cereals including maize and sun flower, but the area under cultivation with respect to these crops did not change much during recent years. Hence, these crops did not seem to influence bio-energy production substantially up to now. The expansion in the cultivation of rape seed is seen by most farmers as a new source of income. Among the NMS, rape seed production also seems to have been encouraged by subsidies for energy crops by the EU. The increase of rape seed cultivation in the Balkan states and Turkey is not as impressive as in the NMS. However, rape seeds are not only processed at the national level, but, in case of limited national demand, exported to neighbouring countries, e.g. by Estonia. But the increase of the share of rape seeds in the crop rotation also brings a couple of repercussions to farmers, which have partly contradictory effects:

- improvement of crop rotation, leading to an increase of the yields of cereals (as reported from Latvia and Slovenia),
- reduction of fertilizer applications (Latvia) while others claim an increase in fertilizer and pesticide needs (Slovenia),
- drop in fixed machine costs due to better utilisation (Latvia). However, rape seed cultivation requires special technical know-how and special machines, hence specific additional investments, and
- reduction of soil erosion during winter seasons (Slovenia).

	2000	2007
New Member States		
Lithuania	0	124,800
Latvia	6,900	99,200
Estonia	28,800	73,600
Poland	437,000	797,000
Czech Republic	325,000	338,000
Slovakia	n.a.	153,831
Hungary	121,838	223,579
Slovenia	122	5,358
Bulgaria	9,500	54,000
Romania	68,000	87,700*
Balkan states and Turkey		
Croatia	10,000	13,000
Turkey	82	10,700
Serbia	6,300	12,900
Bosnia & Herzegovina	0	1,578

Source: Country Reports 2009
Note: n.a. = not available; * 2005; MLT, CYP, MAC, MON, KOS, ALB: no energy crops
Table 1: Change of rape seed area under cultivation, 2000 – 2007 (ha)

These are several figures about the share of area under energy crops in general. Four country reports provide national figures; i.e. in Lithuania, Latvia and the Czech Republic their share amounts to about 5 percent and in Slovakia to about 3.3 percent. Six countries of the study region do not yet grow energy crops: Malta, Cyprus, Macedonia, Montenegro, Kosovo and Albania.

(2) The rising demand on bio-energy has not only implications on agricultural production and cropping patterns, but also on the use of wood. However, when looking in more detail at modern forms of wood energy production and use, the information available is even less. Some information about the production of wood pellets and briquettes as modern forms of wood energy is available. This is summarised in Table 2. A few countries reported that there is no pellet or briquette production from wood and wood waste. The major reasons seem to be that either there are no forests to exploit (e.g. Malta), or no investments in this source of bio-energy had been made due to high initial costs (e.g. Bulgaria, Romania, Montenegro, Kosovo and Albania). In a number of country reports no information has been given, hence it is

not known whether there is any pellet/briquette production at all. Only Macedonia and Serbia report that pellet production has been taken up recently, but no figures have been given.

Only a few countries of the study region provided figures, but they show that pellet and briquette production are rapidly increasing. In particular, entrepreneurs in the Baltic states and some Central European countries are investing in this source of bio-energy. However, when producing wood pellets/briquettes, it does not necessarily mean than these "modern" forms of bio-energy are used in the respective countries. In particular, the Baltic states, as well as Croatia and Serbia, report that almost the whole of their production is exported. Bosnia & Herzegovina exports about one third of its national production. Consequently, it can be concluded that "modern" forms of wood energy start playing a more prominent role in the analysed countries, while this source of bio-energy is not predominantly used in domestic markets, but is seen as an attractive export product.

	2000	2007
New Member States		
Lithuania	270,000	547,000
Latvia	287,000*	461,000
Estonia		377,000**
Poland	20,000***	350,000
Czech Republic	20,900*	102,000
Slovakia		68,000
Balkan states and Turkey		
Croatia	≤2,000	41,000
Bosnia & Herzegovina	3,200*	22,000
Macedonia		just started
Serbia		just started

Source: Country Reports 2009
Note: * 2005, ** 2006, *** 2003; HUN, SVN, CYP, TUR: no information; MLT, BUL, ROM, MON, KOS, ALB: no production
Table 2: Change in the production of wood pellets/briquettes, 2000 – 2007 (tons)

Although biomass production for bio-energy is still in its infancy, all NMS, as well as increasingly the Balkan states and Turkey, are setting renewable energy targets which require higher production volumes of biogas and biofuel. However, to varying degrees all country reports emphasise a severe social repercussion: while in almost all countries of the region small scale farming predominates, rape seed production is, in general, taken up by larger farms (agricultural holdings) only. The reports on Bosnia & Herzegovina and Kosovo where no energy crops are grown for the time being stress the fact that energy crop production might be a potential source of income only for large-scale farmers. A certain minimum size for cultivating these crops (in terms of area and economic size) seems to be necessary. As, in general, small scale farmers in the study region are reluctant to collaborate in order to increase economies of scale and their bargaining power, they are also not acceptable as input providers by (potential) biogas and biofuel producers. The country reports just mention two cases that tried to overcome this disadvantage: (1) In Latvia one cooperative was established in 2000 promoting rape seed production. It also invested in a biodiesel production plant that became operational in 2009. (2) In Croatia, a rape seed producer association has been recently established. However, in both cases no additional information has been provided. Similarly, in many countries of the study region large shares of forestry land are owned by farmers and other private individuals. Their plots, in general, are quite small. Hence, it is doubtful that they can provide sufficient wood for pellet and briquette production in an economically viable manner.

At this stage, it can be concluded that, although the data available is quite limited, the expansion of bio-energy production has had a very modest impact on the agricultural and forestry sectors. The only measurable change is the expansion of the cultivated area of rape seed and the expansion of wood pellet and briquette production. The area under other (potential) energy crops did not change much during recent years. Similarly, in many countries the area under fast growing trees has been expanded, albeit from a very low level, and statistical data has not been available.

3.2. Expansion of Bio-energy Processing Facilities

The second step analyses whether the build-up of modern forms of bio-energy supply have already started. Specifically, the enlargement of biogas and biofuel (i.e. biodiesel and bio-ethanol) production will be examined. First, the development of biogas production will be assessed. In both groups of countries analysed, the set-up of biogas plants and the use of biogas energy is a very recent development. The exceptions are Poland, Slovenia and Romania among NMS, where biogas production started during the 1980s, although Romania's production completely collapsed during the 1990s. Among the Balkan states Croatia, Macedonia and Serbia had their first biogas plants running during the 1980s, but none of

these were operational anymore during the 1990s. Hence at the start of this millennium, just Poland, the Czech Republic and Slovenia among the NMS and Turkey among the second group had some biogas energy production. Most other countries started with this type of bio-energy during recent years. With the exception of Malta, Bulgaria and Romania all NMS have installed biogas plants by now. The reasons seem to be the limited supply of raw material for biogas (e.g. Malta) or limited financial resources available for investments (e.g. Bulgaria and Romania). The picture is quite different among the Balkan states and Turkey. Within that group just Croatia and Turkey have biogas plants running, while the other countries have yet to invest in this source of bio-energy. The scarce data about biogas plants are summarised in Table 3:

	Biogas plants, total	Biogas plants, managed by farmers
New Member States		
Lithuania	6	1
Latvia	3	0
Estonia	n.a.	0
Poland	n.a.	n.a.
Czech Republic	105	20
Slovakia	5	4
Hungary	40	5
Slovenia	9	9
Cyprus	1	1
Balkan states and Turkey		
Croatia	13	3
Turkey	n.a.	n.a.

Source: Country Reports 2009
Note: n.a. = not available; other countries: no biogas production
Table 3: Number of biogas plants, total and managed by farmers, 2007

With the exception of the Czech Republic and, to a smaller extent, Hungary, the number of operational biogas plants is quite small. Only in these two countries is biogas of some relevance as a source of energy. In all other countries of the region which have taken up biogas energy production, this source of energy is of marginal importance so far. However, particularly among those countries with sizable amounts of land and large agricultural areas, the potential seems to be very great. When looking at major sources of raw material for biogas energy, the agricultural sector at present only plays a supporting role. The major sources are:

- municipal waste water (Lithuania, Latvia, Poland, the Czech Republic)
- organic waste from the food industry (Lithuania, Slovakia, Cyprus, Turkey)
- household waste (Latvia, Poland).

Although on a very small scale, some farmers themselves have started investing in biogas production. These plants are predominantly fed with liquid manure and/or maize silage. However, almost all country reports stress the fact that the potential supply of manure and energy crops is much larger. In quite a number of countries there is idle land which could be used, e.g. for cultivating energy crops. The reasons for this rather low involvement of farmers seem to be:

- First, the financial aspect: Investment costs in biogas plants are rather high and the production of this form of energy is not competitive with respect to fossil sources of energy. Hence, investments are only made if there is financial support available. But most NMS have just started to provide such support within their national Rural Development Programmes, 2007-2013.
- The other factor seems to be a social one: Only large farms (agricultural enterprises) have enough raw materials at their disposal to run a biogas plant efficiently (i.e. only after having received financial support). However, in most countries of the region small-scale farming, or even subsistence farming, is predominant. Hence, most of the manure is needed as organic fertilizer, and even if available for biogas energy production, collecting the raw material from a large number of farms would be very costly.

In general, the energy produced by biogas plants is supplied as electricity. Just a small share of the produced energy is used for heating. As mentioned already, most countries have the potential to expand production of biogas. However, where biogas production is already ongoing, it is also emphasised that public resentment is growing due to bad smells and air pollution.

The other type of modern forms of bio-energy refers to biofuel, i.e. biodiesel and bioethanol. The production of biofuel is a very recent development in the study region. There had been some production in the Czech Republic during the 1990s that was later abandoned. In general, biofuel became an issue on the political agenda for NMS when joining the EU. With respect to the Balkan states and Turkey the option of biofuel became an issue with

	No. of companies	Production (t)	Share in diesel	Remarks
New Member States				
Lithuania	3	26,000	4.5	
Latvia	6	9,000	0.2	exports
Estonia	-	-	0.2	all imported
Poland	15	47,500	0.7	
Czech Rep.	17	61,000	2.4	
Slovakia	n.a.	46,000	0.1	mostly exports
Hungary	2	7,000	1.2	
Slovenia	3	11,000	1.2	50% exported
Malta	2	1,000	2.2	
Cyprus	1	1,000	3.7	imports
Bulgaria	20	9,000	0.1	
Romania	n.a.	36,000	-	
Balkan-States and Turkey				
Croatia	2	n.a.	0.2	imports
Turkey	-	-	0.5	imports
Serbia	1	25,000	1.7	
Bosnia&H	1	n.a.	0.0	

Source: Country Reports 2009; production figures for NMS: European Biodiesel Board (2009)
Note: n.a. = not available
Table 4: Production and share of biodiesel, 2007

the recent heavy price increases of fossil fuel and the discussion to reduce the production of greenhouse gases in line with the Kyoto Protocol.

With respect to biodiesel, most NMS have started biodiesel production between 2002 and 2004. Only Estonia has reported no production at all so far. However, it is importing some biodiesel. Among the second group of countries, Croatia started in 2006, while Macedonia, Serbia and Bosnia & Herzegovina have taken up production more recently. Turkey seems to import some biodiesel, while in Montenegro, Kosovo and Albania biodiesel does not yet play any role. The scarce information provided by the country reports is summarised in Table 4.

In general, biodiesel is blended in diesel. The share is still relatively small, but especially among NMS it is planned that it will increase over time due to mandatory blending requirements as agreed by the EU. Among the Balkan states and Turkey the share of biodiesel is even smaller. Mostly, farmers use biodiesel themselves. The major source of biodiesel production is rape seed. In addition, waste from cooking oil is used as raw material (e.g. Malta, the Czech Republic, Cyprus, Croatia, Bosnia & Herzegovina). In Macedonia since 2008, imported soybean oil is used for biodiesel production.

The production and use of bioethanol is still in its infancy among NMS. In Malta, Cyprus and Romania it is still of no relevance at all. Among the Balkan states and Turkey bioethanol is not an issue at all so far. It is assumed that bioethanol production will go up in the next years due to mandatory blending requirements. Particularly, the Czech Republic recorded a big increase in national production, going up from 300 t in 2007 to about 60,000 t in 2008. However, in all countries bioethanol demand (like the demand for biodiesel) depends on national blending requirements and tax incentives. Otherwise both types of biofuel are not competitive with fossil fuels.

3.3. Expert Assessments

The data analysed so far show that there seem to be changes in cropping patterns, an expansion of wood pellet production and a start in biogas and biofuel production. However, the data do not allow for causal conclusion on the positive impact of bio-energy production on agricultural and rural development as claimed by its supporters. In order to get an idea, we relied on expert assessments in the respective countries. In each country up to ten national experts on renewable energy were asked to assess the employment and income effects of bio-energy in their respective countries. These experts were randomly selected among scientists and administrators. However, while there had been a rough common outline of key questions, their statements summarised below just provide a glance and are not

		High (4-5)	Somewhat (2-3)	None (0-1)
Employment	NMS		EST (3), HUN (3), SVN (3), POL (2), CZE (2)	LVA (1), MLT (1), CYP (1), BUL (1), ROM (1)
	Balkan-st. + Turkey	TUR (4)	SER (3), BIH (3)	CRO (0), ALB (0)
Income	NMS	LVA (4)	EST (3), CZE (3), SVN (3), ROM (3), CYP (2)	POL (1), HUN (1), MLT (1), BUL (1)
	Balkan-st. + Turkey	BIH (5), TUR (4); SER (4)		ALB (1), CRO (0)

Source: Country Reports 2009
Note: LIT, SVK, MAC, MON, KOS: no data
Table 5: Assessment of the impact of bio-energy on employment and income in the agricultural and forestry sectors by national experts

		High (4-5)	Somewhat (2-3)	None (0-1)
Employment (non-farm)	NMS	EST (5)	LVA (3), CZE (3), HUN (3), POL (2), SVN (2), MLT (2), CYP (2), BUL (2), ROM (2)	
	Balkan-st. + Turkey	TUR (4), BIH (4)	ALB (3), SER (2)	CRO (0)
Income (non-farm)	NMS	EST (5), ROM (4)	LVA (3), CYP (3), CZE (2), HUN (2), SVN (2), MLT (2), BUL (2)	
	Balkan-st. + Turkey	BIH (5), TUR (4), SER (4)	ALB (2)	CRO (0)

Source: Country Reports 2009
Note: LIT, SVK, MAC, MON, KOS: no data
Table 6: Assessment of the impact of bio-energy on rural development by national experts

representative, statistically. In the following sections, we will focus on two major dimensions: first we look at the impact on the agricultural and forestry sectors in specific and, second, on rural development in general.

In the first round, the national experts were asked whether they would see any employment and income effects in agriculture and forestry with the expansion of biomass production for bio-energy. Their answers were summarised in the national reports on a Likert scale between 0 (not at all) up to 5 (very high). The national findings are summarised in Table 5. In general, the experts only anticipated a modest employment effect or no effect at all if bio-energy production is expanded in their respective countries. Concerning bio-energy as a potential source of income, the experts in general are a bit more optimistic, particularly in Latvia, Serbia, Bosnia & Herzegovina and Turkey, but these effects seem to be mostly concentrated on larger farms and forestry owners.

Besides an impact on the agricultural and forestry sectors in particular, the promotion and expansion of bio-energy production might also have an impact on the rural economy in general. Most of the newly established biomass processing plants are already or will be located in rural areas, with the exception of municipal solid waste plants which might have good prospects in mostly urban areas. There might be employment and income effects in building and servicing bio-energy processing plants in the rural areas.

According to expert opinion, bio-energy so far plays a limited role in rural development. Compared to their assessment with respect to the agricultural sector, they seem to be more optimistic about the impact on rural development in general (Table 6). Again, experts seem to see more potential in income than employment effects. While experts in Estonia, Turkey, Bosnia & Herzegovina and, to some extent in Serbia and Romania, are quite optimistic, Croatian experts are extremely pessimistic. However, national reports are short of providing any rationale for their opinions. If at all, they refer to national programmes, including Rural Development Programmes for 2007-2013 which foresee some financial support for the establishment of bio-energy plants. Therefore, it can be concluded that some modest impact with respect to employment and income will be expected due to an expansion of bio-energy production. Just in Slovakia and Bosnia & Herzegovina a first estimation with respect to employment effects has been conducted. The estimates for Slovakia are that about 5,000-6,000 additional jobs will be created, if the broader renewable energy targets are met by 2020. Bosnia & Herzegovina expects about 5,000 new jobs if the country can use just half of its natural potential. But, in total, it is doubtful whether bio-energy

production in specific or renewable energy production in general will stop the rural-urban migration pattern observed all over the region.

Finally, based on the modest statistical data and expert assessments, it can be concluded that the cultivation of energy crops in general and of rape seed in particular will, in general, create only marginal employment and income effects for most (small scale) farmers in the region. If there are any at all, they will be modest and will not reduce the outmigration rate of farmers. Income effects seem to be observed among larger-scale farmers. This is reflected by the observation that, if farmers do engage in biomass production they are typically larger ones.

4. Conclusions and Recommendations

Modern forms of bio-energy are just starting to become a source of energy supply among the countries in Central, Eastern and Southern Europe. In general, their share amount to less than 0.1 percent of total energy demand. In Central Europe alone it stands at about 0.5 percent. But the promotion of bio-energy as one form of renewable energy has become a top political priority all over Europe. All EU member states, including NMS, have adopted national targets aiming at expanding the shares of renewable energy. Some countries among the second group of the study region have started to do the same. These targets have to be met by 2010 and 2020, respectively. Since bio-energy and other forms of renewable energy at this stage of development are economically not competitive with fossil fuels, the EU and most national governments in the region are prepared to provide financial incentives for their promotion. Bio-energy makes up a significant share of total renewable energy and a further expansion is envisaged. The expansion of bio-energy seems to depend on three major factors:

- The political will to designate financial resources for the promotion of the production of bio-energy (i.e. for electricity, heat and/or fuel production) is almost a precondition since bio-energy production is not economically competitive yet. Without state subsidies, mandatory blending requirements and/or high politically-induced feed-in prices, the production would be in a pilot stage only and play no role at all in meeting total energy demand. Owing to co-financing, a large part of that burden is taken over by the EU with respect to the NMS, but nevertheless a certain share has to be financed by national budgets and/or consumers. So the expansion of bio-energy production is restricted by the available financial resources. Otherwise, interested entrepreneurs are frightened off by the high initial investment costs and the non-cost-covering market prices.
- The natural conditions of some countries seem to favour one source of bio-energy over another. Countries in Northern and Central Europe are more favoured in producing biomass than countries in Southern Europe due to more favourable precipitation patterns. Besides annual crops they can make use of wood and wood products on a larger scale than the drier and hotter regions in Southern Europe. As a result, we conclude that while a mix of various sources of bio-energy production might be desirable to diversify risks, regions will ultimately specialise in those sources that are best adjusted to the respective natural conditions.
- Finally, the social repercussions of bio-energy production become evident in most countries of the region. Most are dominated by small-scale farming and forestry. In order to produce the needed biomass for processing a certain minimum size seems to be a prerequisite. Hence, most farmers and forestry owners cannot participate in this new type of farm and forestry activity. A way out might be better organisation of interested small-scale producers in self-help groups or cooperatives, but most farmers of the study region are still reluctant to join these types of organisations.

By way of summary, it can be concluded that for the near future the overall employment and income effects of an expansion of bio-energy production among the agricultural and forestry sectors as well as in rural regions in general will be very modest. In this respect, we recommend that the EU and national governments not only place emphasis on high prices, tariffs and mandatory blending, but also ensure that (small-scale) farmers and forestry owners can benefit from this development. This requires not only more focused extension and better access to financial services, but particularly targeted support in organising (small-scale) farmers and forestry owners.

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Does Integration Occur on a Certain Day? The Case of the Lithuanian Stock Market

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Abstract:

This paper explores the intersection between market integration and Weekend Effect by investigating the possibility of integration to occur in a certain day over the period of 1 January 1990 until 31 December 2010. The integration was retrieved from the intercept time varying rolling regression of Stehle's (1977) ICAPM Model. Meanwhile, the Weekend effect is captured by the intercept time varying rolling regression of French's (1980) Monday Effect Model. For robustness, we modified the French's Model to examine the seasonality inside market integration with Exchange Rate and Oil Prices as the control variable. This research remarks the seasonality of Lithuanian stock market integration.

Key words: Market Integration, Weekend Anomaly, Portfolio Benefit, Lithuanian Stock Market

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1. Introduction

Stock market integration research has been extensively conducted and evolving over the past several years. However, exploration in this area has continued because of its contribution to the body of knowledge and industrial practices. One of the important issues of market integration is how it can appear in most stock markets in the world.

Interestingly, just like market integration, most stock markets also experience the weekend effect, a calendar anomaly associated with the distribution of daily common stock returns. The weekend effect refers to the repeated returns cycle on a certain day (usually Monday). Those particular returns have had a negatively high dispersal compared to other days. Such a phenomenon has been verified mainly in the developed market over the past two decades.

Related back to market integration, this event indicates ignorance of the equity risk premium and diminishing potential cross-border diversification. To a finance manager on the corporate level, stock market integration indicates that there are fewer opportunities to acquire capital at lower cost across borders, awarding the discouragement of foreign listing activities. The other contributions from stock market integration cater to the potential for welfare gains (see Cole and Obstfeld, 1992; Van Wincoop, 1994; Lewis, 1996) and beneficial consequences on long-term economic growth (see Obstfeld, 1994; Devereux and Smith, 1994; Levine and Zervos, 1996, 1998; Bekaert et al., 2001, 2005).

However, the recent catastrophic economic events such as the Asian Monetary Crisis 1997 and the Global Crisis of 2008 have countered those early findings, showing the high correlation of dossiers among stock

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		Lithuania Stock Return				
		Monday	Tuesday	Wednesday	Thursday	Friday
World Stock Return	Monday	0.5289				
	Tuesday		0.3374			
	Wednesday			0.3379		
	Thursday				0.3419	
	Friday					0.3403

Table 1: The Occurrence of Lithuanian Returns Correlation on a Certain Day

markets in the world. These global economic disasters have affected the allure of the transmission of stock market falls. In short, they suggest the increasing value of stock market integration.

It is noteworthy that several researchers have also found a high correlation among stock markets on a certain day, a phenomenon known as seasonality. For example a study by Tang and Kwok (1994) reported that correlation among stocks was highest during Monday. Tang and Kwok (1997) also found a strong seasonality component on the day of the week effect in correlations of Australia, Germany, Hong Kong, Japan, the UK, and the US.

The first paper that linked market integration and seasonality was by Jaffe and Westerfield (1985). They examined seasonality in terms of correlation between many stock markets and the US stock market. More recently, Chandra (2006) constructed the day of the week effect in the returns and conditional correlation for various Asia Pacific equity markets. The paper found the day of the week effect in the returns and correlations for some of these markets.

To prove this anomalous condition, we successfully demonstrate it in Table 1. By following the preliminary result of Jaffe and Westerfield (1985), Table 1 suggests that there is a strong weekend effect pattern on market correlation. As we have known, market integration starts from the correlation among national stock returns. The seasonality correlation depicted in Table 1 implies that there might be a high correlation between these two markets on Monday. In short, there is a possibility that market integration occurs on Monday.

Table 1 vividly shows the symptoms of market integration seasonality. Intuitively, if the market integration and weekend effect together occur in the market, it elicits speculation on whether it might be an intersection between the weekend effect and market integration. In other words, if the stock market around the world experiences the weekend effect, it might be a possibility that the integration across the country occurs on a certain day. This is what we call the seasonality of the weekend effect. Unfortunately, studies that explores the seasonality of market integration are rare - a gap that this study intends to fill.

This research study aims to investigate if stock market integration also follows the anomaly of the weekend effect. Connecting these two phenomena, we hypothesize that there is a possibility of seasonality in market integration. In light of such possible interactions between the weekend effect and market integration, it is surprising that there is relatively little literature on these associations, except the discussion of seasonality in stock market correlation (See Jaffe and Westerfield, 1985). This is an interesting peculiarity, considering its possible contributions, such as: (1) global fund managers will have comprehensive knowledge about seasonality in market integration that will allow them to construct a new investment strategy; (2) portfolios will significantly diminish on certain days; and (3) signals of a financial contagion can spread out faster on a certain day.

The remainder of this paper is structured as follows. The next section will address the literature review. After that we outline an empirical approach in section 3 by showing the measurement development of the weekend effect and market integration while addressing the equation model. The model in this paper is estimated by using a cointegration test, Granger Causality, and Regression. The results of these tests will be addressed in section 4. The last section will discuss and conclude the paper.

2. Literature

The generally accepted definition of market integration is an event where prices among the different locations have co-movement over a long period,

indicating the significant correlation between two or more stock markets. Co-movement implies diminishing portfolio benefits. Hence, market integration is an event where portfolio benefits are lessened.

This market integration has been extensively documented in many ways. For instance, Arshanapalli & Doukas (1993), Meric & Meric (1997), and Hardouvellis, Malliaropulos, & Priestly (2006) investigated the market integration of developed markets. Daly (2003) examined the integration of emerging markets into the world market. Further, several research studies investigated market integration in terms of its trading block (Fredericsson and Mani, 2004) or regionalism (Bussiere, Fidrmuc, and Schnatz, 2005).

In terms of Lithuanian stock market integration, it is actually hard to find empirical research, as the Lithuanian Stock market is a relatively new stock market. So far, we only found Guiso, Jappelli, Padula and Pagano (2004) who attempted to estimate the integration of European Countries, including Lithuania, by gauging financial market development and growth. In their research, the Lithuanian stock market was found to show integration with other European Stock markets on the industry level and firm level. Another recent research study was conducted by Welfens and Islami (2010), which examined the financial market integration of the Eastern European stock market, including the Lithuanian stock market.

On the other hand, we also found that the weekend effect occurs in most stock markets in the world. The presence of the weekend effect would mean that equity returns are not independent of the day of the week. We compiled weekend effect studies around the world. The early studies of this anomaly are Cross (1973) and French (1980) who introduced the first definitions of the weekend effect and the Monday effect.

Further, French and Roll (1986) and Damodaran (1989) examined the information flow over the weekend and found that Monday's variance is more than three times that of other days of the week. Tong (2000) demonstrated that trade-orders on Monday are conditional on the previous week or Friday's return by using a t-test. This weekend effect is also found in both developed stock markets and developing stock markets.

There is also not much research investigating the weekend effect in Lithuanian stock markets. Ajayi, Mehdian, and Perry (2004) found significant negative Monday returns in the Lithuanian stock market. Sakalauskas & Krikščiūnienė (2007) found that the daily trading volume of the Vilnius Stock differs according to the weekend effect. Thus, there is no research investigating the association between the Lithuanian stock market integration and its weekend effect.

The association between market integration and weekend effect is very rare. So far, we have only found empirical results discussing correlations between seasonality and the stock market (see Jaffe and Westerfield, 1985). They investigated seasonality and stock market correlation for the US stock market on other markets. By using descriptive analysis, they found seasonality to be within correlations among stock markets. Moreover, there is a possibility that the correlation between two markets becomes stronger on a certain day. The relatively infrequent discussion of Lithuanian stock market integration, the Lithuanian weekend effect, and the seasonality of Lithuanian market integration lends importance to this paper, especially considering the implications of stock market integration both for practitioners and academics.

3. Methodology and Data

3.1. Market Integration Measurements

This paper follows Bekaert & Harvey (1995), Dumas & Solnik (1995), Ferson & Harvey (1991), and Hardouvelis et al. (2001) in developing a measurement of market integration, which was developed from the International CAPM of Steehle (1977). The model is as follows.

$$E_{t-1}(r_{i,t}) = \lambda_w \beta_{i,w} + \lambda_d \beta_{i,d} \quad (1)$$

Where r_{it} is the excess return on the domestic portfolio *i*, λ is the market risk premium, β_{iw} is the risk of portfolio i relative to world portfolio, w is defined as $\beta_{iw} = COV_{t-1}[r_{i,t}, r_{w,t}]/VAR_{t-1}[r_{i,t}]$ and $\beta_{id}$is the domestic market portfolio *d*. The null hypothesis of the integration is λ_d equal to zero.

We developed an integration index by using time varying of rolling regression to retrieve the market integration data series. Following Bekaert and Harvey (1995) and Korajzyk (1996), we estimated the integration by using the following formula:

$$R_{w,t} - R_{FW,t} = \alpha_i + \beta_i (R_{m,t} - R_{FM,t}) + \varepsilon_{i,t} \quad (2)$$

Where $R_{w,t}$ is the returns of the world portfolio in time t. $R_{FW,t}$ is the returns of the international risk free rate. $R_{m,t}$ is the returns of the market. $R_{FM,t}$ is the risk free rate of the domestic market. This equation implies the domestic market integrates into the world. The α shows the level of integration. According to Bekaert and Harvey (1995), the

closer the intercept is to zero, the more it indicates integration. Perfect integration will be indicated by a zero index.

The intercept was obtained by employing a 60-day window size rolling regression of equation (2). After running the one day looping of this rolling regression, we adjusted the market integration index by trailing the Leving and Zervos (1998) method, as follows.

$$MI_{i,t} = -\left|\hat{\alpha}_{i,t}\right| \quad (3)$$

3.2. Weekend Effect Measurements

This paper adapts French's Model (1980) to retrieve the weekend effect where the formula is:

$$R_{i,t} = \alpha_t + \beta_1 D_{Tues} + \beta_2 D_{Wed} + \beta_3 D_{Thur} + \beta_4 D_{Fri} + \varepsilon_t \quad (4)$$

Where $R_{i,t}$ is the stock returns of market/firm *i* in period t. D_{Tues}, D_{Wed}, D_{Thur}, and D_{Fri} are the Tuesday Dummy, Wednesday Dummy, Thursday Dummy, and Friday Dummy, respectively. According to Gujarati and Porter (2009), if there are more than 3 or 4 dummies, the equation will be charged on a dummy trap. With regard to avoiding the dummy trap, one dummy has to be eliminated and its proxy replaced by an intercept without reducing the main point of the equation.

In French's Model (1980), there is no Monday Dummy, and the weekend effect is represented by the significant result in the intercept. This is in line with the Gujarati and Porter (2009) dummy trap elimination. This is also the reason why we chose French's Model (1980) as the weekend effect model.

Hence, we employed again the rolling regression of a 60-day window size to collect the measurements. The intercept of equation (4) indicates the weekend anomaly. We pulled out if there is not a significant result at the intercept.

3.3. The Research Empirical Model

The empirical model for this research study is a straightforward model:

$$MI_t = \alpha + \beta_{1,t} DOWA_t + \varepsilon_t \quad (5)$$

This model examines the dynamic relationship between market integration and the day-of-the week anomaly (DOWA). As a robustness check, we tested again the occurrence of integration on a certain day by regressing the modification of French's Model (1980).

It is noteworthy that running the modified French's (1980) model needs several procedures. First, we employed the returns difference between the world stock market and the Lithuanian stock market. This "abnormal returns" or returns difference is our dependent variable. It is a robust proxy because it not only mimics the probability to gain abnormal returns by "picking" Lithuania, but also shows the dispersion of the Lithuania returns from World returns. The more it is dispersed from world returns distribution, the less it is integrated. The independent variables are the French's Model (1980) dummy variable where the intercept representing the Monday Effect. The formula is:

$$R_{diff(W,D)} = \beta_1 D_{Mon} + \beta_2 D_{Tues} + \beta_3 D_{Wed} + \\ + \beta_4 D_{Thur} + \beta_5 D_{Fri} + \beta_6 ER_t + \beta_7 OIL_t + \varepsilon_t \quad (6)$$

Where $R_{diff(W,D)}$ is the return difference between the World Market and the Lithuanian Market. D_{Tues}, D_{Wed}, D_{Thur}, and D_{Fri} are the Tuesday Dummy, Wednesday Dummy, Thursday Dummy, and Friday Dummy, respectively.

In French's (1980) model, the intercept represents the Monday Effect with regard to avoiding the "Dummy Trap". If we did the same procedure, there will be a biased conclusion. Therefore, following Gujarati and Porter's (2009) suggestion, we modified French's (1980) model by eliminating the intercept while adding the Monday slope in the equation with regard to eliminating the dummy trap. To eliminate the variance errors, we introduce Exchange Rate and Oil Price as the control variables. These two variables are the determinant of market integration and are commonly used as control variables in market integration studies (see Ferson and Harvey, 1994; Ng, 2004).

3.4. Data

We retrieved the Lithuanian stock market index and MSCI All-Country World Index on a daily basis over the sample period of 2000-2010 from the Thomson Data Stream. We used the US 3-Month Treasury bill as a global risk free rate. The return is calculated by using the standard normal logarithm formula.

For the dynamic linkages equation, we use the measurement of market integration and the weekend effect as stated in equation [1] and equation [4],

respectively. Meanwhile, for the robustness test in the regression model, we straightforwardly use the log returns by modifying French's (1980) model.

4. Results

4.1. Unit Root Test Results

Finance research usually uses time series data, which are assumed to be stationary. Using non-stationary data in regression analysis leads to spurious regression results. To check the stationary, we conducted the Augmented Dickey Fuller (ADF) of the unit root test.

This test allows this research to gauge the robustness of the integration properties of market integration and the weekend effect. The null hypothesis is that Y_t has a unit root (non-stationary), that is H_0: α_2=0, versus the alternative hypothesis that Y_t is stationary or H_1: α_2<0.

Table 2 shows the results of the unit root test. Comparing the calculated ADF statistic to the MacKinnon (1991) critical value, we conclude that market integration measurement and weekend effect measurement is stationary at level and first difference. It indicates that all variables are integrated and have long run co-movement indication. Therefore, we continued the procedure for the co-integration test.

	Level		First Difference	
	Coefficient	Probability	Coefficient	Probability
DOWA	-0.012749	0.0001	1.000004	0.0000
MI	-0.020861	0.0000	1.023394	0.0000

Table 2: Unit Root Test Results

4.2. Cointegration Test Results

The unit root test results show that there is a stationary level and first difference. Therefore, we continue on to cointegration in regard to investigating the dynamic linkages between market integration and the weekend effect. To test for this cointegration or long run relationship, we employed the maximum likelihood approach of Johansen (1988) based on a vector autoregressive model:

$$X_t = \mu + \prod_1 X_{t-1} + \ldots + \prod_k X_{t-k} + e_t$$

Where X_t is the vector variables integrated on the same order; μ is the intercept terms for the vector, $\prod$ is the coefficient matrix, and e_t is the error terms which are assumed to be white noise. This equation equivalently states in the following cointegration regressions:

$$Y_t = \beta_0 + \beta_1 X_t + u_t \quad (6)$$

Where the null hypothesis is that Y_t and X_t are not co-integrated.

The results of the cointegration test are documented in table 3. It clearly indicates the cointegration of market integration and the weekend effect for all sample periods. This means the movement of market integration is followed by the weekend effect in the long run relationship. This finding seems to be consistent with the view that the stronger the market integration between the Lithuanian stock market and world, the higher the degree of co-movement. There were similar results with Jaffe and Westerfield (1985) where the higher the correlation between the US market and other markets, the higher the co-movement in seasonality.

If we turn back to the hypothesis that there is an association between the two variables, this linkage result indicates the seasonality in market integration. In other words, the migration of portfolio benefit in market integration could occur on a certain day. Thus, cointegration has a limitation in answering this question robustly. We did three verifications: the Vector Autoregression Model for the long run relationship, a Granger Causality for the correlation causality in the short term, and regression, all to tackle this issue.

	Trace Test		Max Eigen Value	
Ho	Trace Statistic	Critical Value	Trace Statistic	Critical Value
r=0	43.16071*	15.49471	24.77891*	14.2646
r≤1	18.3818	3.841466	18.3818	3.841466

* significant in 1%

Table 3: Cointegration Test Results

Now we look at the result of the long run relationship of VECM. Based on equation [6] of VECM, it can be inferred that there is a long run relationship between the weekend effect and market integration. The result of the equation states that the weekend effect is heavily influenced by market integration. This can be seen from the slope coefficient of market integration, which is higher than 50%. The intercept of the equation also shows a 4.9% trend value. This means that in the long run the weekend effect can be associated with 58% of market

integration movement. To check the correlation causality, we further investigated with a Granger Causality.

$$DOWA = 0.04940 + 0.580369MI + \varepsilon_t \quad [6]$$

4.3 Granger Causality Test Results

We proceed with the Granger Causality test in order to investigate the short run dynamic co-movement between market integration and the weekend effect. In general, the Granger Causality test is one that can determine whether one variable is useful in forecasting another variable by revealing its causality. Table 4 shows the unidirectional Granger Causality results from market integration and the weekend effect. It indicates that there is a strong and significant correlation between the current market integration and the lag one of weekend effects.

The result of our Granger Causality test corroborates the long run relationship under the vector error correction model. It suggests significant interaction between market integration and the weekend effect. In other words, it indicates the seasonality in stock market integration, or that the integration of the Lithuanian stock market is stronger and higher on Monday.

The results suggest that a global fund manager should avoid Monday because of diminishing portfolio returns. Moreover, it also reveals that the global financial contagion can spread in Lithuania faster on a Monday. To determine on which day integration occurs more often we utilized equation 6.

These results are interesting for at least two reasons. First, the results show the co-movement among variables in the long run. It confirms our earlier results, where there is a strong association between market integration and the weekend effect. It designates strong and significant causalities from market integration to the weekend effect. Second, it indicates the existence of seasonality in market integration by signifying that the occurrences of market integration on Monday, where the Lithuanian stock market might have strong integration during that particular day. This finding implies the diminishing of the portfolio of the Lithuanian stock market might occur according to seasonality.

Granger Causalities Hypotheses	Chi-Square	Probability
The Market integration Does Not Granger Cause DOWA	4.463216	0.8865
The DOWA Does Not Granger Cause Market integration	17.78752	0.0032

Table 4: Granger Causality Test Result

4.4 Robustness Check

We performed a robustness check by running equation [6] because the Granger causality test implies strong association between market integration and the weekend effect. Following the theoretical model of the weekend effect (see French, 1980; Gibbons & Hess, 1981; Rogalski, 1984; Jaffe & Westerfield, 1985; Lakonishok & Smidt, 1988; Connolly, 1989; Berument and Kiymaz, 2001; Chandra, 2006; Rahman, 2009), we adopted and modified the model by eliminating the intercept and introducing two commonly used control variables for market integration.

Table 5 addresses whether there is a weekend effect on Lithuanian stock market integration. If we look at the results, the entirety of weekday trading is not significant even at the 10% level except for the Monday Dummy (significant at the 1% level). Moreover, the coefficient shows negative relationships except for the intercepts. Interestingly, the coefficient value of the entire day is close to zero. This means the power of changes during those days is very small. The return's difference shows the ability to gain abnormal returns. This is a concept similar to market integration. The result indicates that investors hardly gain abnormal returns during Mondays.

In terms of the control variables, both show significant results. The exchange rate and the oil price have effects on market integration. This is in line with previous literature, where market integration is determined by exchange rate (Ferson and Harvey, 1998) and Oil Price (Ng, 2002). This significance also reveals our model is robust enough to explain the relationship between the Monday dummy and market integration, and it confirms our Granger Causality result.

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Variable	Coefficient	Prob.
DMON	-0.0086	0.0000
DTUE	0.0047	0.3139
DWED	0.0022	0.1697
DTHU	0.0017	0.3201
DFRI	0.0031	0.4512
ER	0.0047	0.0000
OIL	0.0019	0.0003
Rsquared	0.114221	

Table 5: The Modified French's (1980) Model Result

DMON is the Weekend Effect sign, DTUE is the Tuesday Dummy; DWED is the Wednesday Dummy; DTHU is the Thursday Dummy; and DFRI is the Friday Dummy. ER stands for Exchange Rate; and OIL is the oil price.

Another robustness check, which was a t-test, was conducted to confirm the conclusion. Preceding the t-test, we prepared the data set first. Our research deducted the Lithuania returns by World return on the basis of day. We then classified the result of Monday as one class and the rest of the day as another class. In the end, we ran a t-test between the Monday result and the results of other days and found a significant difference. This implies that seasonality does occur and causes different abnormal returns between Lithuania and the World. Therefore, the research concludes that there is seasonality in market integration. Furthermore, it is indeed apparent that an investor cannot gain more returns on Monday because of market integration.

	Mean		T value	Mean Difference
Variable	Monday	Other Day		
Returns Difference	0.0795	0.049301149	-3.064**	-0.00062

** significant at 5%
Table 6: T-Test Result

5. Conclusion

The importance of market integration has become a catalyst for the study of financial markets. Market integration contributes to the explanation of diminishing global portfolio benefits, which is imperative for both the body of knowledge on this area and industry practice. This study investigates market integration in-depth by intersecting it with the weekend effect. Moreover, this study sheds light on the understanding of market integration's weekend anomaly. Note that the occurrences of different levels of market integration on Monday might lead to the idea of avoiding trading on Monday because it can diminish portfolio benefits and easily become a financial contagion.

Our study undertook many investigative steps to ensure that a weekend effect occurs in market integration. We employed a Unit Root Test, Cointegration Test, VECM, Granger Causality, Modified French's Model (1980) regression, and T-Difference test to confirm and relate one finding to another. In short, we did vigorous work to authenticate the seasonality in Lithuanian stock market integration.

Our statistical results show five important findings. First, there is cointegration between market integration and the weekend effect. This means there is co-movement between the changes in market integration and the changes in the weekend effect. This co-movement signals a long run relationship.

This result is followed by a second finding, wherein we found a significant long run relationship between the weekend effect and market integration. Based on the VECM result, the long run relationship of the changes between these two variables is very strong. Equation [6] shows more than 50% of market integration contributes to the changes of the weekend effect.

To verify this strong relationship, we examined the causality relationship by conducting a Granger Causality test. The Granger Causality results show a unidirectional relationship between market integration and the weekend effect. The unidirectional relationship indicates that market integration does granger cause the weekend effect.

We then proceeded to test the existence of seasonality in market integration. By modifying French's (1980) model, our research found that there is a relationship between the abnormal returns of the world portfolio (Lithuania minus World) and day-of-the week anomaly. Hence, we surmise that the abnormal returns occur on a certain day, which in this case is Monday. We examined it further by employing a t-test and found a significant difference between Monday's returns and other weekday returns. This indeed confirms our hypothesis.

In conclusion, we can remark that seasonality occurs in market integration. Our explanation concerns market development and liquidity. Indeed, it is related to the market microstructure and market participant behavior.

This is based on the similarity of the explanation of the weekend effect and market integration. The literature suggests that the explanations of the weekend effect are: market development (see Porter, 1992; Aggrawal and Tandon, 1993; Kamara, 1997; Kok and Wong, 2004; Rezvanian et al., 2008), and liquidity (Lakonishok and Maberley, 1990; Abraham and Ikenberry, 1994; Yahyazadehfar et al, 2006).

Market integration also has a similar explanation, such as market development (Carrieri et al., 2007), and liquidity (Gerard et al., 2003). Consequently, it suggests that these two occasions are caused by the same triggers, which are financial development and liquidity. The Lithuanian stock market is a relatively new market. Financial development is still on its way, and its liquidity is not as stable as other MSCI emerging markets. These two drivers could lead to dynamic co-movement between the market integration of the Lithuanian stock market and its weekend effect. In short, this study suggests that a global fund manager and finance manager at the firm level should consider market integration based on seasonality, as we found a significant relationship between Monday returns correlated with the Lithuanian and World stock markets, Monday is not a good day for portfolio benefits. Moreover, market participants have to be aware of the transmission of a financial contagion.

A few caveats remain in this study. First, we limited our sample to the Lithuanian stock market. This market is a relatively new market compared to others. It was established only in 2001. The lack of a market macrostructure and microstructure might contribute to this seasonality.

Second, the construction of the variable measurement is based on the assumption that the ICAPM and French's Model are the correct underlying models in retrieving the measurement. Although the ICAPM and French's Model still remain the most popular models for market integration and the weekend effect, this is based on several strong assumptions. Hence other alternative measures for market integration and the weekend effect could be considered. For example, in terms of market integration, future research can use the world beta of Akdogan (1996) by taking world systematic risk as the integration index. In terms of the weekend effect, coming research can follow Connoly (1989) or Berument and Kiymaz (2001). Moreover, measurements are retrieved based on time varying rolling regression, where the determining of window size is debatable. Finally, this research study investigates dynamic co-movements, wherein the model will be more robust with one dependent and one independent variable.

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Family Business as a Career Opportunity for Women

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Abstract:

Women as managers and/or key people in family businesses are explored in this paper. Although recognized as generally very important players, the role of women is often defined as invisible in making important business decisions, supportive in traditionally men's business domains and is rarely adequately recognized and rewarded. Regardless, women find working for family businesses attractive and rewarding. We explore the differences in the views of men and women on issues in managing a small family-run business. Their attitudes on the roles of women, and general managerial and ownership issues, are surveyed. The findings support the paradigm of a feminine style of management and we pose the question whether businesses would be managed very differently if they were run by women.

Keywords: family business, women, gender roles, discrimination, managerial styles

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1. Introduction

The role of women as managers in family firms is missing proper observational recognition in the family business literature, as very few contributions were based on actual empirical research (Rowe & Hong, 2000). Women as family members cultivate a high level of interest in their family's business, next to owners and employees (Davis & Tagiuri, 1991). While women tend to enhance their presence as female entrepreneurs, research on women as family members in the field of family business suggested that a majority of women continued to remain in the background, staying "less visible" (Cole, 1997; Fitzgerald & Muske, 2002). In just five years, from 2002 to 2007, the share of women occupying a CEO position in family businesses in the US grew by an astonishing 14 percentage points (Glavin, 2007) but still remains at low levels, with only 24% of all family businesses led by women. Another interesting observation is that family firms started adding "and Daughters" to their name in the 1990's, instead of "and Sons" (Gershick, 1997; Frieze & Jacks, 1996). Occupying a subdued role, however, to some authors (Dumas, 1998; Lyman et al., 1985) provided women with a unique vantage point for understanding the prevailing issues and relationship dynamics in family firms. Women used this insight to provide rare but valuable input into some managerial decisions and the management of relationships among family members (Sirmon & Hitt, 2003). Moreover, a promising observation was made by Garcia Alvarez et al. (2002) who concluded that women as potential successors in family firms already are better educated than their male counterparts.

The main motivation to write this paper was to explore some particularities of women's contributions to family businesses by taking into account the paradigm of

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differences in managerial styles between men and women. First, the theory on women's involvement and roles in family businesses is outlined in the literature review. Next, based on the theoretical background, four propositions are presented and a methodological approach is outlined. Third, the results are discussed covering the managerial role of women and different gender-based roles in family firms. Finally, the paper is closed with conclusions and implications for further research.

2. Literature Review

Traditional gender roles are often present in family businesses. Walters (1982) suggested the prevalence of the dominant father figure and a subordinate mother figure throughout family businesses. Lyman et al. (1985) stated that the working environment in family businesses displays cultural traditions that place women, including wives, mothers, and daughters (Ponthieu & Caudill, 1993) and men in different social positions and different work and family responsibilities. Evaluation of the real contribution of men and women to the family's economic well-being therefore includes a mix of paid employment and unpaid family work (Voydanoff, 1990), often unequally distributed between genders. A number of wives simultaneously (1) hold employment somewhere else, (2) manage a household, and (3) work in the family business, juggling three layers of obligation (Rowe & Hong, 2000).

Involvement in a family business means being part of the family-business core structure: the role of family members in the business, how bonded the members are and how the business defines itself in relation to the outside world (Kellermanns et al., 2008). If a family member is not adequately recognized in running the business this creates dissatisfaction, tensions, and in the end clashes of values and beliefs about the operation of the business and the involvement, tasks and rewards for family members (Danes & Amarapurkar, 2001; Frishkoff & Brown, 1993). Prolonged and unresolved tensions may eventually have a destructive effect on the viability of family business and the health of family and business relationships (Danes et al., 2002). However, for Danes & Olson (2003), tensions and conflicts can either foster a constructive climate that focuses resources on targeted goals, leading to growth and/or continued success (Cosier & Harvey, 1998; Danes et al., 1999) or they can create an environment marked by a lack of trust and fellowship (Steier, 2001).

Some authors analyze the advantages and disadvantages for women in family firms (Frishkoff & Brown, 1993), including flexible work hours, access to influential positions in traditionally male-dominated industries, job security, professional challenges, and opportunities for personal growth (Barnett & Barnett, 1988). However, family firms can also involve gender stereotyping and discrimination like that found in society at large (Jaffee, 1990; Salganicoff, 1990), including the popular view that the male partner is the entrepreneur while the female partner does the bookkeeping in the back room (Dumas, 1998). This attitude leads to the fact that even important contributions from women to the family businesses will not be properly recognized in terms of job titles or salaries (Gillis-Donovan & Moynihan-Brandt, 1990; Lyman et al., 1985). Marshack (1994) found that 80% of male co-owners in husband-wife businesses advocated a stereotypical masculine gender-role orientation and 76% of female business co-owners supported a stereotypical feminine gender-role orientation. Women are seldom considered as successors in family businesses (Dumas, 1998; Haberman & Danes, 2007), even more so in traditional societies where instead of daughters sons-in-law usually take over their spouse's family firm (Lee et al., 2003). Even in Western societies there is a history of choosing successors to family firms by subjective criteria, predominantly gender (Barnes, 1988); as for the UK, Martin (2001) concluded that not one appointed a female successor. On the other hand, Allen & Langowitz (2003) found that companies managed by women are on average 10 years younger than those led by men but twice as productive. The entry of women to the leading positions in family businesses does have a multiplicative effect, as Barnes (1988) concludes that women serve as role models for other female family members who then consider family business an attractive career choice.

Gender roles in family firms are changing, but when a woman chooses a nontraditional role, tensions often surface (Freudenberger et al., 1989; Hollander & Bukowitz, 1996; Lyman et al., 1996). As entrepreneurship has emerged as a career choice for both men and women, the choice has disrupted conservative traditions about work-life balance and family obligations (Greenhaus & Callanan, 1994). As wives' influence in businesses clearly increases when they work within them (Wicker & Burley, 1991), that relative influence can be a source of conflicting

Parameter	Number	Percent	Characteristics
Business activity	37	34.5	retail and wholesale trade
	20	18.7	manufacturing
	19	17.8	construction
	12	11.2	transport and communications
	8	7.5	other services
	6	5.6	tourism and restaurants
	3	2.8	financial and other services
	36	33.6	other activities
Legal status	62	57.9	limited liability company
	45	42.1	sole proprietors
Number of employees	Average: 12.8		
Number of family members employed	Average: 2.67		55 (51.4 %) with two or less, 52 (48.6 %) with three and more
Founders	63	58.9	husband
	8	7.5	wife
	23	21.5	spouses as partners
	13	12.1	others (businesses inherited)
Foundation date	41	38.2	before 1989
	50	46.7	during 1990-1994
	16	15.0	after 1995
Family ownership	97	90.7	100 % family ownership
	9	8.4	50-81 % family ownership
	1	0.9	no family ownership
Gender of the manager	89	83.2	Male
	18	16.8	Female

Source: own sample, 2007
Table 1: Sample characteristics

perceptions and can create tensions for the family business (Rodriguez et al., 1999; Sharma, 2004).

Work-family issues at the intersection of business and family systems within family businesses are a particularly fertile area of conflict (Harvey & Evans, 1994), with five sources of conflict: justice, role, work-family balance, identity, and succession conflict (Danes et al., 2000; McClendon & Kadis, 1991). The existence of more than one decision maker in a family business will, in time, create some level of disagreement and tension (Kaye, 1996) fuelled by the different conflict resolution styles between men and women (Danes et al., 2000).

Poza & Messer (2001) describe six different types of roles adopted by spouses of successful family firms: jealous spouse, chief trust officer, partner or co-preneur, vice-president, senior advisor, and free agent. Curimbaba (2002) reported that Brazilian women occupied either a professional, invisible, or anchor role in their firms. Due to the small convenience samples these studies mainly provide an indication of the varying types of women's roles. However, it is mostly expected from women to occupy the second rank or to head one of the business functions, traditionally finance and accounting or sales.

3. Methodology, Propositions and Sample

A sample of family firms was compiled from the public directory of all Slovenian SMEs. A random selection of 200 companies was made and asked through a phone call whether they considered themselves family businesses or not. Out of 200 companies, 107 explicitly confirmed themselves to be family businesses (Birley, 2001); we then used guided questionnaires to gather data. Certain criteria were put into place to be sure that firms have observable gender roles: (1) at least five employees, (2) at least two family members employed, (3) having been in business for a minimum of three years to have a certain

Group of respondents	Number of respondents	Average age (in years)	Average work experience (in years)	Work experience in other firms (in years)	Years in the CEO role
Managers: all	107	47.2	25.6	10.2	14.2
- male CEOs	89	48.2	26.8	10.5	14.9
- female CEOs	18	42.6	19.4	8.7	10.3
Key women – all	107	42.2	20.7	9.0	
Key non-CEO women	89	42.1	20.9	9.1	

Source: own sample, 2007
Table 2: Some age and experience related data on key groups of respondents

School completed	Founders of family firms (%)	Managers (%)	
		All	Female
Grammar school	1.9	1.9	-
Vocational school	32.7	25.2	16.7
Secondary school	43.0	49.5	50.0
College	10.3	10.3	22.2
University	11.2	12.1	11.0
Other	0.9	0.9	-
Number of persons	107	107	18

Source: own sample, 2007
Table 3: Level of formal education in the sample of family firms

track record and quite well established patterns of behavior.

The analysis of data is based on the following sections: (a) demographics on the family firm, (b) data on the manager, (c) data on the key woman in the firm (if she is not the CEO).

Since this was one of the first studies on the role of women in family firms in Slovenia and it can be argued that findings from other countries would generally be applicable despite different histories, cultures and traditions of gender issues, four propositions were developed from the literature survey and some fragmented findings from past surveys:

P1. Women are underrepresented as CEOs compared to men in family firms but dominate in second-level managerial positions (Cole, 1997; Fitzgerald & Muske, 2002).

P2. Women in family firms would exercise a different, softer style of management due to the differences in their values, personal traits and experience (Dumas, 1998; Poza & Messer, 2004).

P3. Non-CEO women see many opportunities for improvements they would implement if they had a chance to run the family business (Frishkoff & Brown, 1993; Barnett & Barnett, 1988; Allen & Langowitz, 2003).

P4. Although their contribution in the family firms is generally not adequately recognized, women still see many opportunities for themselves in family firms (Rowe & Hong, 2000; Curimbaba, 2000; Barnes, 1988).

As presented in Table 1, family firms are mostly active in trade/retailing, but they are also reasonably represented in manufacturing and construction. Most companies were incorporated businesses and percentages are comparable with the official data of similarly sized companies in Slovenia.

On average, participating companies employed 12.8 employees. Approximately half of the sample (51.4%) employed up to two family members, while the remainder employed at least three relatives. As expected, the vast majority of businesses were under the ownership control of the family, managed mostly by men in CEO positions (83.2%) and only 15 % of participating companies were in business twelve or fewer years, while the remaining companies were older. One particular family business with no family ownership was recently sold to a multinational holding company but family members still retained managerial positions. In the case of sole proprietors, only one member of the family actually owns the business, yet he or she can hire other members or outside employees. Some gender-based characteristics of the observed groups within the sample are given in Tables 2 and 3. As can be observed in Table 2, the women are on average younger than the men in the sample. There is no important difference between CEO women and key non-CEO women regarding age and years of experience.

Characteristics of behavior at work	Managers			All key women	key Non-CEO women
	All	Men	Women		
Responsible	5.37	5.33	5.61	5.27	5.20
Pro-active	5.28	5.26	5.39	5.07	5.00
				t=2.108; P=0.036	
Communicative	5.19	5.13	5.44	5.09	5.01
Persuasive, convincing	5.08	5.06	5.22	4.71	4.60
				t=3.247; P=0.001	
Good-hearted	5.05	4.97	5.44	5.28	5.25
		t=1.883; P=0.062		t=2.071; P=0.040	
Efficient	5.04	5.01	5.17	4.90	4.85
Sociable	5.03	4.95	5.39	4.91	4.81
		t=1.757; P=0.082			
Thorough, accurate	5.03	5.00	5.17	5.15	5.14
Pragmatic	4.99	4.91	5.41	4.75	4.62
		t=2.189; P=0.031		t=2.087; P=0.038	
Credible, trustful	4.92	4.83	5.33	4.93	4.85
		t=2.069; P=0.041			
Kind, pleasant	4.92	4.81	5.50	5.20	5.13
		t=2.978; P=0.004		t=2.348; P=0.020	
Well organized	4.92	4.88	5.11	4.83	4.77
Energetic	4.86	4.80	5.17	4.71	4.61
Bright, lucid	4.82	4.78	5.00	4.68	4.61
Creative, full of ideas	4.80	4.82	4.72	4.38	4.31
				t=3.503; P=0.001	
Innovative	4.79	4.80	4.78	4.28	4.18
				t=3.633; P=0.000	
Benevolent	4.72	4.65	5.12	4.84	4.79
		t=1.820; P=0.072			
Enthusiastic	4.68	4.66	4.78	4.56	4.51
Visionary	4.55	4.65	4.06	3.96	3.94
		t=1.877; P=0.062		t=3.787; P=0.000	
Understanding	4.52	4.43	5.00	4.86	4.83
		t=2.130; P=0.036		t=2.668; P=0.008	
Compassionate	4.51	4.36	5.28	5.04	4.99
		t=3.470; P=0.001		t=4.252; P=0.000	
Generous	4.47	4.35	5.06	4.69	4.61
		t=2.386; P=0.019			
Competitive	3.75	3.89	3.06	3.21	3.24
		t=2.329; P=0.022		t=3.117; P=0.002	
Nervous	3.32	3.40	2.89	3.29	3.38
Worried, not relaxed	3.28	3.36	2.89	3.15	3.20

Source: own sample, 2007

Table 4: Self-evaluation of work-related characteristics

A possible drawback of Slovenian family firms is the large share of these firms originating from the crafts sector, which had intensive development during the 1980's with a more liberal economic policy. This crafts tradition provides a conservative view on some factors of success (Vadnjal & Glas, 2008): education of the managerial staff, market orientation vs. product infatuation, acceptance of modern technology, etc. Having mostly first generation family firms in the sample, there is hardly any difference between the education of founders and the acting managers, as it is often expected in family businesses that the younger generations hold a higher level of formal education. On the other hand, as presented in Table 3, women in the sample tend to hold significantly higher levels of formal education than men ($\chi^2 = 11.64$; DF = 5; $\alpha = 0.04$).

4. Women as Managers in Family Firms

In some earlier work (Glas et al., 2006) the differences in life and work values among the generations were studied and the second generation was found to be more

Statement about the change in management and doing business in the family firm: As CEO, I would	*Strongly agree*	*Completely agree*	*Mean value*
Improve the communication in the firm	41	25	4.06
Work on improving the quality of products / services	26	24	3.80
Give more support to the ambitions of employees	43	13	3.77
Put more attention on teamwork	41	12	3.67
Invest more in the education of the staff	34	11	3.56
Make more relaxed, informal relationships in the firm	29	16	3.54
Take care of higher wages/salaries of employees	34	6	3.47
Provide more flexible employment for mothers employed	32	10	3.46
Care more about the ethical side of the business	32	6	3.28
Contribute more to charitable activities	22	7	3.05
Make profit the key measure of success	18	10	3.04
Enhance networking with other female entrepreneurs	14	8	2.99
Rely more on external consultants	23	5	2.98
Care more about community development	13	4	2.93
Introduce more formal hierarchy – it should become clear who the boss is	23	7	2.83

Source: own sample, 2007

Table 5: Key women in the family firm on the changes in business in case they became CEOs

inclined towards the modern concept of a work-life balance. Looking at life and work values among gender specific groups in family firms, some differences were found as well (Vadnjal & Zupan, 2009).

Work values confirm some of the expected characteristics of women that might influence their managerial styles, although few values are significantly different in terms of gender. More details on managerial styles can be found in the self-evaluation on the 25 characteristics of their behavior at work, using a 6-point Likert scale with 1 – Not true, to 6 – Completely true. The list of characteristics has been borrowed from research on Slovenian managers (Mihelic, 2006) that will enable further comparison beyond the scope of this article. In Table 4, these characteristics are ranked according to the average scores of all answers and added test results with the null hypothesis *"There is no difference between both samples"*, where the difference between men and women managers was statistically significant at the 5% level ($P<0.05$)

Our research (Table 4) has shown some patterns:

- highly ranked characteristics are a mixture of "hard" and "soft" traits
- female CEOs have generally evaluated themselves with the highest grade – this could be either explained by their over-confidence or by the assumption that they really have to be superior to men to climb to the top position
- the exceptions to this pattern are few but interesting: male CEOs should be more creative and innovative, they are superior in creating visions and they behave in a more competitive way; however, they also act more nervously and worriedly, which might put them under stress and has a negative impact on their well-being
- non-CEO women fall significantly behind the female CEOs but also behind male CEOs, with the exception of some highly "feminine" characteristics: they are more good-hearted, credible and trustful, kind, benevolent, understanding, compassionate and generous; it could be also added that they are more thorough as an assumed trait of women

These results confirm the assumption that the "female" managerial style would differ from that of male CEOs. Female CEOs seem to be a rather select group, and not like other women; again, either as a result of the duties and challenges they faced at the top or the very selective process that demands that they be superior to men to be trusted as CEOs. The ultimate mark of different managerial styles is presented by the statements of non-CEO women about what they would change in the way of managing and running the family firm if they became CEOs on the 5-point Likert scale. In Table 5, the number of non-CEO key women are provided that certainly agree with the changes (4=strongly agree and 5=completely agree) and the mean value.

Assumed advantages of working in family firms	Key non-CEO women	
	Mean	Rank
More autonomy at work	4.18	1
Having more flexible working time	4.16	2-3
Having more control over duties, obligations	4.16	2-3
Being more equal with men	3.92	4
Being more satisfied with life	3.90	5
Being less exposed to bullying	3.82	6
Getting a better salary	3.65	7
My work is more appreciated, recognized	3.43	8
Having more time for family	3.27	9

Source: own sample, 2007
Table 6: The advantages of being employed by family firms (mean values)

Women would exercise change in many aspects of management:

- their focus would be on communication in the firm, quality of products/services, support for employees' ambitions and teamwork – this quality is already a high level of concern of family firms according to our survey and other research on family firms in Slovenia, while the other three items seem quite "feminine."
- there would be more attention on the education of employees, more informal and relaxed relationships (women are the proponents of such an approach since they least support more formal hierarchy)
- there is no high priority given to provide more work flexibility for employed mothers which might disappoint, if firms have not already done a lot in this respect.
- women would not seek support from other female entrepreneurs – they do not stress gender and they feel quite self-confident in the broader entrepreneurial community – this finding supports the practice in Slovenia, where women rarely make separate groups and do not stress the gender aspect in creating networks, but strive to become an equal part of broader networks;
- women would care for the ethical aspect of business, but there is no intensive focus given to the social responsibility of the business, charity or community development, which is partly surprising.

The findings do not give a very high level of support to the proposition of a significantly different approach by women to management and business issues. This approach is marked more by the general situation of entrepreneurship in Slovenia, where the culture, overall business climate and government policies are not perceived as business-friendly. Gender is not the prime concern, and women would not forge "a revolution" in firms if they became CEOs.

5. Family Firm: A Career Opportunity for Women?

It has been found that women's contributions to the family firm are not really recognized and rewarded, and that they would also change a number of issues in the formal structure of family firms, including their management style and the climate among employees. However, women who did not decide to pursue a CEO position or were not appointed as successors in their family's firm, and therefore have or had a realistic chance to be employed elsewhere, still find a number of advantages in being employed in the family firm as compared to non-family firms. This view is shared also by women entrepreneurs who prefer the challenges of an entrepreneurial career. All key non-CEO women were asked to assess the potential advantages on a 5-point Likert scale. Women were very affirmative in assessing the advantages of family firms, mostly related to enhanced autonomy and flexibility, while financial advantages were not really confirmed (Table 6).

Non-CEO women feel more equal to men since they mostly perform meaningful duties in the firm. However, this fact also means that they share more responsibilities in the firm and possibly do not have time for family. Due to their role in the firm, key non-CEO women have assessed these advantages as relatively high. Family firms that are on average still fairly small mostly do not offer good formal career prospects, while they allow women more control over their work and relationships.

6. Conclusions and Implications

Considering the number of family firms in Slovenia, more women are taking part in the entrepreneurial potential of these firms than starting their own businesses. Working with family members and avoiding stress and uncertainty by leaving the leadership role to their male partners seems more attractive to women than facing business challenges as sole owners. On the other hand, while the informal role of women is often recognized, such a role is more pronounced in family firms. In the latter, women exercise their influence on the decision-making process in the office and during family time.

Considering that female family members share second-rank managerial roles in a large share of family businesses where men dominate as CEOs, their share in ownership certainly understates their role in running the family business. However, women do not seem opposed to the existing situation, and often consider their informal influence as powerful enough to provide them personal satisfaction. They also do not opt for higher salaries and benefits, although this aspect may become important with the reform of the health and pension systems, which would relocate the access to services increasingly towards the voluntary involvement of beneficiaries. Women rather deny these financial aspects as important and this denial is a good cause not to push for changes. All this is supported by the first proposition, which can be regarded as supported.

The "feminine" style of women in family firms is very important for creating good internal relationships, the overall climate in business, and employee satisfaction and morale. This aspect is likely to positively contribute to the financial performance of family firms, but it has value in itself for the well-being of employees even if it does not materialize in improved balance sheets. This contribution by women is often benevolently recognized but not adequately rewarded. Again, women are quite patiently wishful for social recognition and the recognition of their family members, but they do not intensely pursue their demands. Thus, it can be concluded that data from the study confirm the third proposition, which suggests that women often possess different views on transitional issues compared to men. Interestingly, this confirmation is stricter for female respondents, which may be interpreted such that women are more aware of their gender dictated managerial roles.

Women, when becoming CEOs, would introduce a number of changes in the management style, where they would add their softer feminine approach as a new quality to the existing style. This assumption is very relativistic, since the research has indicated that female CEOs behave unlike other female family members involved in the firm. These findings contribute to the confirmation of proposition three. It can be said that women in family firms need to be very tough and superior to their male siblings in order to get to the top position. The process of their elevation to the CEO position can neutralize part of their femininity and softness, and performing the duties of a CEO seems to develop experiences that harden their approaches. Taking into account all of the abovementioned findings, proposition three can be neither confirmed nor rejected.

For the purpose of managing small family firms and also consulting for them, it should be clear that women's roles in the family business are often formally underestimated. Women not only play a traditional supportive and invisible role but can also contribute to a different, people-oriented managerial style when their feminine style of tackling business issues is applied as an alternative to the more traditional masculine approach. In diagnosis processes of consulting projects, women, although not holding leadership positions, may be invaluable sources of information and complementary opinions. In conflict resolution programs, women can play an enormously positive role in lowering the temperature which usually rises among men.

There are many opportunities for further research in the field. Researchers should be encouraged to start longitudinal multinational studies in order to assess differences between countries and cultures. A more multi-disciplinary approach is recommended because the complex family and partnership relationship combined with the pressures of daily business activities demands much broader research skills and knowledge than is usually available and provided by business science researchers. An insight on the work-life balance of women in family businesses would give valuable insight for further policy measures and recommendations.

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Corporate Reputation and Brand Architecture: the Debate

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Abstract:

This paper argues that for organizations with a branded identity structure investing in corporate reputation is not a waste of scarce resources, but a wise strategic investment that earns significant present and future economic and non-economic returns for a company. In the global market of the 21st century, corporate reputation provides a number of intangible benefits: it permits stakeholders to asses a firm's ability to deliver valued products; it indicates past interactions with a firm's stakeholders; it improves a firm's ability to recruit and preserve its primary stakeholders; along with delivering tangible (financial) benefits by enhancing a firm's ability to do better than its competitors, thus expanding its profits and revenues. These tangible and intangible benefits of favorable corporate reputation are present regardless of the brand architecture type, such that strategic investment in corporate reputation must be executed equally for all three categories of brand architecture.

Keywords: corporate reputation; brand architecture; monolithic brand structure; endorsed brand structure; branded identity structure; corporate identity; corporate brand; corporate communication; corporate culture; corporate reputation management; corporate social responsibility.

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1. Introduction

This paper will argue that corporate reputation has to be established and maintained independently and meticulously, regardless of the company's brand strategy, and thus even in the case of branded identity companies.

Corporate reputation has always been deemed a valuable corporate asset, but only since the late 20th century has it become a business issue of the utmost importance. Corporate reputations are omnipresent, and no longer "seldom noticed until they are threatened" (Fombrun and Van Riel, 1997). They are acknowledged as one of the driving forces behind successful businesses. Reputations are externally perceived, and so are largely outside the direct control of a company's managers (Fombrun and Shanley, 1990; Fombrun and Van Riel, 1997). It takes time for a reputation to form in observers' minds. Empirical studies show that even when confronted with negative information, observers resist changing their reputational assessments (Wartick, 1992). Therefore, reputations are valuable intangible assets because they are inertial (Cramer & Ruefli, 1994).

While most corporate reputation scholars agree that brand architecture is a part of the multidimensional paradigm of corporate reputation (Fombrun and Van Riel, 1997; Balmer and Greyser in 2007), the significance of its impact has yet to be agreed on (Dowling, 2001). Companies most frequently apply three types of branding strategies (Olins, 1978; Kotler, 1991; Fombrun and Van Riel, 1997): all products refer to the company, identifying the company name on all products (monolithic brand structure); combining the company

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name with product brand names (endorsed brand structure) or individual names for all products without any explicit mention of the company (branded identity structure). Related to these branding strategies, some scholars do not acknowledge the symbiotic connection and interaction between brand architecture and corporate reputation (Zyglidopoulos, Alessandri, and Alessandri, 2006); while others claim that investing in corporate reputation for companies with separate freestanding brands (branded identity structure) is a waste of scarce resources (Brown and Dacin, 1997; Dawar and Parker, 1994).

This manuscript advocates the position that brands and corporate reputation are highly interrelated, as damage to the one harms the other. As a result, investing in corporate reputation for companies with branded identity structures is just as important for companies with monolithic brand architecture.

2. Key Concepts and the World of Corporations Defined

As defined by Cornelissen (2004) "corporate communications is the management function for the effective coordination of all means of communication with the overall purpose of establishing and maintaining a favorable reputation with stakeholder groups upon which the organization is dependent". This definition not only summarizes the essence of corporate communications, but describes a "favorable" reputation as its main goal. Nevertheless, corporate communications has to focus on the organization as a whole, not just on its external image, and create a "diagnostic and alteration capability" that will motivate the productivity of its internal structures as well (Van Riel and Fombrun, 2007).

In his definition of corporate communications, Blauw (1986) was among the first to add the notion of the corporate identity, stating that "Each item of corporate communication must convey and emphasize corporate identity." Thus, developing and managing a positive corporate reputation begins at the corporate identity level. Corporate identity is the "tangible manifestation of a corporate personality" (Olins, 1978), or a mix of an organization's distinctive, central and enduring characteristics (Albert and Whetten, 1985; Pratt and Foreman, 2000).

Yet in recent years this notion of a corporate identity as a monolithic phenomenon has been often replaced by a five identity ACCID Test (also referred to as AC^2ID) developed by corporate identity scholars Balmer and Greyser in 2007. They define five different simultaneous corporate identities:

- ***Actual Identity*** constitutes the current internal and external, tangible and intangible characteristics of the corporation.
- ***Communicated Identity*** is disseminated through "controllable" corporate communication as well as "non-controllable" channels of communication.
- ***Conceived Identity*** is the general view of corporate image and corporate reputation held by relevant stakeholders.
- ***Ideal Identity*** is the optimal positioning of the firm in its market over a given time line based on systematic research and analysis.
- ***Desired Identity*** can be described as the vision corporate leaders have of the organization. While ideal identity is fact-based, the desired identity is frequently based on a CEO's subjective preferences.

In all of these, identity is closely related to the notion of corporate character, personality and culture. While companies do have multiple identities that simultaneously coexist, the potential risk to corporate reputation in a case of discrepancy or misalignment between any two identitities always has to be taken into consideration (Balmer and Greyser, 2007).

However, for a corporation to establish its corporate reputation, its corporate identity has to be projected onto a certain corporate image first. Corporate image (the majority of scholars use the terms corporate, public, external image and corporate brand interchangeably) is a collection of cognitive beliefs, emotions, ideas, and impressions a person or a group of stakeholders have about an organization (Dowling, 2001). Having a positive or poor public image is partially determined by signals that an organization transmits about itself; these signals are construed by stakeholders based on the firm's actions and self-expressions (Fombrun and Shanley, 1990). Nevertheless, there is no assurance that organizations with a clear corporate identity and sincere and engaging signals will create a positive image in the minds of all of their stakeholders (Van Riel and Fombrun, 2007). A number of factors influence the corporate image of an organization, among other things rumors, employee and management conduct, business decisions, social responsibility, crisis management, and both cognitive and irrational signal interpretations by its stakeholders (Van Riel and Fombrun, 2007). And just as there are multiple

corporate identitities, a company can have multiple corporate images as well (Dowling, 2001).

Balmer and Greyser's (2007) definition directly ties corporate image and corporate reputation as two parts of a time line: "the perception of the organization by an individual, group or groups *at one point in time* (corporate image), and *over time* (corporate reputation)". Other scholars also concur that repeated impressions of corporate image over time structure corporate reputation (Zyglidopoulos, Alessandri, and Alessandri, 2006). Thus, corporate reputation can be defined as a "perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all of its key constituencies when compared to other key rivals" (Fombrun, 1996).

According to Bromley (1993) corporate identity is analogous to personal identity or a notion of self-concept, while reputation is characterized as individual or corporate social identity. As such, reputation is related to many aspects of social psychology. Observed through Farr and Moscovici's (1984) study of social representation, which explains on what levels our understanding of the world is socially conditioned, and uniting distributive and collective views on social representation, reputation may also be described as the sum of members' beliefs about an entity (Bromley, 1993). The main difference between social and individual representation is in the fact that social representation is a collective outcome of social interaction (Farr and Moscovici, 1984).

Thus, corporate reputation as a corporate social identity to sociologists indicates legitimacy; reputation being a cumulative evaluation of a firm's performance related to institutional expectations and norms (Fombrun and Van Riel, 1998). In reality, companies have multiple characteristics and multiple reputations that develop from multiple but related corporate images among all of their stakeholders.

Aligned with everything stated thus far and before we embark on the main topic of this manuscript, which is defending the position that corporate reputation is a valuable asset not just for companies with monolithic and endorsed brand architecture, but also for those with freestanding individual brands operating under a corporate holding company, the key concepts used in this paper shall be defined as follows:

- ***Corporate Communication*** is a set of activities involved in managing and orchestrating all internal and external communications designed to create favorable points with the stakeholders upon whom the company depends (Van Riel and Fombrun, 2007).
- ***Corporate Reputation*** is a perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all of its key stakeholders when compared to other key rivals in the market; and as such signals the firm's status within the industrial social system (Fomburn, 1996).
- ***Corporate Identity*** is a foundation for both the reputation and the brand (Oechsle, 2002). It represents those unique characteristics of an organization that its members understand as fundamental, distinctive and enduring within the organization over time (Pratt and Foreman, 2000).
- ***Corporate Culture*** is a total sum of the values, customs, traditions, meanings and representation that make an organization unique; it is thus often referred to as the "character of an organization". Those values embodied in corporate culture influence ethical standards within the organization as well as managerial behavior (Parker, 2000).
- ***Corporate Image*** is a holistic and ongoing public impression of an individual or a specific group (stakeholders) about a specific organization, formed directly or indirectly, with more or less awareness, rationally or emotionally, and which, as a rule, emerges as the positive or negative attitude/behavior of the public towards that organization (Alvesson, 1990).
- ***Corporate Brand*** is an umbrella for all of the company's product brands; it is correlated with corporate image and closely tied to corporate identity (Kitchen and Schultz, 2000). Due to its similarity, it is interchangeably used with the term corporate image.
- **Brand Architecture** is the explicit relationship between the corporate brand and the firm's various product brands developed as a result of a carefully established branding strategy (Zyglidopoulos, Alessandri, and Alessandri, 2006). These can have a monolithic, endorsed or branded-identity structure (Olins, 1978).

3. Brand Architecture Explained

Combining definitions of corporate communications and corporate reputation, it can be inferred that in order to "establish and maintain a favourable reputation"

(Cornelissen, 2004) corporate communications aims to influence the perceptions of a firm's relevant stakeholders about the organization. The most popular academic and practical terms in describing stakeholders' perceptions are "brand", "corporate brand" and "brand image" (Van Riel and Fombrun, 2007).

The brand culture fits ideally with the era of the "global village" or "global theatre" (McLuhan, 1970). Brand and branding are creations of the commercial industry, but in the 21st century "its impacts are virtually immeasurable in social and cultural terms" (Olins, 2003). There is a wide variety of the definitions for the term "brand"; one of the most encompassing is probably the one coined by the advertising expert David Ogilvy, who stated that a brand is "the intangible sum of a product's attributes: its name, packaging, and price, its history, its reputation, and the way it's advertised".

Brand image describes the specific composition of perceptions in the minds of stakeholders (Van Riel and Fombrun, 2007), therefore consisting of both the literal brand image and of the pattern of beliefs and feelings connected to the brand. As seen in the previous section, the terms corporate brand and corporate image are used interchangeably, and are closely tied to corporate identity.

Following Kitchen and Schultz's (2000) "corporate umbrella" analogy, corporate brand can be described as an umbrella for all of the other company product brands. A firm's branding strategy is the way the company presents itself to its stakeholders through its products and services (Zyglidopoulos, Alessandri, and Alessandri, 2006). Most scholars agree that branding strategy is tantamount to brand architecture, which "reflects the explicitness of the relationship between the corporate brand and the firm's product brands" (Zyglidopoulos, Alessandri, and Alessandri, 2006).

Olins (1978) distinguished three types of brand strategy on a continuum:

- The first end of the continuum is a corporate or **monolithic brand structure** where all the products and services are delivered under the same name and visual identity, thus equated with the corporate brand (Olins, 2003). Many reputable Far East companies have a tradition of using this type of brand strategy (Yamaha pianos, motorcycles, television sets; Mitsubishi cars, food, banks), but that trend is not geographically conditioned; perhaps the most notable example in the Western world is the broad spectrum of products and services of the Virgin Group conglomerate.
- At the middle of the continuum are companies with an "**endorsed brand structure**" (Olins, 2003). These companies have a number of brands with their own distinctive images and identities, but all of these sub-brands are linked to the corporate brand. One of the examples for this kind of brand structure is Nestle with its sub-brands (KitKat, Nesquik, Lion, and Nescafe among others).
- The final end of the continuum is represented by the **branded identity structure** where "each unit or brand is projected separately to the consumer and is seen to be completely independent" (Olins, 2003). Due to its emphasis on the product brand and omission of the corporate brand, this brand strategy is also known as the Procter & Gamble approach in reference to their vast brand portfolio (Zyglidopoulos, Alessandri, and Alessandri, 2006). Other multinational companies with this type of brand structure are, among others, Unilever (with Rexona, SlimFast, Lipton, Knorr, etc), and premium alcoholic drinks business Diageo (with Guinness, Johnnie Walker, Baileys, Smirnoff, etc).

Even though the prominence of Olins' tripartite categorization of brand strategy from the late 1970s provides a useful basis for understanding corporate brand management, new times delivered more complex classifications. Thus Balmer (2002) after detailed research identified six contemporary corporate/trans-corporate types of brand structure. He contended that the traditional tripartite branding typology should be extended to reflect the new modes in which corporate brands were being utilized. Thus, they proposed six new corporate branding categories (Balmer and Greyser, 2007):

1. **Familial**-sharing of the same corporate brand by two entities within the same industry or sector (i.e. Hilton UK and Hilton USA);
2. **Shared**-similar to familial, but operating in distinct and sometimes related markets (i.e. Rolls Royce Aero Engineers UK and Rolls Royce Car Subsidiary of BMW);
3. **Surrogate**-a franchise agreement whereby one organization's product/services are branded as that of another (i.e. British Regional Airways use the British Airways Brand);

4. **Supra**-a quasi-arch brand is used to supra-endorse company brands and is particularly common within the airline sector (i.e. "Star" Airline Alliance; "Miles & More" Airline Alliance).
5. **Multiplex**-multiple uses and possibly multiple ownerships of a corporate brand among of a variety of entities in a variety of industry sectors (i.e. Virgin; Virgin Trains; Virgin Airlines; Virgin Financial Sector).
6. **Federal**-the creation of a new corporate brand by separate companies (i.e. the Airbus Consortium).

Although we deem it very important to be familiar with Balmer's (2002) typology of corporate brands and its multiple contemporary applications, for the purposes of this paper we shall continue working with Olins's tripartite categorization of brand strategy (2003).

The concept of brand architecture is crucial for the differentiation of firms, their marketing strategies and positioning, and it has been noted that the majority of companies pursue the prevailing brand structure attitudes of its sector (Balmer and Greyser, 2007).

While brand categorizations did evolve with the requirements of the new century, one notion remained unaffected: In the 21st century, corporate reputation, regardless of the company's brand architecture, is the organization's most valuable intangible asset (Zyglidopoulos, Alessandri, and Alessandri, 2006).

4. Corporate Reputation on the Stage of the "Global Theatre"

The world of the 21st century is McLuhan's "global village" categorized by the fast and accessible dissemination of information across continents, cultures, and markets. It is, moreover, a ferociously competitive marketplace. Firms have discovered that their stakeholders are increasingly savvy and determined in their desire to know more about a company behind the brand (Kitchen and Laurence, 2003). They want to "comprehend and critique social and ethical corporate performance" (Fombrun, 1996). To build, maintain and advance one's market position, brands and branding alone are insufficient (Kitchen and Laurence, 2003).

Consequently, empirical studies show that business leaders everywhere are recognizing corporate reputation as their company's most valuable intangible asset "which would take them longest to replace, if they were to start from scratch" (Zyglidopoulos, Alessandri, and Alessandri, 2006).

Fombrun's (1996) description of corporate reputation comprehensively reiterates its essence by stating that it "embodies the general estimation in which company is held by employees, customers, suppliers, distributors, competitors, and the public". By successfully fulfilling the expectations of each of these constituencies, the company develops "reputational capital" or intangible wealth that gives it a competitive lead against its rivals (Fombrun, 1996).

To build "reputational capital" or enhance its corporate reputation, companies are engaging in community activities and relationships that transcend both their basic goods production functions, and pure philanthropy. As Bromley (1993) noted "these extramural activities create the impression that the company upholds the values of the wider society, generating social approval and support". Businesses are no longer being assessed solely by their profits and balance sheets or their brand portfolios, but their positive impact on micro and macro communities, which has become a significant measure of their overall performance (Van Riel and Fombrun, 2007). Thus, investing in positive social impact builds toward a positive corporate reputation in return.

Empirical studies show corporate reputation to exponentially increase in importance since it creates a "reservoir of goodwill" in times of crisis (Fombrun, 2001), subsequently yields tangible financial benefits (Schnietz and Epstein, 2005), and places a company in a superior position against its competitors (Balmer and Greyser, 2007). Consistent with everything stated thus far, it can be summarized that corporate reputation symbolizes two essential aspects of a firm's efficiency: "an appraisal of its economic performance, and an appraisal of its success in fulfilling social responsibilities" (Etzioni, 1988).

The company that epitomizes Olins's (1978) branded corporate identity, the consumer products conglomerate Procter & Gamble (P&G), was among the first to acknowledge and foresee the hidden value of a favorable corporate reputation and to systematically and persistently invest in it. Since the early 1980s P&G adapted its production, packaging, marketing and distribution techniques, and actively formed partnerships with schools, suppliers and customers to promote environmental issues. In 1990, P&G established the Global Environmental Management Initiative (GEMI), a collaboration of 20 leading companies to support sustainable development. GEMI currently has 37 multinational member companies that share the same environmental codes of conduct, and support research

on environmental matters (GEMI, 2007). Presently, P&G is engaged in at least eight other projects involving environmental or philanthropic goals (Advertising Age, 2008).

As stated in the P&G value statement "our reputation is earned by our conduct: what we say, what we do, the products we make, the services we provide and the way we act and treat others...as conscientious citizens and employees, we want to do what is right", and by persistently doing so they are traditionally annually named one of America's 10 Most Admired Companies by Fortune 500. Consistent with findings by McGuire, Sundgren, and Schneeweis (1988) that prior return on assets was highly correlated with a company's reputation for social responsibility, at the beginning of 2008 Procter & Gamble reported a 14% rise in profit and 9% rise in revenue, ranking first in its group (CNN Business, 2008). For Procter & Gamble, having a vast portfolio of independent, individually reputable brands was not an obstacle for investing in corporate reputation as well.

5. Conclusion

To summarize all of the above, favorable corporate reputation does provide both tangible and intangible assets for a company. It entices investors, reduces the cost of capital, and augments a firm's competitive ability (Fombrun and Shanley, 1990). It also influences employees' construed external image of the company and enhances member identification, therefore influencing a strong "organizational citizenship behavior" within the organization (Dutton, Dukerich, and Harquail, 1994). Corporate reputations are externally perceived information signals originating from a unique corporate identity that enhance stakeholders' confidence in the firm's products and services (Balmer and Greyser, 2007). The other important characteristic of corporate reputations is that they are inertial, thus even if faced with negative information stakeholders oppose changing their reputational evaluation (Wartick, 1992).

Following the "actions speak louder than words" cliché analogy, it is not surprising that a company's behavior has been found to be the major influence on building, maintaining, advancing and enhancing the firm's reputation (Balmer and Greyser, 2007). Thus, by developing a corporate social responsibility strategy, companies aim to project themselves as "good corporate citizens", build a favorable reputation with their relevant stakeholders and their communities, and subsequently enjoy both the economic and non-economic benefits of doing so.

According to Kitchen and Laurence (2003), corporate reputation or "the management of the corporate brand," has an increasingly important role for a firm's ability to build and maintain its market position, attract and retain customers and skilled employees, and increase its market share in a global economy. Corporate reputations are developed over time, but can be changed or even destroyed as a result of short-term actions, whether deliberate or inadvertent (Fombrun and Shanley, 1990). Hence, business executives concentrate not only on finances, sales, and marketing, but increasingly on corporate reputation management as well through "exercising social responsibility and a due accountability for their actions" (Kitchen and Laurence, 2003). Based on numerous empirical studies conducted by corporate reputation scholars, this trend among business executives to exert increased focus on corporate reputation management will be anything but ephemeral.

Consequently, and as shown in this paper, persistent investment in corporate reputation should be preformed regardless of the company's brand architecture. As seen from the example of Procter & Gamble's, even for companies with a branded identity structure investing in corporate reputation is a shrewd business decision, and never a waste of scarce resources. In a world of global brands, global corporations, as well as global news and global information flows, faced with increasingly savvy and demanding customers, the whole has definitely became greater than the sum of its parts in the corporate world. Corporate reputation takes precedence over individual brand reputation as an "umbrella" for all of its freestanding brands, and therefore should in all instances be given priority.

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The Humanitarian Relief Chain

Ali Murat İlhan*

Abstract:

Supply Chain Management is a concept that originated and flourished in the manufacturing industry and has been subsequently adapted to many different areas. At present Disaster Management is one of those areas to which it has been adapted. Disaster Management is the set of rules for the coordination of activities at the disaster area and the rational usage of resources. During a disaster several logistics decisions should be made. The unpredictability of global emergencies (e.g., volcanic eruptions, earthquakes, floods) and the stakes of the adequate and timely delivery of the goods/services and challenge of managing material flow in the relief operations, which hold as their ultimate objective the delivery of the appropriate level of resources to locations worldwide in order to minimize human suffering and loss of life.

Keywords: The Humanitarian Relief Chain, Disaster Management, Relief Operation, Supply Chain Management

JEL: M11, M14, L31, H84 **DOI:** 10.2478/v10033-011-0015-x

1. Introduction

A Supply Chain (SC) is a network of facilities and distribution options that performs the functions of the procurement of materials, transformation of these materials into intermediate and finished products and the distribution of these finished products to customers. SCs exist in both service and manufacturing organizations (Ganeshan and Harrison 1995).

Supply Chain Management (SCM) is a concept that has orginated and flourished in the manufacturing industry and has been subsequently adapted to many different areas. Nowadays Disaster Management (DM) is one of those areas to which it has been adapted. DM is set of rules for the coordination of activities at the disaster area and the rational usage of resources. During a disaster several logistics decisions should be made. The unpredictability of global emergencies (e.g., volcanic eruptions, earthquakes, floods) and the stakes of the adequate and timely delivery of the goods/services and challenge of managing material flow in relief operations, which hold as their ultimate objective the delivery of the appropriate level of resources to locations worldwide in order to minimize human suffering and loss of life. While international large-scale responses to global emergencies are not new, research on understanding and improving the relief supply process has received little attention in the literature.

2. Logistics and Supply Chain Management

The Council of Logistics Management defines logistics as the process of planning, implementing and controlling the efficient flow and storage of raw materials, in-process inventory, finished goods, services and related information from the point of origin to the point of consumption (including inbound, outbound, internal and external movements) for the purpose of conforming to customer requirements (Cooper, Lambert, and Pagh 1997). All of the logistics operations (procurement, transportation, distribution, warehousing etc.) are closely

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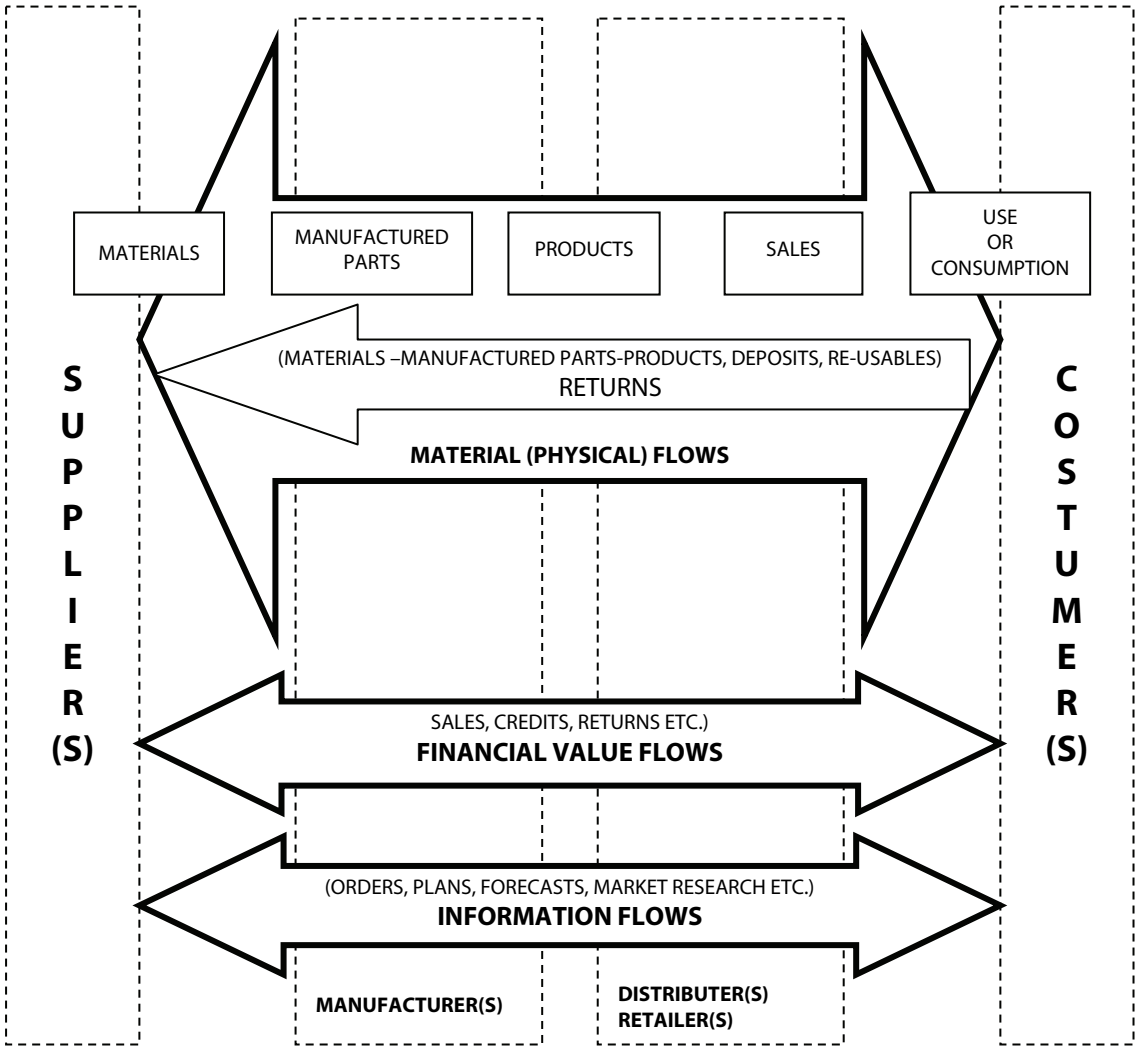

Figure 1: Generic Configuration of SCM in Manufacturing

linked to each other.

Supply Chain, a dynamic structure in both directions, has material (physical) financial value and information flows. Material flow circulates in its manufacturing processes from raw materials or components, through its use within the manufactured product. Material flow occurs between the following SC processes: resource mobilization, procurement, transportation, stock asset management and extended point of delivery. Railroads, motor vehicles, ocean shipping and aviation can represent physical logistics tools. Nevertheless, various modes of transportation can be considered. The sequence of the SC is usually determined by the natural sequence of activites inherent in the manufacturing and logistics processes. However, the structure can follow the previous history, habits and limitations of the communication media and limitations of the coordination mechanisms. The flow of material is not always along an arborescent network (Ganeshan and Harrison 1995). The bill of materials for the end item may be both deep and large. These flows can be very long and complex or have a simple structure. The product on the basis of all the products may be separate or may be in for a single grain. Different types of organizations require different SC designs and strategies. An organization's SC strategy must be aligned with business strategy and goals and must be tailored to meet the needs of the customer (Beamon and Balcik 2008, p.8). More efficient information exchange affects directly better physical and financial flows. Figure 1 shows a simple and generic configuration of an SC in manufacturing with information flow such as orders, schedules, forecasts, circulations between

customers, retailers, assemblers, manufacturers and suppliers.

Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers and customers (Council on Supply Chain Management Professionals 2008). The goal of SCM is holistic, coordinated decision making across the firm's supply chain of these decisions regarding purchasing, production, distribution and therefore inventory, of the firm's products so as to minimize total cost (Shapiro 2006, p.1). The firm's products so as to minimize the total cost (Shapiro 2006, p.1). It can be difficult to grasp the concept of SCM from a definition alone. This is due to the fact that SCM is a methodology that can be applied at different extremes. Cooper and Ellram (1993) provide a useful description of characteristics that can be used to differentiate between SCM and traditional approaches. These characteristics can also be grouped into two main perspectives and are summarized below;

- From the Enterprise Perspective: Most of the time, firms using traditional approaches have independent efforts in their inventory managements and try to minimize only their own costs and risks. Information sharing, even in a firm, is not sufficient and efficient. Also there may be independent efforts between the departments (human resources, finance, marketing etc.) in a firm. However, in SCM, with the help of sharing information, joint planning about orders, procurement, manufacturing, sales, forecasting and market research, etc. between firms is possible. Firms within the same SC focus on reduction of channel inventories, and minimize channel risks and product costs offered to the last user. The time horizon of plans also can be extended.
- From the Channel Perspective: Firms using traditional approaches should create and manage their own channel(s) for procurements and sales. They focus only on their own performance. However in SCM, there is a channel leadership for coordinating all efforts and there are multiple contacts between firms and levels of channel. By sharing information, the speeds of flow (material, financial values, information) are relatively high and uninterrupted. The transparency and visibility of the channel increases gradually.

Simchi-Levi et al. elaborate that SCM is a set of approaches utilized to integrate the suppliers, manufacturers, warehouses, and stores efficiently so that the product is produced and distributed at certain quantities to certain locations and at a certain time in order to minimize system-wide costs while satisfying service level requirements (Simchi-Levi et al. 2000). SCM looks across entire SC rather than just at the next entity or level and aims to increase the transparency and alignment of the SC's coordination and configuration, regardless of functional or corporate boundaries (Cutting-Decelle et al 2007, p.73). More precisely, the objective can be translated into more precise areas of concern which are: flexibility, delivery reliability, delivery time, lead time and inventory level. Delivery reliability and delivery time are both aspects of customer service, which is highly dependent on flexibility and inventory (Cutting-Decelle et al 2007, p. 73).

Supply Chain Management also aims for a real sense of customer satisfaction (e.g., high-quality service at a cost acceptable to enable the submission). Enterprises achieve this objective in itself before supplies and along the entire chain with the most efficient manner possible (low cost, creating a minimum of waste, through rapid response, high efficiency, with less stock, without damaging the material with the lowest possible error rate) required (Waters 2003, p.18).

One of the major benefits of the SCM is "To help to resolve the mismatch between demand and supply". Surge in demand may be taken control of by creating inventories along the chain (Waters 2003, p.12), yet failure in one area may result in the failure of the entire logistics operation (Iqbal et al 2005).

Supply Chain Management is a concept that has orginated and flourished in the manufacturing industry and has been subsequently adapted to many different areas.

3. Disaster Management and the Humanitarian Relief Chain

3.1. Disaster Management

Disaster is a term that can be defined in different ways depending on whether the spectrum is broad or narrow, and can also be classified as either a rapid onset disaster, such as an earthquake or flood, which reqires immediate

interventions of rescue and aid, or a slow onset disaster such as drought or famine that may allow more time to respond. But generally "disaster" means a progressive or sudden, widespread or localized, natural or human-caused occurrence which; (a) causes or threatens death, injury or disease, damage to property, infrastructure or the environment; or disruption of the life of a community; (b) is of a magnitude that the affected community cannot help themselves with their own resources. The disaster is not entirely the event itself, but the consequences born of it (Yılmaz 2003, p.112).

Regional or international non-profit organizations, UN bodies and donor organizations that provide humanitarian assistance to victims during the disaster or crisis situations are defined as Humanitarian Relief Organizations (HRO) (Sphere Project 2000, p.275). HROs execute the aid or humanitarian operations according to "The Standards of Human Aid Agreement" and various accepted international agreements. Relief operations, humanitarian operations, humanitarian assistance, humanitarian aid and humanitarian intervention are terms often used interchangeably in the literature. Here Relief Operations (R/O) is the preferred term. In addition to these bodies, one of the first groups to respond in disasters is generally the military of the country. Military humanitarian missions are often amongst the fastest in terms of response times. At the same time, a military humanitarian mission may consist of conventional military units and other peacekeeping forces may be dispatched to a crisis area to safeguard humanitarian workers, the aid itself and/or to assist in the deconfliction of a troubled area.

The companion of disasters is the deployment of aid: people, equipment, materials and funds-resources employed to relieve sufferings wherever disasters occur, and the cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people (Thomas and Kopczak 2005). Disaster Management is the set of rules for the coordination of activities at the disaster area and the rational usage of resources (manpower, time, material, equipment, money, etc.). DM can be divided into two phases, which are proactive and reactive; (a) the Risk Management Process Phase, which includes pre-disaster risk reduction and disaster preparedness, rehabilitation and reconstruction, and (b) the Crisis Management Process Phase, which includes rescue and first aid during the disaster. These two main phases include a continuous and integrated multi-sectoral, multidisciplinary process of planning and implementing measures aimed at:

- Preventing or reducing the risk of disasters (capacity building, reducing future damage: two years or longer)
- Mitigating the severity of the consequences of disasters
- Emergency preparedness (rapid and effective response to disasters: immediate assistance 1-3 months, food, clothing, shelter, medical, water and sanitation, daily necessities)
- Post-disaster recovery and rehabilitation (resumption of normal living: 3-12 months, temporary housing, schooling, community facilities, etc.)
- Reconstruction (rebuilding homes and communities - 1-5 years)

The boundaries between these different phases are sometimes blurred; phases can overlap and initiatives exist to integrate these phases in Linking Relief, Rehabilitation and Development programs.

The Humanitarian Relief Organization also engages in two broad types of activities:

- Relief Activities: Relief for victims of large-scale emergencies. These short-term activities focus on providing goods and services to minimize immediate risks to human health and survival.
- Development Activities: Longer-term aid, focusing on community self-sufficiency and sustainability. These activities include establishing permanent and reliable transportation, healthcare, housing, and food

In this study, the focus is the relief activities of the HRO about its R/O. The application of SC concepts to R/Os is relatively new. This new way of providing aid has to be related to the current trend in R/Os to move towards a more industrial way of working, particularly for global HROs. This is a challenging sub-field of SCM, where the disaster itself may prevent conventional distribution (Maspero and Ittman). Logistics in R/Os has much in common with commercial logistics. But the best practices from the commercial world or from other HROs have not crossed over yet.

3.2. Relief Operations and the Humanitarian Relief Chain

Relief Operations aim to preserve life and reduce the sufferings of members of communities in crises. R/Os comprise the provision of material and technical aid as well as the delivery of essential services in response to crisis situations when the community's ability to cope has been severely impeded. R/Os are launched in response to both natural and man-made crises and executed normally over a short to medium-term time horizon. As soon as the political and security situation permits, these operations are replaced by rehabilitation and reconstruction programs, which in turn are followed by development aid.

During a disaster several logistics decisions should be made. These must be structured according to the needs of the community. When a disaster hits, the distribution of supplies to victims at a certain time is vital. Any delay in procurement may complicate logistics operations and accelerate casualties. Effective operation of the procurement process requires financial resources to maintain procurement activities before and during the disaster. Priorities should be given to the most affected regions and coordination between the different agencies there. It is important to note that each crisis is unique and may require a tailor-made response.

Relief Operations are a time-limited process. R/Os start immediately after the occurrence of the disaster and continue 1-3 months depending on the size of the disaster (Can 2005, p.3-4). The simplest R/Os start with the procurement and dispatch of aid for transportation to the beneficiary region. These grants can be in the form of materials, services and cash. The aid may be stored in either a national or regional warehouse before transport to central warehouses and distribution points in the disaster area, and then to local warehouses where the aid is handed to the beneficiaries. The activities executed during this period are mainly vital activities and should be managed by appropriate methods within a very short time (Yılmaz 2003, p.56). For this reason, HROs create SC. The Humanitarian Relief Chain (HRC) is an SC that can create cost-effective material flows, financial value flows and information flows for the planning, implementing and controlling of R/Os.

In Relief Operations, the HRC is required to organize and implement the efforts of organizations responding to a crisis. This is not a simple matter. Often large amounts of people, food, shelter, clothing, heavy machinery, and medical supplies must be moved into and around the disaster area using many different modes of transportation. Lives are at stake, so the procurement of disaster relief goods at a certain time should be made to meet the needs of the victims in a disaster. This must be done quickly, while holding costs low. The main problem areas of any R/O can be characterized by the following elements:

- Generally the demand pattern is unpredictable in terms of timing, location, type and size (Beamon 2004)
- The lead time is approximately zero and dramatically affects inventory availability, procurement and distribution.
- Inventory control is challenging due to the high variations in lead times, demands, and demand locations. Supply information is unreliable, incomplete or non-existent.
- Transportation and distribution network configuration are challenging due to the nature of the unknowns and occurrences away from major traffic lanes in less developed regions with inadequate infrastructure (Long and Wood 1995). Locations are frequently unknown until the demand occurs.
- The strategic goals are to minimize the loss of life and alleviate suffering (by increasing donor funding). The performance measurement system traditionally focuses on output performance metrics (e.g., response time, ability to meet the needs of the disaster). Many R/Os are naturally ad hoc, without effective performance measurement systems in place.
- Information systems are often unreliable, incomplete, or non-existent.
- Due to the high stakes nature of disasters and complex emergencies, there is a desire to rush aid to victims despite the lack of or poor structure of coordination among NGOs.
- The high stakes over lives (rescue/relief teams, beneficiaries) and donations.
- Having the same needs for coordination, collaboration, visibility and logistical information systems as the military and business sectors.

The characteristics mentioned above have a great impact on the HRC. However, the operational characteristics of the HRC also differ depending on the type of disaster and the types of relief actors involved.

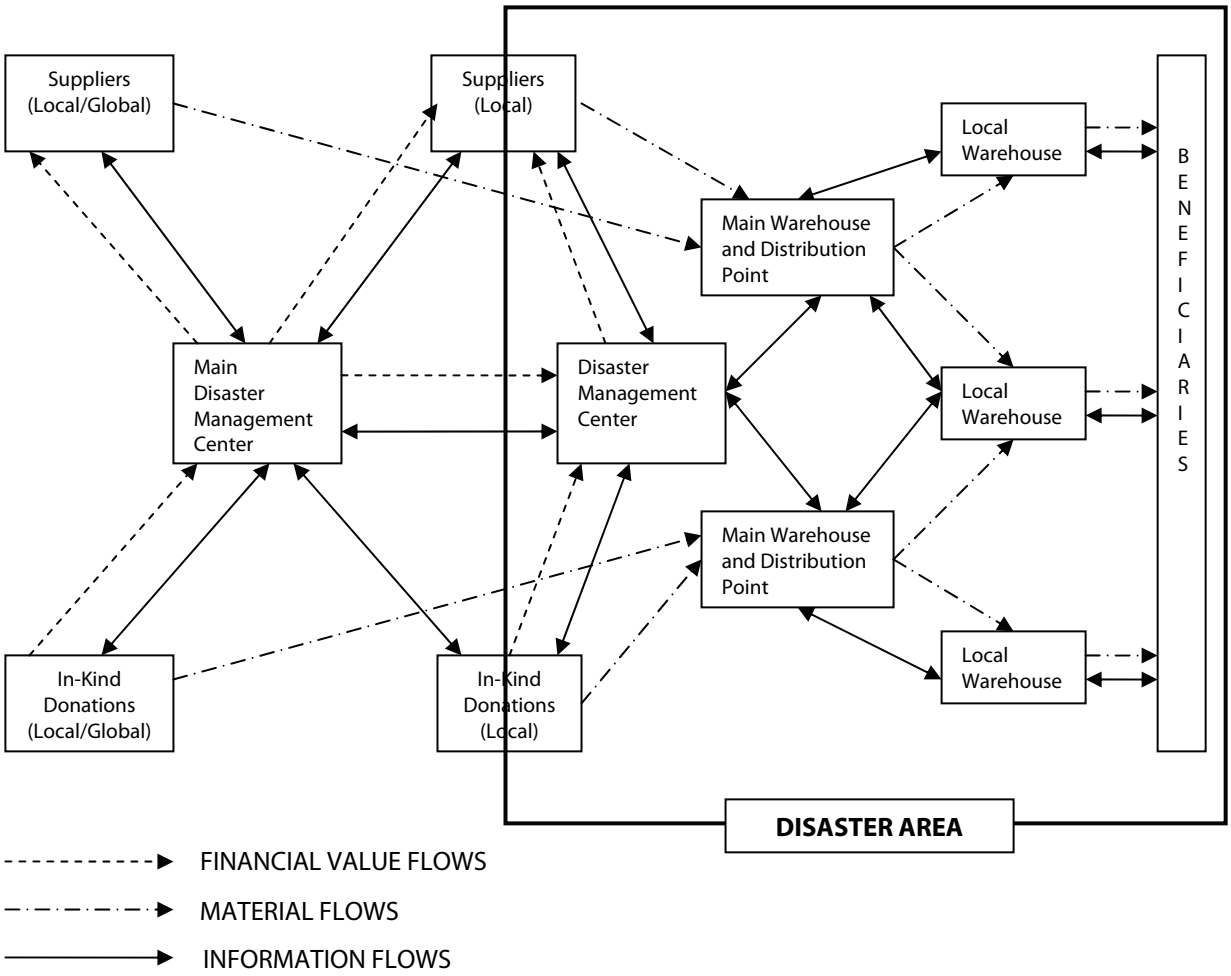

Figure 2: Generic Structure of Relief Chain

Like Supply Chain Management, the HRC also involves delivering certain supplies to certain people, at a certain place, at a certain time and in certain quantities. The HRC links all of the stakeholders (donors, humanitarian organizations, military, governments, beneficiaries, etc.) in the processes. The typical flows in the HRC driven by an international/local HRO are illustrated in Figure 2. Material flows of humanitarian aid activities and deliveries of goods and equipment to disasters follow routes from the suppliers to the warehouses. Delays or disruptions in the flow of material during a disaster may cause additional pain. Information flows connect the actors and the following HRC processes: preparedness; assessment and appeal; track and trace; monitoring, evaluation and reporting and communications. Financial flows take place during the subsequent processes: preparedness, assessment and appeal, procurement, monitoring, evaluation and reporting.

3.3. Comparision of the Humanitarian Relief Chain with the Commercial Supply Chain

Relief Operations crucially rely on logistics support and effective HRC, which enable the prompt delivery of the required goods and services. Applied to R/Os the fundamental aspects of SC remain the same; however some differences may appear due to the specificities of DM.

One of the primary differences between the nature of the "Demand Patterns" is that whereas commercial SC experiences relatively stable and predictable demand patterns, the demands in a humanitarian chain are irregular and occur suddenly in unpredictable locations. In most applications, the commercial SC product demand from the internal and external environment is relatively stable and predictable. In addition, many facilities, especially warehouses and residential demands, are needed for an appropriate structure. However, the chain

of humanitarian aid materials, the demand for services and the staff is composed of irregular amounts and irregular intervals. For this reason, many facilities are in place until the demands become unclear.

The other difference concerns "inventory management". In the commercial sector an inventory management system ensures the continuity of business profits and sales revenues to increase the competitiveness of the acquisition and the active management of stock due to a decision parameter (Üreten 1999, p.43-44). Strategic inventory planning is concerned with the optimal deployment of inventories, often by product family, across the redesigned SC network. Deployment refers to decisions regarding the location of inventories and the missions of the facilities where inventories are stored. For example, decisions about whether or not to have one or more distribution centers dedicated to slow moving items. Such inventory deployment decisions should be coordinated with other network redesign decisions such as the location of plants and distributions centers. Incorporating inventory deployment decisions in SC network optimization models to optimize coordination plans has been recently achieved. It requires innovative modeling methods because the one year planning periods typically used in these models are too long to accurately track inventories through material balance equations (Shapiro 2006, p.3).

But creating a systematically inventory management system for HRO can be more difficult than a commercial enterprise. HRC has very short lead time, challenging inventory policies, and unreliable information flow to minimize suffering in the affected areas. Excessive costs and unnecessary resource use in this situation is caused by the operations carried out. HROs in a wide variety of inventory management policies can be affected by the following factors:

- The organization's founding goals.
- Long-term management strategies, medium-term tactical and short-term daily operational decisions. For example, the goal of the strategy of the International Federation of Red Cross and Red Crescent Societies (IFRC) for inventory management services is "the national organizations of humanitarian aid, disaster preparedness and disaster activities and manpower services to offer in terms of material resources in order to be capable of adequately supporting the effective management of a stock". Such an operation is considered successful in the case of a disaster anywhere in the world consisting of 48 hours for 5,000 families, and 15,000 families predicted for the delivery of relief supplies at a standard of 14 days.
- The needs of victims
- Disasters
  - Type
  - Size
  - Area
  - Number of victims
- Weather and terrain conditions
- Response priority and speed
- To-do type of assistance
- Use of required technology
- Transportation facilities
- Economic movements
- Ethnic structures

Another difference is "information flows". In SCM, information flows create efficient coordination through the channels. This enables the transparency and visibility of the SC. But as mentioned before, information flows are often unreliable, incomplete or non-existent at the disaster area. In addition, HRC does not have a stable environment, very well-defined, pre-committed or over-defined networks and no pre-planned customer demand. In addition, the system actually works in an environment where within a very short period of time it is required to meet demands for formations amid insufficient or missing information, or information overload, as well as within an uncertain environment and with unreliable information flow to minimize suffering in the affected areas. An important requirment for a collaborative system is the ability to capture knowledge from multiple domains and store it in a form that facilities reuse and sharing. It is clear that communication problems form an important part of the differences in the construction of HRC.

Another difference concerns "performance measurement". The ultimate goal of the performance management in SC systems is establishing relationships between decision variables and performance outputs, leading to the certainty and maintenance of high-performance systems. A performance measure describes the effectiveness and/or efficiency of a system. Effectiveness is the extent to which the system performs the required objectives, while efficiency is the amount or number of resources the system uses to meet the required objectives (Beamon 2004, p.79).

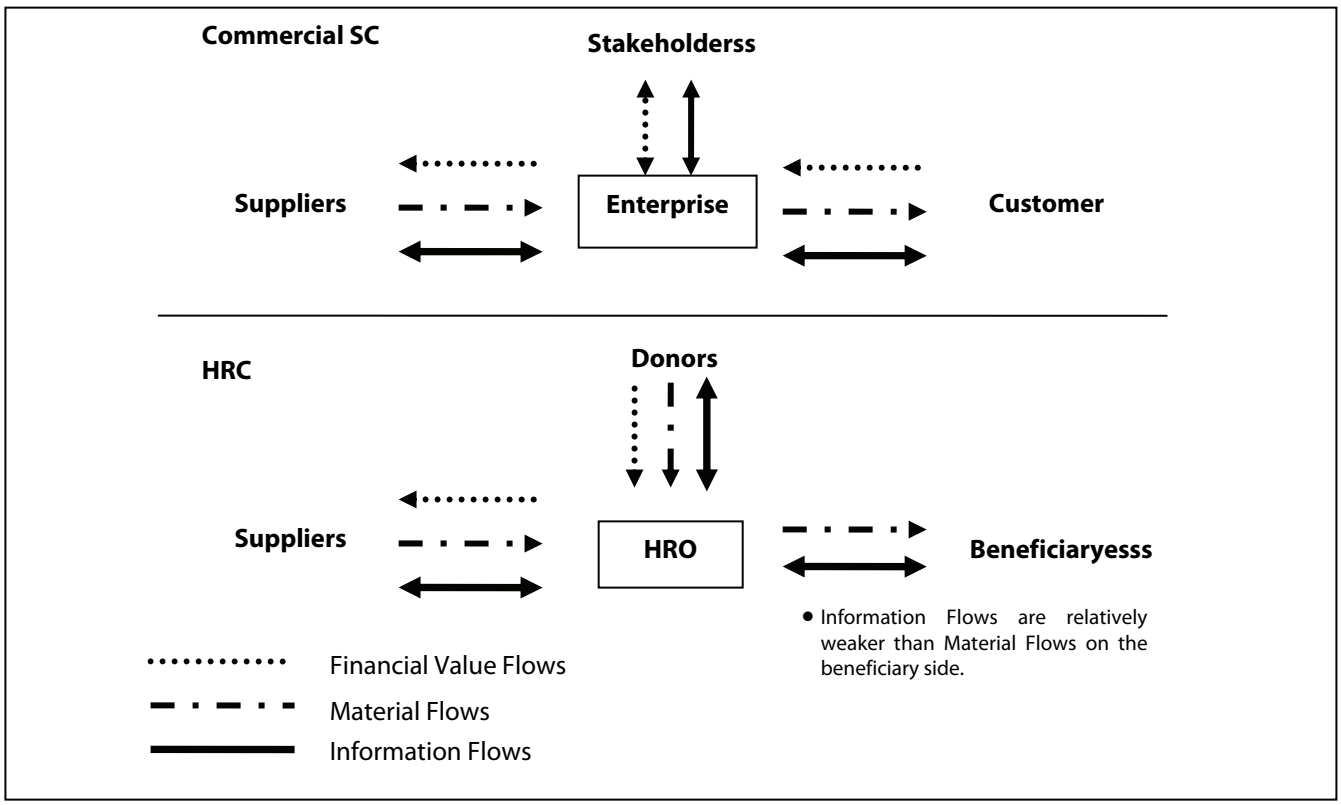

Figure 3: Comparing HRC and Commercial Supply Chain Flows

Performance measurement is vital to HRO as well. However, like other processes, performance management in HRC is not simple. Critical issues remain regarding which measures are the most appropriate indicators of performance and how these factors influence the flow of information for decision making and coordination. For example, lack of coordination among chain members has been shown to increase inventory costs, lengthen delivery times, and compromise customer service. Since logistics accounts for 80% of relief operations, relief chain coordination is the key to improving HRC performance (Balcik et al 2010, p.22). It may also be necessary to have more than one set of criteria for performance management: one for rapid onset disasters and another for slow onset disasters.

The Humanitarian Relief Chain, according to commercial SC, has among its most significant shortcomings its still immature performance measurement sets and undefined standard management processes. There are several reasons for this situation, including:

- The lack of structure for collecting the necessary information
- Insufficient IT infrastructure
- The unpredictable, chaotic and unknown environment after the disaster
- The lack of encouragement for HROs to measure performance
- The potential negative approach of the media
- Human resource issues
- Organizational culture
- Conflict between short-and long-term goals of the DM approach
- Other external factors

Another difference concerns the "structure of the chain". Chain content must change according to the type of disaster: the weather and ground conditions, transportation opportunities and the degree of assistance vary priority. This activity is taken into account when at the disaster region unstable and changing conditions become more complex.

Another important difference is the "customer". Commercial SC originates at the customer who is driven by his/her needs, wishes and desires and who is, or ought to be, the origin of all activities within the SC. This notion can partially be transferred to HRC, where the beneficiary is in need of certain services and goods. However, the beneficiaries cannot be considered the real driving forces

behind the SC, although an assessment of the beneficiaries' needs is often the origin of activities within the HRC, as shown in Figure 3. Rather, these are the donors who finance all activities within the SC. Donors provide (mainly financial) resources, which are sourced, channelled and managed by the funding process. Humanitarian organizations must sometimes be the first solution to their sponsor before they can serve the beneficiaries. Beneficiaries are the "customers" who hopefully do not seek to return. Therefore, the objectives are different: while the objective of commercial supply chains is the maximization of profits, the HRC is driven by alleviating the suffering of people in crisis (Kovács and Spens 2007, p. 107).

4. Conclusion

Disaster is a situation or event that overhelms local capacity, necessitating a request to national or international levels of external assistance. It is an unforeseen and often sudden event that causes great damage, destruction and human suffering (İlhan 2009, p.248). The need to increase activity rates for humanitarian aid supply chains is emerging in all its clarity. To increase quick responce capability and the effectiveness of relief operations, any HRO needs careful planning and strong relations with its suppliers and donors. In 2006 alone, 427 disasters occurred around the world. In those disasters, more than 23,000 people were killed, and 143 million people affected, and more than $34.5 billion in economic damage was incurred. "Disaster relief is and will be a continuing growth market. Disasters are expected to increase another five-fold over the next fifty years due to environmental degradation, rapid urbanization, and the spread of HIV/AIDS in the developing world" (Thomas and Rock Kopczak 2005).

Most of the research work and real test case analyses (in fact, as can be seen in the literature, not enough research has been done in the domain of DM) have assessed that many relief operations are ineffective and many problems can be observed. Analysis of these problems has shown that a major part involve inventory, transportation, communication, and performance problems originating at the interfaces of different parties or functions.

The Humanitarian Relief Chain has the opportunity to increase its contribution to disaster relief, as well as to be recognized for this contribution by implementing initiatives in the areas of logistics, knowledge management, performance measurements, community and positioning. While moving relief items to disaster sites will continue to be an important role for logistics, the strategic focus must be on providing timely information, analyzing information to garner insight as to how to improve operations and learning internally, among others. It is imperative for humanitarian logisticians to find ways to communicate to donors and the general public how logistics effectiveness is improving.

It is hoped that through a stronger focus on logistics and especially the professionalization of the humanitarian logistician this focus will indeed change. If this can be achieved, humanitarian logistics will have succesfully made the transition to HRC management, where every partner in the chain is committed to the goal of creating and fostering value creation for the poorest, most marginalized and disaster-stricken populations on earth.

In this paper, the Humanitarian Relief Chain has been discussed as an approach of SC within the point of view of DM and its differences from commercial SC have been highlighted. It is clear that many activities should be done to bring HROs closer to the private sector in terms of accountability, transparency of operations, coordination and collaboration, improved logistics and streamlined operations. HRC has been recognized as being of crucial importance for the effectiveness and efficiency of humanitarian operations. However, many humanitarian actors have not yet acknowledged this importance and continue to mainly concentrate their efforts on fundraising, communications or public relations. HRC is commonly viewed as a necessary expense rather than having an interface and management function decisive for the success of relief operations.

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Fiscal Policy Stance and Debt Sustainability in SEE countries: A Comparative Analysis

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Abstract:

Following a period of declining debt in the current decade, recent developments in view of the current global financial crisis brought again to the fore the issue of public debt in SEE emerging market economies. The existing fiscal vulnerabilities pose a major challenge for consolidation. This paper places an emphasis on the SEE countries' fiscal structure in a comparative perspective, since public debt has often had more immediate consequences for economic performance and debt crisis has been a recurring phenomenon of the histories of many of these countries. The macroeconomic data series show that all countries in our sample have made efforts towards a successful fiscal consolidation over the last decade – largely supported by strong output growth and low real interest rates. However, the empirical evidence is suggestive of a weak link between public debt sustainability and the short-run conduct of fiscal policy. This means that the short-run conduct of fiscal policy does not tend to improve debt sustainability and hence to reduce the probability of sovereign risk in SEE.

Keywords: emerging SEE economies, public debt dynamics, debt sustainability

JEL: G1, G2, H3

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1. Introduction

Following a period of declining debt in the current decade, recent developments in the view of the current global financial crisis have brought again to the scene the issue of public debt in SEE emerging market economies. There are some worries that going forward will activate potential vulnerabilities, especially at a time when the growth rate in advanced Europe is falling (see Bank of Greece 2009, Gardó and Martin 2010, Hardouvelis 2011). For instance, fiscal vulnerabilities pose a major challenge for consolidation. So far, in 2009 and 2010, Bulgaria, FYROM and Serbia recorded worse than foreseen budget outcomes, whereas in Albania and Romania the budget deficit declined due to considerable spending cuts in Romania and to higher than expected tax revenues in Albania. However, it still remained high. Turkey reduced its fiscal deficit chiefly due to output growth acceleration. Nevertheless, in all SEE countries debt ratios increased; they, however, still lag behind the debt levels of the euro area countries.

The political economy aspects of public debt have received increased attention in recent years. In this literature, debt is seen in a strategic context, where the government can use it to finance higher spending or tax cuts to boost its re-election prospects or to try to constrain the actions of successor regimes (see Rogoff 1990, Persson and Svensson 1989). Why might a

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government choose to borrow and accumulate debt? First, debt may be used to fund spending that contributes to broader economic and social objectives such as physical infrastructure, population's education and health. Second, debt may be used as a buffer to limit the need to immediately raise taxes to finance increased spending in the view of a sudden and temporary event, for example, a war or a natural disaster (see Barro 1979). Third, financing counter-cyclical fiscal policy by issuing debt helps to stabilise the economy and smooth the business cycle. However, high public debt requires high taxes to repay the debt and pushes upward the real interest rates, crowding out private investment. A highly indebted government that it is no longer able to finance its deficits should raise taxes or curtail spending often at a time when fiscal policy is needed to help stabilise the economy. In other words, fiscal policy becomes pro-cyclical instead of being counter-cyclical. When the government cannot find revenues to finance debt issue, a debt crisis occurs and the government is forced to default or inflate the debt away. Both actions entail large economic and social costs due to resulting painful periods of financial consolidation and economic adjustment.

In this paper, we study the country specific features that determine a sovereign risk element. We place an emphasis on the SEE countries' fiscal structure in a comparative perspective, since public debt has often had more immediate consequences for economic performance and debt crisis has been a recurring phenomenon in the histories of many of these countries.

Country risk includes 'sovereign risk', i.e. the risk that a government would fail to honour its sovereign obligations due to either unwillingness or inability to pay; 'transfer risk', i.e. the risk of restrictions on the international transfer of funds; and 'collective debtor risk', i.e. the threat country-wide events will cause simultaneously default by a large number of private debtors.[1] Country risk is high when currency mismatch is high; the real exchange rate is overvalued; and large portfolio capital inflows paired with a weak banking system make it less likely that credit expansion will go towards the most efficient borrowers (Goldstein 2007). Analytically, when financial liabilities are mostly denominated in domestic currency while assets are mainly denominated in foreign currency, then depreciation of the local currency will result in balance sheet problems that cause economic growth to decline. Thus, a low rate of GDP growth drives government revenues lower and threatens the country's ability to service its liabilities since the less liquid a country the more likely a debt crisis. Moreover, and more importantly, a high probability of a 'sovereign risk event' implies deterioration in the governance balance sheet that will eventually adversely affect the health of the balance sheet of both households and firms and ultimately the health of the balance sheet of the banks. This happens because an increase in the debt ratio today implies that taxes will go up tomorrow, impairing firms' profitability and reducing their ability to repay their debts to the banks.

We analyse SEE public debt dynamics in a comparative perspective and assess debt sustainability by first comparing actual and debt stabilising primary balances and, second, by looking at the relationship between fiscal policy tools and objectives. We find that although all SEE countries in our sample have made efforts towards successful fiscal consolidation, the data, however, have shown that it was largely supported by strong growth rates and low real interest rates over the last few years. More importantly, the empirical evidence is suggestive of a weak link between public debt sustainability and the short-run conduct of fiscal policy.

The rest of the paper is organised as follows. Section 2 discusses SEE public debt dynamics over the last decade. Section 3 nominates the specific features of the fiscal structure in SEE countries that determine the level of public debt that they can sustain. Section 4 estimates the fiscal policy response of debt accumulation. Section 5 concludes the paper.

2. Public Debt Dynamics in SEE

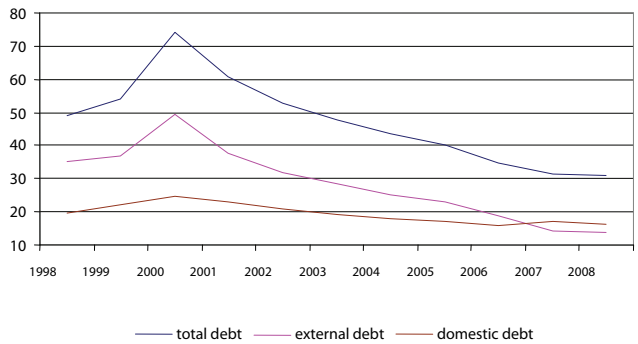
To the best of our knowledge, few studies have empirically examined public debt sustainability or large public debt reductions in emerging market economies. More recently, Reinhart and Rogoff (2009, 2010) analyse the cycles underlying serial debt and banking crises across a large sample of both emerging and mature economies and over a long time span.[2] In this section, we study those country specific features that determine a

[1] Political risk is associated with unwillingness to pay, while financial and economic risks are associated with inability to pay. For a thorough analysis of country and political risks with practical insights to global finance, see Wilkins (2004).

[2] For an examination of the episodes of large external debt reductions in these countries, see Reinhart, Rogoff and Savastano (2003). For an assessment of debt sustainability in emerging market economies, see IMF (2003, ch. II and III) as well as Sheikh and Heijmans (2004).

'sovereign risk event'. We place an emphasis upon the countries' fiscal structures in a comparative perspective. Public debt had sharply increased since the mid-1990s in many transition economies with costly debt defaults (Russia, Ukraine) and severe fiscal difficulties (Turkey) in the very early years of the 2000s. However, this is not to say that there have not been success stories. For example, Bulgaria has succeeded reducing significantly its excessively high public debt ratio, from close to 160 per cent of GDP in the early 1990s to less than 20 per cent in 2007. Another success story is Serbia; its high public debt has been reduced from around 240 per cent of GDP in 2000 to close to 30% in 2007.[3]

As seen in Figure 1, after a peak in 2000, total public debt as per cent of GDP followed a downward trend during the period 1998-2008, largely as the result of the painful fiscal consolidation process pursued over the last years. Compared with the value that the ratio takes for the euro area over the same period (70%), we see that for the SEE countries the mean rate was 1.5 times lower (Figure 2). Debt as a percentage of total public revenues is also lower in SEE (see Figure 3). However, Albania and Turkey have higher ratios; they are more than 2.5 times higher. Moreover, as seen in Figure 4, external debt was 2 times as high as internal debt, with Serbia, Bulgaria and FYROM show a higher proportion of external to internal debt.



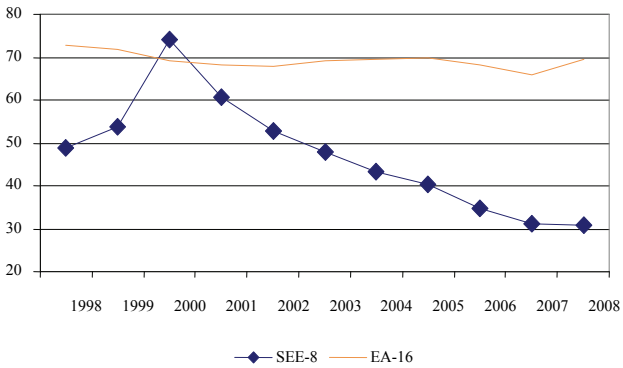
Notes: gross debt of general government, simple unweighted country averages, end of period data. For Turkey, the data refer to the non-financial public sector, and for FYROM, to consolidated central government. The data entries for the years 2007 and 2008 are preliminary, projected or estimated. The time period for Serbia (Montenegro is excluded) is 2000-2008; for Bosnia-Herzegovina, 1999-2008. See also the data appendix.

Sources: IMF *Country Reports*, SDW ECB, AMECO *General Government Data* (spring 2009) and national central banks.

Figure 1: Public Debt in SEE, percent of GDP, 8 countries, 1998-2008

[3] The excessively high rates of the public debt ratio are mainly attributed to the war of 1999.

What are the main explanations behind the developments in SEE markets' public debt? Figure 5 highlights the changes in the debt stock by using a simple public debt dynamics equation using the 2008 data entries. In particular, it gives a quantitative expression of the debt dynamics, giving the influence of the flow variables on the evolution of the outstanding stock of government debt.



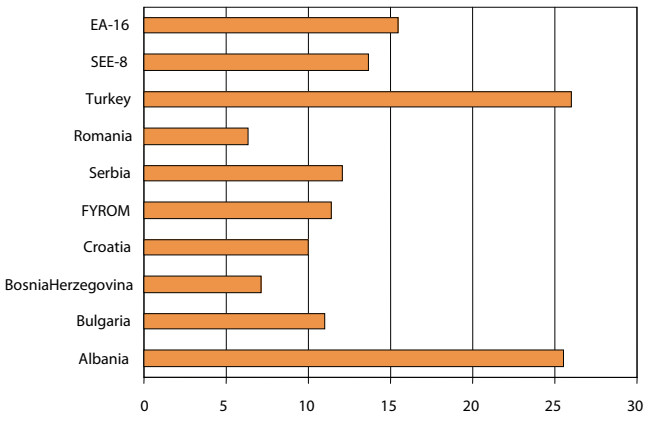
Notes: simple arithmetic unweighted country averages.

Sources: IMF *Country Reports*, SDW ECB, AMECO *General Government Data* (spring 2009) and national central banks.

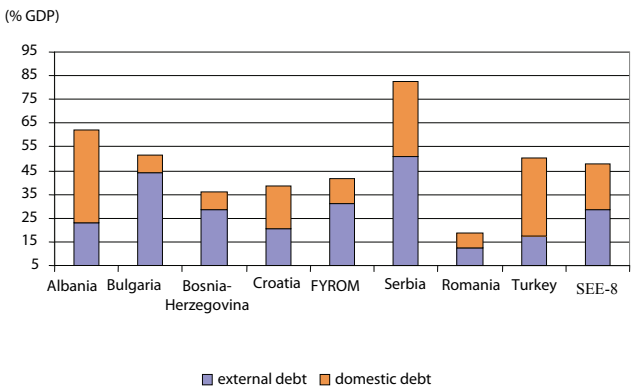
Figure 2: Comparison of Public Debt Levels in SEE and EA, *percent of GDP, 1998-2008*

According to the debt dynamics or the budgetary constraint of a country, public debt changes are influenced by the primary fiscal deficit (non-interest expenditures less revenues), the nominal GDP growth rate and interest rate and 'other factors'. The last item captures a wide range of factors, including the accumulation of financial assets, exchange rate depreciations, and fiscal costs arising from the resolution of banking sector crises and receipts from privatization deals (off-balance sheet items, contingent liabilities as well as remaining statistical adjustments).[4]

[4] It is known as stock-flow adjustment or debt-deficit adjustment (SFA). It ensures the consistency between a flow variable such as net borrowing and the variation in the stock of gross debt. Analytically, SFA is made up of the following elements. First, the net acquisition of financial assets leads to changes of the stock of debt even though it does not contribute to the primary deficit. Second, the appreciation or the depreciation of foreign currency denominated debt reflects the impact of changes in exchange rates on these debt components that are denominated in foreign currencies. Third, corrections are also needed due to the fact that the debt is measured at face value and therefore accrued interest is excluded. Fourth, adjustment may arise due to changes in sector classification and volume changes in financial liabilities. The last element of SFA is the statistical discrepancy that reflects differences arising from the diversity of data sources and statistical practices. For an analysis of the elements of FSA for the EU27 for the period 2005-08, see Eurostat (2009), April, EDP notification.



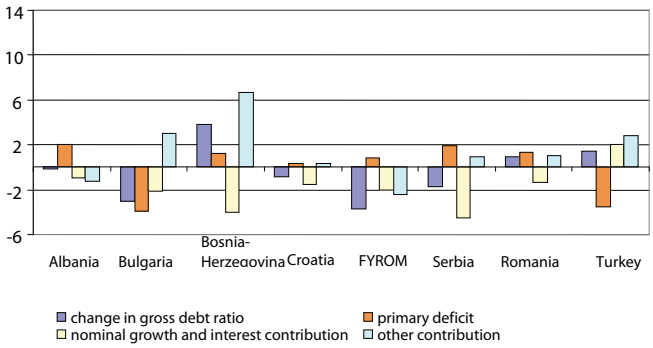
Notes: simple arithmetic unweighted country averages. General government total debt; total public revenues. End of year data.
Sources: IMF Country Reports, SDW ECB, AMECO General Government Data (spring 2009) and national central banks.
Figure 3: Public Debt, ratio to revenue, in per cent: average, 1998-2008



Notes: year averages and simple arithmetic unweighted country averages. The sample period is for Romania, 2000-2008 and for Croatia, 1998-2007.
Sources: IMF *Country Reports*, SDW ECB and national central banks.
Figure 4: Public Debt in SEE, *average, 1998-2008*

We note that in almost all of the countries in the sample, with the exemption of Turkey, the impact of output growth and the interest rate was favourable in reducing the stock of debt. The contribution of the primary balance, however, was not strong enough so as to cut debt. This was true in particular for Turkey, but not for Bulgaria. The broad picture is that the primary government balances were often insufficient to significantly reduce the debt-to-GDP-ratio. Primary deficits in Albania, Croatia, Serbia and Romania either constrained the downward trend of debt or reinforced its upward movement. In Turkey, in particular, the contribution of the primary surplus, even though it was large in value, did not seem strong so as to eventually contain debt. With regard to the 'other factors', in only two cases, Albania and FYROM, do they seem to have contributed to debt fall. In all of the other cases, their contribution was positive and particularly strong in Bosnia-Herzegovina[5], Bulgaria and Turkey. Additionally, finding empirical evidence of the 'twin deficits' relation in SEE countries during the transition process has proven elusive, since many factors other than fiscal policy play a significant role in determining the current account (IMF 2008). Panel data estimates for 15 Eastern and Southeastern European countries over the period 1995-2006 reveal that the current account is likely to be driven by more factors than fiscal variables, such as domestic credit, economic activity, terms of trade and the real effective exchange rate that have a significant impact on the current account (see Bartolini and Lahiri 2006). The received mixed empirical evidence may reflect first strong Ricardian effects, namely where fiscal consolidation allows economic agents to reduce domestic savings and, second, the overwhelming effect of domestic investment in causing large and persistent current account deficits (Teferra and Mottu 2006).

[5] Till 2006, the country's total public debt was dominated in foreign currencies and in conjunction with the strong devaluation pressures against the dollar, stock flow adjustment was high.



Notes: The debt dynamic equation emphasising the role of the primary (non interest) deficit can be written in terms of output:

$$\frac{D_t}{Y_t} = \frac{D_{t-1}}{Y_{t-1}} \times \frac{(1+i_t)}{(1+y_t)} + \frac{P_t}{Y_t} + \frac{SFA_t}{Y_t} \quad (1)$$

or

$$\frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}} = \frac{P_t}{Y_t} + \frac{SFA_t}{Y_t} + \frac{D_{t-1}}{Y_{t-1}} \times \frac{i_t - y_t}{1+y_t} \quad (2).$$

Based on equation 2, the total change in the gross debt ratio has been assessed as the contribution of primary balance (P_t, deficit), the stock flow adjustment and the contribution of nominal output growth and the nominal interest rate. The implicit interest rate i_t is derived as the nominal interest expenditure divided by previous period debt stock. For the most countries in the sample, data entries for the year 2008 are preliminary, estimates or projections.

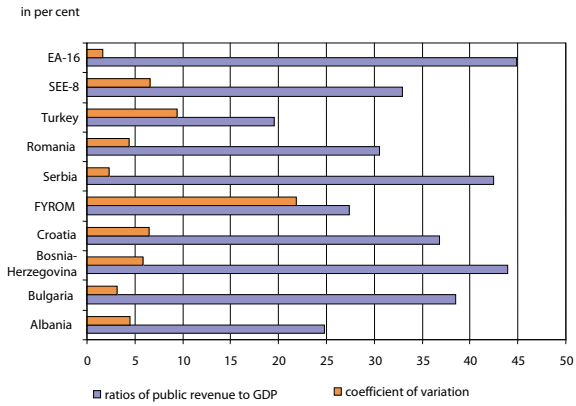
Source: Own calculations based on data from IMF *Country Reports.*

Figure 5: Contribution to changes in the total government debt stock; 2008, % of GDP

3. Assessing debt sustainability

What are the specific features of the fiscal structure in SEE countries that determine the level of public debt that they can sustain? We can nominate the following:

(i) SEE countries generally have lower and more volatile revenue ratios (see Figure 6). On average, the revenue to GDP ratio is about 33 per cent for the period 1998-2008, compared with 45 per cent in the euro area during the same period. There are, however, considerable differences among the countries with, for example, Serbia and Bosnia-Herzegovina having ratios almost on par with the euro area.[6] On the other hand, Turkey, Albania and FYROM are the countries with the lowest revenue ratio. The volatility of revenues measured as the coefficient of variation in SEE countries is generally much higher than in the euro area. Volatility is four times as high as in the euro area.[7]



Notes: gross public debt to total government revenues, mean averages and simple arithmetic unweighted country averages. The coefficient of variation measures the standard deviation relative to the series' mean. End of period data. The sample period for Serbia is 2003-2008 and for Croatia is 1998-2007. See also the data appendix.

Sources: IMF Country Reports, SDW ECB, AMECO General Government Data (spring 2009) and national central banks.

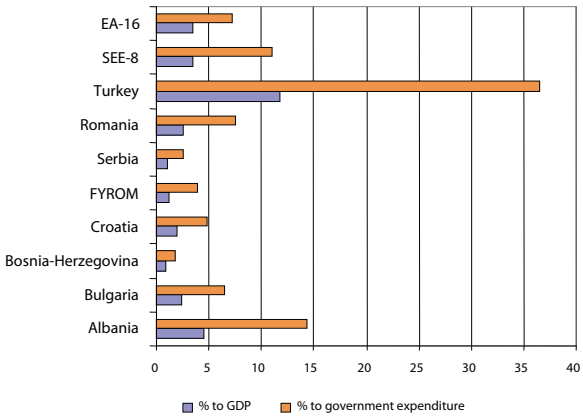
Figure 6: Revenue Ratios in SEE, 1998-2008

(ii) Interest costs account for a high proportion of government expenditure in SEE countries (see Figures 7.1 and 7.2). At 11 per cent of total expenditure, interest costs are 1.5 times as high in SEE countries as in the euro area, even though they account for an average of 3.5 per cent of GDP, which is on par with the EA-16. The relatively large burden of the interest cost indicates the risks to which SEE counties are exposed in view of the current world-wide financial and economic turbulence. This is because a decline in the growth rate accompanied by an upward move in expenditures and a downward move in revenues make the management of a short maturity debt a very hard task. Interest expenditures are also more volatile because of the structure of public debt. As seen in Figure 7.2, the coefficient of variation is 2.5 times as high in SEE countries as in the euro area. Currency mismatches and maturity mismatches can explain to

[6] It may be more important to assess the effective direct and indirect tax rate in an attempt to detect the reasons of the observed low revenue ratios. However, lack of data on key variables for many countries in the sample does not allow us to carry out this task. According to the methodology proposed by Mendoza, Razin and Tezar (1994), the effective direct tax rate is calculated as the ratio of total tax and non-tax revenues net of domestic taxes on goods and services divided by the sum of compensation of employees and total operating surplus. The effective indirect tax rate is calculated as the ratio of all domestic taxes on goods and services divided by private consumption.

[7] It has been empirically shown (see IMF 2003, Kose, Prasad and Terroner 2003) that, for most of the emerging economies, the impact of commodity prices and commodity exports on government revenues and thus on primary budget balance is important even for the emerging market economies that have diversified their exports away from primary commodities.

a great extent high volatility. With a large proportion of public debt either external or denominated in foreign currency,[8] and government revenues in domestic currency, high exchange rate volatility resulted in large spikes in interest payments relative to government income. Further, domestic debt is often of a short maturity so interest costs are more sensitive to changes in the domestic interest rates.

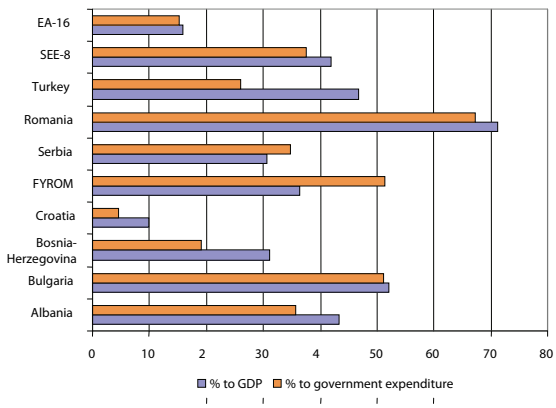


Notes: simple arithmetic unweighted country averages. For Serbia (Montenegro is excluded) the sample period is 2003-2008. Data entries for the year 2008 are preliminary, estimates or projections. See also the data appendix.

Sources: IMF, *World Economic Outlook* (April 2009), AMECO *General Government Data* (spring 2009), IMF *Country Reports*, Central Bank of Bosnia-Herzegovina *Annual Report*, Ministry of Finance of the Republic of Serbia, Ministry of Finance of Croatia.

Figure 7.1: Interest Costs in SEE, 1998-2008

coefficient of variation



Notes: simple arithmetic unweighted country averages. For Serbia (Montenegro is excluded) the sample period is 2003-2008. The coefficient of variation measures the standard deviation relative to the series' mean. Data entries for the year 2008 are preliminary, estimates or projections. See also the data appendix.

Sources: IMF, *World Economic Outlook* (April 2009), AMECO *General Government Data* (spring 2009), IMF *Country Reports*, Central Bank of Bosnia-Herzegovina *Annual Report*, Ministry of Finance of the Republic of Serbia, Ministry of Finance of Croatia.

Figure 7.2: Volatility of Interest Costs in SEE, 1998-2008 coefficient of variation

3.1 Actual and debt stabilising primary balances

These differences in public debt structures may have important implications for debt sustainability. A quite simple approach to public debt sustainability starts from the basic accounting identity that links the public sector budget balance to the change in the debt stock. A fiscal policy can be viewed as sustainable if it delivers a ratio of public debt to GDP that is stable. The difference between the actual and the debt stabilizing primary balance indicates the degree of fiscal adjustment that is needed to achieve a constant debt to GDP ratio (see Blanchard *at al.* 1990).

The budget identity indicates that the stock of public debt at the beginning of period *t+1* (B_{t+1}) results from the inherited debt (B_t) to which the period *t* interest requirements are added. Since interest costs are not a fiscal policy variable but depend on the stock of debt, the identity can be re-written relating the primary (non interest) balance, P_t (surplus), to the change of public debt stock:

$$B_{t+1} = (1+r_t)\, B_t - P_t \qquad (1)$$

or in terms of ratios to GDP to account for the effect of growth on borrowing capacity

$$(1+g)\, b_{t+1} = (1+r)\, b_t - p_t \qquad (2)$$

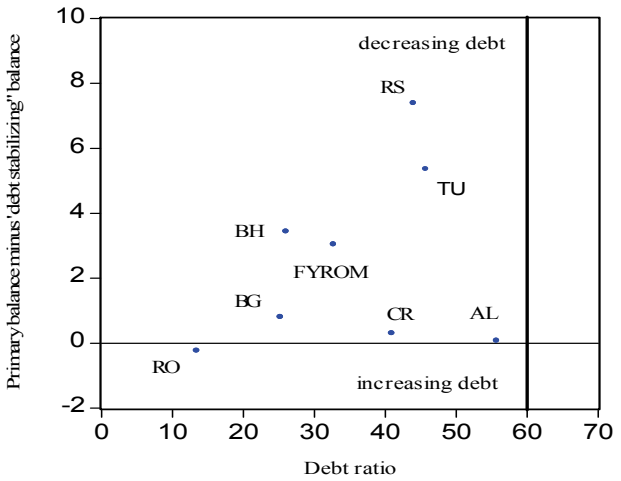
[8] For all countries, foreign currency denominated debt accounts for a very large proportion of total public debt. For example, in Bulgaria, Croatia, Bosnia-Herzegovina, Serbia and FYROM the stock of debt that is denominated in foreign currencies accounts for more than two thirds of the total stock.

where g is the nominal growth rate and r is the nominal interest on government debt. From equation (2) the primary surplus that stabilises the debt ratio (b_{t+1}) is given by

$$p^*_t = b_t (r-g) \qquad (3)$$

where g and r can be also measured in real terms as the effect of inflation disappears with the use of GDP ratios. From equation (3), the primary surplus consistent with a constant debt to GDP ratio increases with the initial debt stock and the difference between the real interest rate and the real growth rate, insofar that the real interest rate is higher than real growth. The main drawback of this simple indicator of debt sustainability is that it is based upon an arbitrary definition of sustainability (i.e. to stabilize the debt to GDP ratio). This is because it is unlikely for a country to maintain a stable debt ratio at all times while incurring temporally high debt levels that may be appropriate in some circumstances (see IMF 2003).

If the actual primary balance is less than the debt stabilising balance, current fiscal policy implies an increasing ratio of public debt to GDP. Based on the historical averages for the years 2005-2007, one can conclude that most countries in the sample had run primary (non-interest) balances consistent with what was required to stabilise or reduce the debt to the GDP ratio (see Figure 8). In all cases, public debt was below 60 per cent of GDP, i.e. the benchmark established for the EU members in the Maastricht Treaty. In Serbia and Turkey, both countries with a high debt ratio, the actual primary balance was more than the debt stabilising balance, meaning that fiscal policy pursued over the past few years implied a decreasing ratio of public debt to GDP and, therefore, it was viewed as sustainable. The reverse, however, is true for Romania and even Albania.[9] Many factors might explain the favourable prospects for SEE government debt dynamics. All countries had recently made considerable efforts to increase their primary fiscal surpluses. Further, a smaller primary surplus would be needed to stabilise or reduce the debt ratio as real growth was stronger and the real interest rate was much lower in the past few years.



Notes: real interest rate= nominal rate on public debt minus change in GDP deflator. See also the data appendix.
Source: Own calculations (see eq. 3) based on data from IMF Country Reports.
Figure 8: Actual and Debt Stabilising Primary Balances, 8 SEE countries, per cent of GDP, 2005-2007

4. Fiscal Policy Response to Debt Accumulation

A more formal approach to assessing debt sustainability is to look at the relationship between the fiscal policy tools and objectives. In other words, we estimate the 'fiscal policy rule' or the 'fiscal policy reaction function'.[10] In the context of the fiscal policy decision making process, we consider primary fiscal surplus as the key operating target that reflects the actions of the fiscal authorities and maintaining debt sustainability as their primary objectives. Therefore, we assume that primary fiscal surplus responds to public debt changes.

Following Bohn (1998), the fiscal policy reaction function can be written as follows

$$p_{it} = a_i + \Sigma_j b_i X_{ijt} + \lambda\, b_{it-1} + u_{it} \qquad (4)$$

where p_{it} is the primary surplus of country i at period t , X_{ijt} is a vector of temporary factors (j=1..N), b_{it-1} is the debt level at the end of the previous period, a_i is the country specific constant (fixed effect) account for heterogeneity in the group of the countries in the sample and u_{it} is an error term.

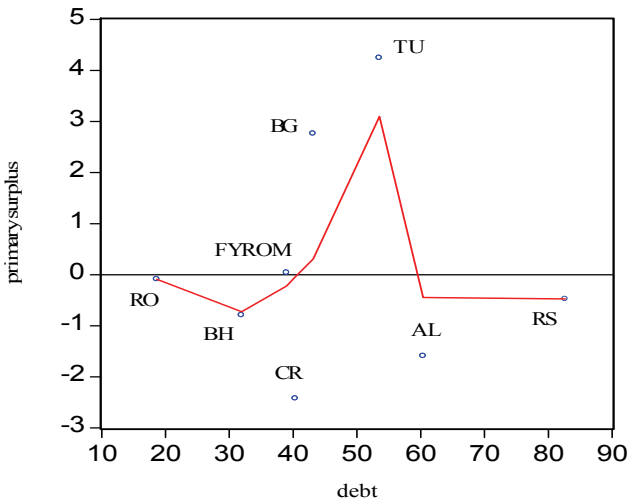
[9] Romania had the lowest debt ratio, but its actual primary balance was less than the debt stabilizing balance. Albania had the highest debt ratio among all of the countries in the sample while the difference between its actual primary balance and debt stabilising balance was near zero.

[10] For fiscal policy studies for industrial countries see, Bohn (1998), Mélitz (1997), Debrun and Wyplosz (1999) and Gali and Perroti (2003). For a comparison between industrial countries and emerging market economies, see IMF (2003).

A short-run consistent borrowing schedule requires that the primary balance systematically and positively responds to past changes in the public debt, that is the parameter λ in equation (4) takes a positive value. Specifically, we refer to the association between the primary surplus as per cent of GDP and the ratio of public debt to GDP observed at the end of the preceding year. For assessing this connection, we used pooled data for 8 SEE countries over the period 2000-2008.

However, surpluses are also affected by other macroeconomic variables that explain changes in primary balances unrelated to debt sustainability. According to Barro's tax smoothing policy (1979) these variables reflect temporary shocks to government spending that are due to business cycle fluctuations or exceptional events (such as wartime emergencies, natural disasters or economic crises and financial panics) that increase spending to abnormal levels. Therefore, apart from the ratio of public debt to GDP we consider two temporary factors that affect the primary balance: the business cycle and the inflation rate. Specifically, the output gap defined as the deviation of real GDP from its H-P filtered trend is included to capture the impact of the business cycle on the primary surplus. The CPI inflation rate accounts for shocks to seigniorage revenues.

Figure 9 brings together the primary balance[11] and public debt. As seen, the link between them seems to be positive at almost any level of debt below 50 per cent of GDP. However, the response of the primary surplus weakens and turns to be negative as the debt to GDP ratio exceeds that level and it stops altogether when the debt ratio exceeds 60 per cent of GDP. We should mention that this behaviour rests on the average of the countries in the sample and it does not refer to each individual country.



Note: The Kernel is the function used to weight the observations in each local regression; mean averages, end-of-year data.
Figure 9: Public Debt and Primary Balance, 8 SEE countries, 2000-2008, per cent of GDP

The empirical results presented in Table 1 verify the conclusion above. Before proceeding, we first take into account the time series properties of our data set. Testing the series for the presence of a unit root is necessary to avoid a spurious correlation. On the basis of the ADF test, we find that the null hypothesis of a unit root is rejected at conventional significance levels.

Debt stationarity does not necessarily mean debt sustainability. In a deterministic world, '…debt is said to be sustainable when the present value of future revenue flows minus debtor expenses can pay for all that has been contractually agreed' (Lustasa da Costa 2010, p74). One of the most commonly used ways to assess sustainability is based on public debt stationary tests. This way has gained momentum from the work of Hamilton and Flavin (1986). We recall that a stochastic process is in general stationary when it tends to revert to its average or to its trend following a random shock. Alternatively, a series is said to be weakly or convariance stationary if the mean and autocovariance of the series do not depend on time. This simply means that following a shock that changes the value of the debt, surpluses are raised to force the debt to slowly return to its original value. In other words, the value of the debt complies with the transversallity condition that says that the debt should be sustainable. However, Bohn (2007) questions this literature. He claims that an integrated debt of any order is always stationary. A difference stationary series is said to be integrated; the order of integration is the number of unit roots contained

[11] Not adjusted for the influence of transitory changes.

Block I. Fiscal Policy Reaction Functions *Dependent variable*: primary surplus as per cent to GDP		***Block II. Expenditure Equations*** *Dependent variable*: primary (non interest) spending as per cent to GDP	
Explanatory variables		*Explanatory variables*	
	(1)	*(1)*	*(2)*
constant	-2.644	36.482	19.596
	(-1.854)	(87.625)	(3.953)
Operational fiscal target			
Lagged public debt (% GDP)	0.073	-0.009	-0.011
	(1.875)**	(-1.817)***	(-1.854)***
Lagged public debt^2 (%	-0.006		
GDP)	(-1.596)***		
Lagged public debt^3 (%	0.001		
GDP)	(0.760)		
Control variables			
Output gap	15.034	8.736	8.084
	(1.505)***	(1.753)***	(1.752)***
CPI inflation	0.111	-0.038	-0.018
	(3.627)*	(-2.156)**	(-1.818)***
Lagged spending			0.474
			(3.497)*
Adjusted R^2	0.821	0.988	0.984
Se	1.150	2.463	2.238
Hausman statistic	No endogeneity	No endogeneity	No endogeneity
	(0.358)**	(0.187)**	(0.227)**
Number of observations	64	64	64

Notes: pooled cross section and time series data. The equations have been estimated with GLS allowing for fixed effects (country and period) and using a heteroskedasticity-consistent White variance-covariance matrix. *se* is the standard error of the regression. A constant term is automatically included so that the fixed effects estimates sum to zero. They should be interpreted as deviations from an overall mean. A Hausman (1978, Davidson and Mackinnon 1989, 2003) specification test has been also carried out testing whether the estimates are consistent. Debt service payments are chosen as an instrument in the auxiliary regression. The p-values of rejecting the hypothesis of consistent estimates are reported in the parentheses. (*) significant at 1%, (**) significant at 5%, (***) significant at 10%. See also the data appendix.

Sources: IMF *Country Reports* and *World Economic Outlook*, April 2009.

Table 1: SEE countries: fiscal policy reaction functions and expenditure equations, 2000-2008

in the series, i.e. the number of differencing operations it takes to make the series stationary. However, in practice we cannot reject sustainability based on stationary tests since stationarity cannot be tested for all orders. Ultimately, we cannot prove that a debt series is non-sustainable. Besides, stationarity tests based on the historical evolution of the observed time series neglect very recent structural changes that alter the future behaviour of the series.[12]

Estimating the fiscal policy reaction function and taking into account the influence of temporary factors and the existence of a non-linear relationship (quadratic and cubic powers of public debt have been added in the regression equation) between the primary surplus and public debt (both as per cent of GDP), we find that at low levels of debt the primary surplus does respond positively although slightly to a rise of the debt to GDP ratio. At mid levels, this response weakens and turns to a negative sign while at higher levels it seems that the primary surplus does not react at all as debt rises. It is worth noting that both transitory factors of the fiscal policy have the expected signs, but only inflation is statistically

[12] For a detailed discussion of the ways of assessing debt sustainability, see Lustasa da Costa (2010).

significant. In particular, in line with the effect on seigniorage revenues, higher inflation is associated with a larger primary surplus. By contrast, the primary surplus appears to be only slightly reactive to cyclical fluctuations.

These results suggest that – on average – the conduct of fiscal policy in SEE countries is not consistent with ensuring sustainability when debt exceeds a threshold of 50 per cent of GDP. However, the validity of this finding could be also attributed by the presence of two other factors. First, we examine developments over a short time period (2000-2008) and second, during that period, all countries in the sample reduced their debt ratios by taking measures towards fiscal restructuring and consolidation.

Broadly speaking, the results are suggestive of a weak link between debt sustainability and the short-run conduct of fiscal policy. They are primarily driven by the behaviour of primary spending, which, as per cent of GDP, appears to be slightly pro-cyclical (see Table 1, block II).[13] This means that in cyclical upswings primary spending increases slightly faster than output and falls faster in a downturn when revenues also decline and lending conditions tighten. Pro-cyclical fiscal policy likely reflects the inability to control spending and thus reflects the absence of the automatic stabilisers that give to government spending a stabilising role against macroeconomic volatility. Finally, the results in Table 1 also suggest that SEE countries react to debt accumulation by decreasing spending while inflation has a negative effect on spending.

5. Conclusions

The main purpose of the paper is to examine the country specific factors that may determine sovereign risk. We place an emphasis on the countries' fiscal structure in a comparative perspective since a high probability of a 'sovereign risk event' implies deterioration in the government balance sheet that will eventually adversely affect the health of the balance sheets of both households and firms and ultimately the health of the bank balance sheets. This happens because an increase in the debt ratio today implies that taxes will go up tomorrow, impairing firms' profitability and thus reducing their ability to repay their debts to the banks.

Our main empirical findings are as follows. First, examining the 'sovereign risk quality', we conclude that all SEE countries have recently made significant efforts towards successful fiscal consolidation that was largely supported by strong output growth and low real interest rates over the last few years. Second, the empirical evidence is, however, suggestive of a weak link between debt sustainability and the short-run conduct of fiscal policy. This means that the short-run conduct of fiscal policy does not tend to improve debt sustainability and hence to reduce the probability of sovereign risk in SEE. This finding is validated by the evidence on the pro-cyclical character of primary government spending.

However, some caveats are in order. First, the empirical findings are only suggestive, tentative and in no way definitive. This is due to the existence of serious constraints on data availability and to the short time horizon that we choose to study these developments. Second, since SEE countries are characterised by both domestic and foreign (public and private) debt, a possible way of examining sustainability would be to examine the link between fiscal and external sustainability. This involves the national income identity, the evolution of net foreign liabilities and the government's budget constraint. In this latter case, the credit risk is covered by the exchange rate risk with two parts to be studied: (i) the probability of the domestic currency depreciation and (ii) currency mismatch. Third, in the analysis we claim that the deterioration of fiscal balance would have harmful effects on the balance sheet of households and firms. However, in the recent crisis in Turkey in 2001, it was the fragility of the financial private sector balance sheet that initiated an economic crisis in the country. Therefore, a country-wide risk need not arise only out of government balance sheet imbalances. Some measures of both financial and non-financial sector balance sheets can be taken into account, such as the ratio of foreign currency denominated liabilities of non-financial firms to their foreign currency denominated assets. However, serious data constraints prevented us from doing so in our analysis.

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[13] The coefficient of output gap is positive and statistically significant only at a level higher than 10%.

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Data Appendix

In the empirical analysis we choose a set of macroeconomic variables for which a continuous data series is available for all of the countries in the sample. However, the use of different data sources and frequent updates concerning the variables' definitions or the method of data evaluation raise the problem of the existence of significant statistical discrepancies.

The data set for public debt (see Section 5) focuses on gross public sector debt rather than on net debt (where public sector assets are netted out) or the present value of the debt because of data limitations. The data are on a general government basis.

The set of fiscal variables refers to

EA-16. Debt: outstanding, general government; total public revenue: total current revenue (i.e. total of current taxes, social security contributions and other current revenue received by the general government, capital transfers are not included, ESA 95) (SDW ECB, AMECO); interest includes flows on swaps and forward rate agreements, excessive deficit procedure (AMECO *General Government Data*, spring 2009).

Romania. Debt: consolidated general government, excluding public debt guarantees (SDW ECB, AMECO and Romanian National Bank); interest, total government expenditure: consolidated general government (IMF *Country Reports*).

Bulgaria. Debt: general government, total public revenue: general govern ment (taxes, grants and non tax revenues) (IMF *Country Reports*); interest and total government expenditure: excluding social insurance contributions paid by the general government on behalf of its employees (IMF *Country Reports*).

Croatia. Debt: general government, arrears and guarantees stock are excluded; total revenue: consolidated central government (IMF *Country Reports*, Croatian National Bank); interest and total government expenditure: consolidated general government (Ministry of Finance).

Turkey. Debt: non-financial public sector (i.e. general government= central government plus local administration and funds minus financial institutions), total central government revenue (IMF *Country Reports* and Central Bank of Turkey); interest and total government expenditure: central government (IMF *Country Reports*).

FYROM. Consolidated central government for domestic and total debt while general government for external debt, central government revenue (total revenues and grants), (IMF *Country Reports*); interest and total government expenditure: consolidated central government (IMF *Country Reports*).

Albania: Debt: general government, including arrears; total government revenue: taxes and grants (IMF *Country Reports* and Bank of Albania); interest and total government expenditure: general government (IMF *Country Reports*).

Serbia (Montenegro was excluded). Government guaranteed debt was included while IMF was excluded, general government (IMF *Country Reports*); interest and total government expenditure: Ministry of Finance. The data on primary surplus and primary spending for the years prior to 2003 refer to Serbia and Montenegro.

Bosnia-Herzegovina. Debt increases in 2007 reflect the estimated recognition of domestic claims and in 2008 the projected recognition of domestic claims, consolidated general government (IMF *Country Reports* and the Central Bank of Bosnia-Herzegovina, *Annual Reports*); interest and total government expenditure: consolidated general government (IMF *Country Reports* and the Central Bank of Bosnia-Herzegovina, *Annual Reports*).

For SEE countries, the data for GDP (at current and constant market prices in national units) and for CPI inflation (2000=100, year averages) are from the database of the *World Economic Outlook*, IMF, April 2009. For EA-16, GDP time series (at current market prices, ESA 95) are from the AMECO.

The Impact of Exchange Rate Volatility on Turkish Exports: 1993-2009

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Abstract:

This paper attempts to investigate the long-run and short-run relationships between Turkish exports, exchange rate volatility, foreign income, and relative prices by employing quarterly data for the period 1993Q3-2009Q4. Towards this purpose, multivariate cointegration and error correction model (ECM) techniques are used in this study. The long-run estimation results suggest that foreign income and real exchange rate volatility exert positive and statistically significant impacts on Turkish exports, while relative prices affect Turkish exports negatively and significantly. In addition, the results of the ECM model indicate that relative prices have a negative and significant effect, foreign income has an insignificant effect, and nominal exchange rate volatility has a positive and significant effect on Turkish exports.

Keywords: Exchange Rate Volatility, Export, ARDL Cointegration, Turkey.

JEL: F14, F31 and F41

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1. Introduction

Since the collapse of the Bretton-Woods system, the volatility of real and nominal exchange rates has increased among countries that adopted a new regime of floating exchange rates. In addition, free movement of capital cross-border also tended to amplify the extent of exchange rate volatility among countries. As a result of these developments, many researchers have shifted their attentions to investigating the nature and magnitude of the impact of exchange rate volatility on trade flows. Therefore, a great deal of both theoretical and empirical literature has been generated in this field. From this literature two distinguished hypotheses have emerged: whilst the first argues that the volatility of exchange rates would have an adverse effect on trade flows, the second argues that the volatility of exchange rates would encourage trade flows. In the Turkish context, information about the impact of volatility on exports is also a major concern for policy makers given the implementation of flexible exchange rate mechanism since early 2001.

Empirical studies have also yielded conflicting evidence for the effect of exchange rate volatility on trade flows due to the sample period chosen, model specification, measure of volatility preferred, and countries selected. There are a great number of empirical studies that support the hypothesis that increased

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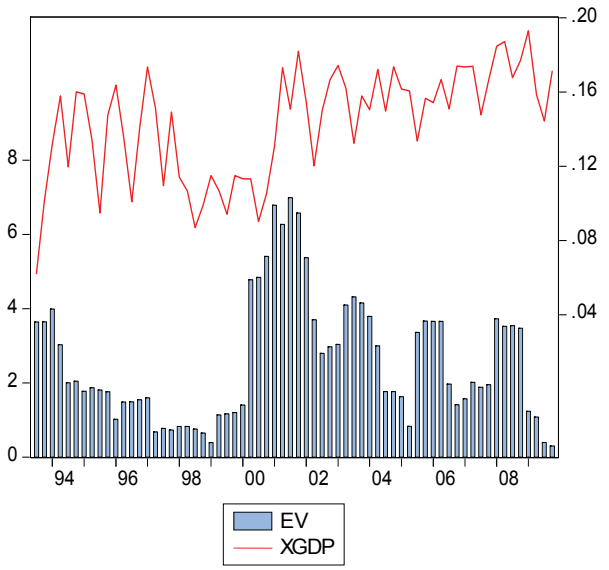
exchange rate volatility will decrease trade flows due to risk-averse traders. Among the examples are Cushman (1983 and 1988), Kenen and Rodrick (1986), Thursby and Thursby (1987), De Grauwe (1988), Chowdhury (1993), Arize (1995), Doganlar (2002), Vita and Abbot (2004), Clark, et al, (2004); and Arize et al (2008). On the other hand, several others support the hypothesis that increased volatility may lead to a greater volume of trade or an ambiguous effect on trade flows (Hooper and Kohlhagen, 1978; Bailey et al, 1987; Franke, 1991; Asseery and Peel, 1991; Sercu and Vanhulle, 1992; Holly, 1995; McKenzie and Brooks, 1997; McKenzie, 1998; Aristotelous, 2001; Bredin et al, 2003; Kasman and Kasman, 2005; and Zhang et al, 2006).

The effect of volatility in exchange rates is particularly important for Turkish exports since more than 25 percent of GDP during the study period is exported to the world market. The results of the current estimation are to some extent consistent with the previous findings by Kasman and Kasman (2005) and Ozturk and Kalyoncu (2009). The earliest work of Ozbay (1999) covering this period, where a crawling peg exchange regime was followed, concluded that exchange rate uncertainty bears a negative impact on exports. Another study by Vergil (2002), estimating bilateral exports to the US, Germany, France, and Italy also provided evidences for a negative relationship between real exchange rate volatility and real exports. Kose et al (2008), using three different measures of real exchange rate volatility over the monthly period 1995-2008, found that exchange rate volatility has a negative effect on aggregate exports both in the long-run and short-run. Other studies which also established similar findings include Buguk et al (2001), Doğanlar (2002), Ozturk and Acaravcı (2003), Demirel and Erdem (2004), Saatcioğlu ve Karaca (2004), and Tuncsiper and Oksuzler (2006).

As can be seen from Figure 1, higher exchange rate volatilities in 1994, 2001, and 2008 are associated with greater instabilities in the economy and world as well as significant increases in scale and variety of cross-border financial transactions in the last two decades. In addition, real exchange rate has become fairly volatile since Turkey followed free float exchange policy after 2001 compared with the period before 2001 when the managed float and crawling peg exchange regimes were adopted. If the exchange rate fluctuations, particularly for the post-crisis period (2001), are examined together with the export performance of Turkey, one can suggest that the export performance does not fall with increasing exchange rate fluctuations.



Note: Real Exchange volatility is computed by using data from the Central Bank of Turkey

Figure 1: Real Exchange Volatility and Export/GDP Ratio, 1993-2009

The rest of the paper is organized as follows: Sections 2 and 3 review the previous theoretical and empirical literature, respectively; Section 4 specifies the model of export demand of Turkey, describes data sources and definitions of variable and explains the estimation techniques. Section 5 discusses the findings of empirical analysis. Finally, section 6 offers some concluding remarks and policy implications.

2. Theoretical Literature

As was said earlier, the impact of exchange rate volatility on trade flows can be positive or negative depending on the assumptions employed in relation to the definition of exchange rate volatility, market structure, the flexibility of production capacity, the presence or absence of a forward exchange market, and the risk preferences of traders (Hooper and Kohlhagen, 1978; Ethier, 1973; De Grauwe, 1988; Franke, 1991; Viaene and Vries, 1992; Sercu and Vanhulle, 1992; and De Grauwe, 1994). Côte (1994) and McKenzie (1999) who surveyed the literature on the topic conclude that there has been no unambiguous relationship between exchange rate volatility and trade flows.

The early theoretical studies supported the view that an increase in exchange rate volatility leads to a decline in

the volume of trade flows (Clark, 1973; Hooper and Kohlhagen, 1978). These models, by taking into account risk-averse firms, argued that higher exchange rate volatility lowers the level of expected profits from exports and, thus reduces the volume of trade. This outcome is obtained with the assumptions of no forward market, that exchange rate volatility is the only source of risk, and production and trade decisions are to be made before uncertainty is resolved. Another traditional model of Ethier (1973) and Baron (1976), under the assumption of perfect hedging, stated that exchange rate volatility may not affect the volume of trade. This is the case for industrial countries, where there is a well-developed forward market. Firms in these countries can easily avoid their sales from markets where there is high exchange rate volatility. In addition, there are various possibilities for reducing the level of exposure to the exchange rate risks for a multinational firm that engages in a wide variety of trade and financial transactions across a large number of countries (Makin, 1978).

On the other hand, recent studies suggest no clear-cut relationship between exchange rate volatility and trade flows. Viaene and Vries (1992) stressed that even in the presence of a forward market, exchange rate volatility can affect indirectly the volume of trade. They show that an increase in exchange rate volatility may generate adverse effects on importers and exporters since they are located on the opposite sides of the forward contract. Thus, an increase in exchange rate volatility may operate to the loss or benefit for trade flows, depending on the net trade balance of the country. Exporters lose (benefit) and importers benefit (lose) when the trade balance is positive (negative), or alternatively when the forward risk premium is positive (negative). De Grauwe (1988), assuming firms operate in a competitive market and domestic price of exports is the only source of risk, suggested that the effect of exchange rate volatility on exports depends on the degree of risk aversion. If firms are sufficiently risk averse, an increase in the exchange rate volatility raises the expected marginal utility of export revenue and thus induces them to export more (income-effect). However, if firms are less risk averse, they will produce less for exports since exporting becomes relatively less attractive (substitution-effect). Under this setting, the author concluded that the dominance of the income-effect over the substitution-effect can lead to a positive relationship between exchange rate volatility and trade flows.

While these models took into account the firm's option to hedge or at least diversify its exchange risk, they often ignored the firm's option to adjust producton and trade in response to exchange rate risks. Models focusing on such adjustments suggested that higher exchange rate volatility can cause more trade (see Dixit, 1989; Franke, 1991; Sercu and Van Hulle, 1992; De Grauwe, 1994). Franke (1991) modelled the export strategy of a risk neutral firm, which operates in a monopolistic market. The export strategy is determined by the transaction (entry and exit) costs to a foreign market. A firm starts exporting if the present value of the transaction costs is outweighed by the present value of the expected cash flows from exports. When the expected cash flow is a convex function of the exchange rate, the present value of cash flows grows faster than that of the entry and exit costs and the firm benefits from increased exchange rate risk. Under this setting, the model predicts that firms will enter a market sooner and exit later when the exchange rate volatility increases, so that the amount of firm trade will increase.

Sercu and Vanhulle (1992) analyzed the behavior of an exporter who incurs standard duties and transport costs instead of the entry and exit costs to/from a foreign market. In their analysis, Sercu and Vanhulle assumed risk aversion, a perfect forward market and a random walk for the exchange rates. When exchange rate falls (appreciation of local currency) below a certain level, the firm can either abandon the market completely or suspend exports temporarily. In the first case, all expenditures are stopped, while in the second case, the firm continues to incur some costs – such as maintaining equipment and keeping in contact with the market. The results of their analysis indicated that an increase in exchange volatility raises the value of the exporting firm and reduces the exchange rate, which causes the firm to stop exporting completely.

Finally, De Grauwe (1994) developed a very simple static model of an exporting firm which is a price taker in its market. The model assumed that there are no adjustment costs and the firm responds rationally to changes in production prices. A weaker (stronger) exchange rate increases (decreases) the local currency prices of exports, which induces the firm to expand (contract) production. Given the lack of consensus on the theoretical effects of exchange rate volatility on exports, there is a greater need for empirical analysis to shed light on this matter.

3. Empirical Literature

Similar to the theoretical discussions, empirical evidences of both early and recent studies have mixed implications, with a large majority of these studies failing to produce systematic relationship between volatility and trade flows. The early studies surveyed by the IMF (1984) did not yield consistent results, with a large majority producing little or no support for a negative relationship between exchange risks and trade flows, while bilateral studies seem to establish a negative relationship between the two variables. The earliest work conducted by Hooper and Kohlhagen (1978) examined the impact of exchange rate volatility on aggregate and bilateral trade flows for all G-7 countries except Italy. They measured the exchange rate volatility by the absolute difference between the current period spot exchange rate and the forward rate of the last period, as well as the variance of nominal spot exchange rate and the current forward rate. They found basically no evidence of any negative relationship.

Cushman (1983) used real exchange volatility to estimate U.S. bilateral exports to 17 industrial countries over the quarterly period of 1965-1977. From the 28 equations estimated in total, he found seven negative and five positive and significant coefficients for exchange rate volatility. Another study carried out by the same author in 1988 explored the relationship between real exchange rate volatility and U.S. bilateral trade flows. The study covered the period 1974-1983, where floating exchange regime was adopted. The results revealed a large number of significant and negative risk effects in 5 of 6 import flows and only one positive and significant effect on exports.

The IMF (1984) estimated bilateral export functions between G-7 countries over the quarterly period of 1969-1982. Export is considered as functions of foreign income, capacity utilization, real exchange rate, and real exchange volatility, which was measured as the standard deviation of percentage changes in the exchange rates over the preceding five quarters. From a total of 42 estimations made, only three provided negative and significant relationships, while eleven cases provided positive and significant relationships between the exchange volatility and exports.

Asseery and Peel (1991) also examined the influence of effective exchange rate volatility on the multilateral exports of five industrial countries over the quarterly period of 1972-1987. They used cointegration and error correction techniques to explore the long-run and dynamic short-run effects of exchange volatility on exports. For all countries except for the UK, the study found that volatility has positive and significant effects on exports.

A study by Kroner and Lastrapes (1993) examined the impact of exchange rate volatility on the exports of five developed countries for the monthly period of 1973-1990, using multivariate GARCH models. The results of the study indicated that exchange rate volatility have statistically significant effects on the export volumes for all countries. The signs and magnitudes of the volatility coefficients differ widely across the countries; negative for the U.S. and U.K. and positive for Germany, Japan, and France.

McKenzie and Brooks (1997) used the ARCH model to quantify variability in exchange rates in their study of U.S.-German bilateral trade over the monthly period 1973-1992. In their model, trade is viewed as a function of income, relative prices, exchange rates, and volatility. The estimation results indicated that a significantly positive relationship exists between volatility and trade flows.

Arize et al. (2000 and 2008) estimated export models to examine the effect of real exchange rate variability on export flows of 13 less developed countries and 8 Latin American countries, respectively. They used Johansen's multivariate cointegration and error correction techniques over the quarterly periods 1973-1996 and 1973-2004 to measure the long-run and short-run dynamic impacts of exchange rate volatility on exports. The major results showed that increases in exchange rate volatility impose significantly negative effects on exports both in the long-run and in the short-run in all countries.

Bredin et al. (2003) analyzed the relationship between export volume and its determinants, by using cointegration and error correction techniques. The model was estimated for both aggregate and sectoral Irish exports to the EU over the quarterly data for the period 1978-1998. The short-run and long-run estimation results showed that exchange volatility has no significant effect in the short-run, but has a positive and significant effect in the long-run on aggregate and sectoral exports. This can be concluded that a decline in exchange volatility associated with single currency (euro) will lead to a long-run fall in Irish exports to the market.

Aurangzeb et al. (2005) examined the impact of exchange rate volatility on Pakistan's exports to its major trading partners over the monthly period 1985-2001. Long-run and short-run export models were estimated by utilizing Johansen's multivariate cointegration and errror

correction approaches. Exchange rate volatility is measured by using an ARCH-type model. The long-run results provided a negative and insignificant impact of volatility on exports in all cases. The results of the short-run models, however, suggested a negative causality running from volatility to exports in all cases except for the UK.

Hall et al (2010) examined the impacts of exchange rate volatility on exports of 10 emerging market economies (EMEs) and 11 other developing countries in their study. They used panel data, covering the period 1980:Q1–2006:Q4 and two different estimation methods - generalized method of moments (GMM) and a time varying coefficient (TVC). The result suggested that there is a negative and significant effect of exchange volatility on exports for the non-EMEs, while there is no negative effect for the EMEs. This implies that the open capital markets of EMEs may have reduced the effects of exchange rate fluctuations on exports compared with those effects in the other developing countries.

There are also studies that employ an augmented version of the gravity model[1] to investigate the relationship between exchange rate volatility and trade flows. These studies also failed to establish any systematic relationship between the two variables. Frankel and Wei (1993) looked into the relationship between exchange rate volatility and bilateral trade flows between 63 industrial and developing countries by using cross section data for 1980, 1985, and 1990. The empirical results found that exchange rate volatility has negative and significant effects on trade in 1980 and positive and significant effects in 1990.

Dell' Ariccia (1999) investigated the impact of nominal and real exchange rate volatility on bilateral trade between 15 EU countries and Switzerland over the period 1975-1994. He used four different measures of volatility and found negative, but small (ranging between -0.10 to -0.13) coefficients on the exchange rate volatility, implying that an elimination of the exchange rate volatility would raise bilateral trade between Switzerland and the 15 EU countries by 10 to 13 percent. When fixed and random effects are incorparated in the estimation procedure to explain the simultaniety bias, however, the effect of exchange volatility reduces significantly to 3-4 percent.

Another study, Rose (2000), which also employed the gravity approach, used a data set covering 186 countries for the five years 1970, 1975, 1980, 1985, and 1990 to test the impact of exchange rate volatility on trade. The estimation results also confirmed a negative relationship between exchange rate volatility and bilateral trade, with the volatility effect being relatively small (a coefficient of -0.13). This implied that reducing exchange rate volatility by one standard deviation around the mean would increase bilateral trade by 13%. However, when random effects are taken into account in the estimation procedure, the size of the effect of exchange volatility falls significantly to 4 percent.

Tenreyro (2003) used a panel data set covering a period from 1970 to 1997 for a large number of countries to address the relationship between exchange rate volatility and bilateral trade. This study carried out different estimation methods to overcome statistical problems that were faced by the previous studies and obtained values for the coefficients of exchange volatility ranging between 2 and 4 percent. This implied that eliminating all exchange rate volatility would increase trade by a maximum of 4 percent. However, when endogeneity is taken into consideration by the use of instruments, volatility seems to lose its significant effect on trade.

4. Model Specification and Data Set

4.1. Model Specification

Based on the early empirical studies of exchange rate volatility and following Arize et al. (2000), Bredin et al. (2003), and Aurangzeb et al. (2005), the long-run export demand equation can be written in log-linear form as:

$$X_t = \beta_0 + \beta_1 Y_t^* + \beta_2 PI_t + \beta_3 EV_t + \beta_4 D_1 + \beta_5 D_2 + u_t \quad (1)$$

where X_t represents real exports (measured as the ratio of nominal exports to nominal GDP); Y_t^* is a measure of foreign economic activity, which is proxied by GDP deflator of OECD countries; PI_t represents relative prices (defined as the ratio of Turkish export prices to world export prices); EV_t is a measure of exchange rate volatility, which is measured by the moving average of the standard deviation of real effective exchange rates;

[1] The gravity model has been used widely in empirical works and has been highly successful in explaining bilateral trade flows. In its basic form, the gravity model explains bilateral trade flows as functions of their GDPs, geographical distance, population, and several dummy variables, such as common border, common languages, and membership in a free trade organization (Clark, 2004: 6).

and D_1 and D_2 represent dummy variables that took into account the possible effects of the Russian crisis of 1998 and the Turkish financial crisis of 2000. Economic theory suggests that increases in the real GDP of trading partners would result in a greater volume of exports to those partners. However, if the relative prices rise (fall), it would make domestic goods less (more) competitive than foreign goods and, therefore, the demand for exports will fall (rise). As discussed in the previous section, the effect of exchange rate volatility on exports is ambiguous. Therefore, it is expected that $\beta_1 > 0$, $\beta_2 < 0$, and β_3 is either positive or negative.

Exchange rate volatility is a measure that aims to capture the risks faced by exporters due to unexpected fluctuations in exchange rates. Various volatility measures have been proposed in the literature, including averages of absolute changes, standard deviations, deviations from trend, and variances of exchange rate changes. In this study, we implimented the most commonly employed method, namely the moving average of the standard deviation of real effective exchange rate changes, since it is more likely to account for periods of high and low exchange rate uncertainity. This proxy is mathematically expressed as:

$$EV_t = \left[\frac{1}{m} \sum_{i=1}^{m} (\ln ER_{t+i-1} - \ln ER_{t+i-2})^2 \right]^{\frac{1}{2}}$$

where R represents the real effective exchange rates and m is the order of moving average and equals 4 in this work.

4.2. Data and Methodology

The study covers quarterly observations from 1993:3 to 2009:4. The data on exports, Turkish exports price index, and Turkish GDP are obtained from International Financial Statistics available on the internet sites of the IMF. The GDP deflator of OECD countries is collected from the online sources of the OECD website, while real effective exchange rate is obtained from the Turkish Central Bank. Finally, world export price index is constructed with the use of the export price index of nine major trading partners, which is available from the sources of Eurostatistics. All real values are measured through the base of year 2000. All these series are expressed in US dollar terms except for the Turkish GDP, which is then converted into US dollars by using bilateral US/TL exchange rates. All of the series, except for EV, were transformed into logarithmic forms in order to interpret the results as elasticities. The export series was the only variable that required a seasonal adjustment process and it was accomplished with the Troma/Seat method with the econometric software Eviews.

Prior to estimating eq. (1), the time-series properties of the individual variables must be checked to ensure that none of the variables are stationary at their second differences, I(2), since most of the time series tend to be non-stationary and their variances increase over time in level. The estimation of a model with such variables (integrated of order 2) tends to produce spurious results. Here the order of the integration of the above variables is determined using the augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) unit root tests by the following formulas;

Variables		Level		First Difference		Results
		ADF	PP	ADF	PP	
X		-3.17 (0)**	-3.21 (1)***	-6.68 (3)***	-8.32 (8)***	I (0)
Y*		0.41 (1)	0.88 (4)	-4.27 (0)***	-4.27 (0)***	I (1)
PI		-3.34 (0)**	-3.32 (3)**	-4.14 (0)***	-10.8 (10)***	I (0)
EV		-2.62 (10)	-2.29 (4)	-4.95 (3)***	-7.02 (3)***	I (1)
Critical Values	%1	-3.53	-3.51	-3.53	-3.51	
	%5	-2.90	-2.89	-2.90	-2.89	

Note: Figures in parentheses represent the number of lags chosen with respect to the AIC. *** and ** denote the rejection of null hypothesis (that variables are non-stationary) at the 1% and 5% significance level, respectively. The critical values for ADF and PP tests are obtained from MacKinnon (1996). Estimations are carried out by Eviews econometric software.

Table 1: Unit Root Test Results

$$\Delta y_t = \alpha + \delta y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta y_{t-i} + \varepsilon_t$$

where Δy is the first difference of y series, α is a constant term, ε_t is the residual term and k is the lagged values of Δy_t,which is included to avoid serial correlation in the residuals. The ADF and PP test results without trend are provided in Table 1. The lag length for the ADF tests was selected based on Akaike Information Criteria (AIC), with the estimation of an initial eleven lagged first-differenced right-hand side variable, Δy_{t-i}. The results of the integration tests clearly show that foreign income and EV series are non-stationary in levels, but stationary in first differences, I(1) at the 1% significance level, while the other two series are level stationary. Hence, the results of these integration tests support the use of the Autoregressive Distributed Lag (ARDL) approach in this paper.

In terms of methodology, this paper adopts the ARDL cointegration technique developed by Pesaran and Shin (1999) and Pesaran et al (2001) to establish the long-run relationship between the variables. This estimation procedure is preferred to other single multivariate cointegration tecniques for four reasons. First, the ARDL approach does not require unit root tests for the variables in the model and can be applied to any set of data, which are purely I(0), purely I(1) or a mixture of both. Second, endogeneity problems and the inability to test hypotheses on the estimated coefficients in the long-run associated with the Engle-Granger (1987) method are avoided. Third, with the ARDL approach, it is possible for different variables to have different optimal lags, which is impossible with standard cointegration techniques. Finally, this procedure is more efficient than the others with limited sample data (30 to 80 observations), as suggested by Narayan (2005).

Basically, the procedure involves estimating the error correction version of the ARDL model for eq. (1) and can be formulated as follows:

$$\Delta X_t = a_0 + \sum_{i=1}^{m} a_{1i} \Delta X_{t-i} + \sum_{i=0}^{m} a_{2i} \Delta Y^*_{t-i} + \sum_{i=0}^{m} a_{3i} \Delta PI_{t-i} + \sum_{i=0}^{m} a_{4i} \Delta EV_{t-i} + a_5 X_{t-1} + a_6 Y^*_{t-1} + a_7 PI_{t-1} + a_8 EV_{t-1} + \lambda_1 D_1 + \lambda_2 D_2 + u_t \quad \textbf{(2)}$$

where m stands for the lag length; u_t is white noise error terms; and the first line starting with the summation letter, ∑, represents the short-run dynamic relationship, while the second line (one-year lagged variables) represents the long-run relationship.

In order to determine whether a long-run relationship exists among the variables in hand we must first test the null hypothesis of no cointegration, ($H_0 : a_5 = a_6 = a_7 = a_8 = 0$) against the alternative hypothesis of cointegration, ($H_1 = a_5 = a_6 = a_7 = a_8 = 0$) using the F-test for the joint significance of the coefficients of the lagged levels in equation (2). The critical value of the F-test, which has a non-standard distribution, depends on (i) the integration level of the data, (ii) the number of regressors, and (iii) whether the model contains an intercept and/or a trend. Therefore, two sets of critical values are generated, one set referring to the I(0) series (lower bound critical values) and the other to I(1) series (upper bound critical values). If the computed F-statistic is greater than the upper bound critical value, then the H_0 hypothesis is rejected. If the computed F-statistic is less than the lower bound critical value, it implies no cointegration. Finally, if it lies between the lower and upper bounds critical values, then the result would be inconclusive. In the second step, once a cointegration is established among the variables, the following long-run export function can be written as follows:

$$X_t = b_0 + \sum_{i=1}^{m} b_{1i} X_{t-i} + \sum_{i=0}^{m} b_{2i} Y^*_{t-i} + \sum_{i=0}^{m} b_{3i} PI_{t-i} + \sum_{i=0}^{m} b_{4i} EV_{t-i} + b_5 D_1 + b_6 D_2 + u_t \quad (3)$$

The order of lag (m) in eq. (3) is selected using Akaike Information Criteria (AIC) before the selected model is estimated by ordinary least squares. Since we use quarterly data, our estimations start with a maximum of 6 lags and choose the model that minimizes the value of AIC (1, 0, 0, 1). In the third and final step, we obtain the short-run dynamic paramaters by estimating an error correction version of the ARDL (4, 0, 2, 0) model. This is specified as follows:

$$\Delta X_t = c_0 + \sum_{i=1}^{m} c_{1i} \Delta X_{t-i} + \sum_{i=0}^{m} c_{2i} \Delta Y^*_{t-i} + \sum_{i=0}^{m} c_{3i} \Delta PI_{t-i} + \sum_{i=0}^{m} c_{4i} \Delta EV_{t-i} + c_5 EC_{t-1} + e_t \quad (4)$$

where c_5 represents the error correction coefficient which measures the speed of adjustment to the long-run equilibrium. A negative and significant coefficent of EC_{t-1} will be an indication of cointegration.

5. Empirical Results

Before estimating the long-run and short-run export models for the Turkish economy we must test the null

hypothesis of no cointegration among the variables. In doing this, we first decide the lag order on the first differenced variables in eq. (2) by using AIC. The optimal lag length (m=1) is chosen to reveal that there is no serial correlation among the residuals obtained from eq. (2). The results of the ARDL bounds tests with the number of lags in row 1 are provided in Table 2.

Lag Order	LM tests	AIC	SBC	F-tests
6	1.44 (0.26)	-1.78	-0.58	1.77
5	5.31 (0.01)***	-1.80	-0.76	1.99
4	5.10 (0.01)***	-1.75	-0.85	1.73
3	0.29 (0.74)	-1.68	-0.93	5.23***
2	1.11 (0.34)	-1.67	-1.06	5.71***
1	1.40 (0.49)	-1.85	-1.38	8.36***

Note: *** denotes significance at the 1% level. LM represents the lagrange multiplier test for serial correlation. Number inside the brackets represents the probability ratio. F-statistics for 1% critical value bounds are 3.74 and 5.06. The critical values are obtained from Table CI (iii) in Pesaran et al (2001). Estimations are carried out by Eviews econometric software.

Table 2: Bounds Tests for Cointegration

The computed F-statistics (8.36) is greater than the upper bound critical value (5.06) at the 1% significance level, using an unrestricted intercept and no trend. Thus, the null hypothesis of no cointegration is rejected, implying long-run cointegrated relationship between Turkish exports and its determinants. The empirical results of the long-run cointegration model obtained by normalizing on Turkish exports are provided in Table 3. As can be observed from the table, all the variables, ($Y^*, PI,$ and EV) appear to have significant effects on the dependent variable, (X) and their coefficients have the expected signs. Thus, this result seems to be consistent with the existing empirical literature. Our results can be interpreted in the following way;

Dependent Variable	Independent Variables		
X	Y^*	PI	EV
	0.84 (3.36)***	0.34 (0.85)	0.04 (2.38)**

Note: *** and ** denote significance at the %1 and %5 levels. Numbers in parantheses represent t-values. Estimations are conducted with the use of Eviews econometric software.

Table 3: Estimated Long-run Coefficients with the ARDL (1, 0, 0, 1) Model

First of all, a positive and significant coefficient on foreign income variable is consistent with our expection and previous studies. This means that a rise in the level of OECD income leads to an increase in the level of Turkish exports. A 10% rise in the level of foreign income will cause an 8.4% increase on Turkish exports. The relatively low income elasticity, compared to the previous studies, is probably linked to the use of OECD GDP rather than world GDP. Many studies carried out for Turkey, at aggregate level, have found a long-run income elasticity that was greater than one (Acaravcı and Ozturk, 2003; Kasman and Kasman, 2005; Tuncsiper and Oksuzler, 2006; Kose et al, 2008; Ozturk and Kalyoncu, 2009).

Second, a positive but statistically insignificant coefficient on the relative export price variable implies that a change in the relative prices is not related to a change in the level of Turkish exports. Therefore, given the price inelasticity of exports, Turkey cannot use price competition policies to maintain or even increase its world's export share rather than adopting alternative policies.

Third, and most importantly, exchange rate volatility has a positive sign and affects the value of Turkish exports significantly. This finding is consistent with the previous studies of Kasman and Kasman (2005) and Ozturk and Kalyoncu (2009) in the case of Turkey. There are also overseas studies that support the positive relationship between volatility and exports, such as Klein (1990) and McKenzie and Brook (1997). Exporters increase the supply of exports in response to changes in exchange rate volatility when such volatility (which is 2.58% in the sample period) is above the threshold level (see, Zhang et al, 2006). As was argued before by Franke (1991), trade would increase with exchange volatility when the expected cash flow from exports grows faster than the entry and exit costs.

The final stage in this work is to construct an error correction model (ECM). The model structure is determined by Hendry's general to specific model

Variable	Coefficent	t –statistic	Variable	Coefficient	t -statistic
C	-0.005	-0.28	ΔPI_t	0.29	1.07
ΔX_{t-1}	0.36	1.86*	ΔPI_{t-1}	-0.30	-1.22
ΔX_{t-2}	-0.09	-0.85	ΔPI_{t-2}	0.37	1.52
ΔX_{t-3}	-0.09	-0.84	ΔEV_t	-0.003	-0.26
ΔX_{t-4}	-0.27	-2.42**	EC_{t-1}	**-0.74**	**-3.11***
ΔY_t^*	3.88	0.80			
Diagnostic Test Results					
F-statistic = 3.08 (0.004)			$\chi^2_{BG}(2)$ = 0.38 (0.68)		
DW-statistic = 2.07			ARCH F(1, 58) = 1.12 (0.29)		
Adjusted R^2 = 0.38			RESET F(1, 49) = 2.06 (0.16)		
AIC = -1.80			χ^2_{JBN} = 28.3 (0.000)		

Note: The optimal lag order is determined by AIC. Numbers in parentheses show p-values. ***, ** and * denote significance at the %1, %5 and %10 levels. χ^2_{BG}, ARCH, RESET, and χ^2_{JBN} show Breusch-Godfrey test statistics for autocorrelation, heteroskedasticity, Ramsey misspecification, and Jarque-Bera normality statistics.

Table 4: Estimated Short-run Coefficients with the ARDL (4, 0, 2, 0)

selection strategy. This procedure requires elimination of insignificant lags from the estimation of eq. (4). The regression results are reported in Table 4. Before discussing the results, we need to determine the consistency of the ECM. For this reason, we performed a number of diagnostic tests that are reported at the bottom of Table 4. These tests indicate that the short-run model has no serial correlation, heteroskedasticity, and mis-specification problems. The following remarks can be made from the estimation results.

First, in contrast with the long-run results, the short-run income coefficient is positive, but statistically insignificant. Second, unlike the long-run estimation results, the short-run exchange rate volatility coefficient is negative and statistically significant. Third, the error correction term, EC_{t-1}, is negative and statisitically significant at the 1% level, indicating that the adjustment of short-run fluctuations towards the long-run equilibrium point takes place very fast.

5. Conclusion and Policy Implications

The purpose of this paper was to examine the impact of real exchange rate volatility on aggregrate Turkish exports over the quarterly period of 1993:3 to 2009:4 by employing the ARDL cointegration approach and error correction model. There are three important findings in this study. First, the results of the unit root tests indicate that variables under consideration are either I(0) or I(1) in level, suggesting that the ARDL approach is more appropriate. Second, the estimation results from the long-run model suggest that Turkish exports are significantly related to foreign income and exchange rate volatility, while they are not significanty associated with relative export price.

To be more precise, foreign income has a positive effect on exports, suggesting that a 10% rise in the incomes of OECD countries may increase the Turkish exports by 8.4%. Real exchange rate volatility affects the level of Turkish exports positively, implying that a complete elimination of the volatility of 2.58 would have decreased total exports by 4 percent. Third, as far as the short-run dynamics is concerned, about 74 percent of the variation in the Turkish exports is corrected within the next quarter.

In terms of policy implications, our study establishes that policy makers can not improve the contry's balance of trade both in the long-run and short-run by following price-oriented policies. Nor are policy makers required to follow an exchange rate stabilizing policy. Further research is also needed on disaggregated trade data to make clear policy recommendations.

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Insurance and Management of Political Risk Exposure in Developed Economies and Serbia

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Abstract:

The paper explores the risks, associated with government actions, which reduce the value of the company, in other words, a political risk. The purpose of this research is to determine the theoretical, institutional, regulatory management and implemented activities of political risks in different countries (the USA, the UK, France, Japan and Germany). The aim of this paper is the analysis of the characteristics of political risks, the analysis and the characteristics of the risk of the insurance policy from the standpoint of global, regional and state agencies and private insurers as well, determining the interdependence of political risks and country risks. The analysis begins by reviewing different ways of entering foreign markets (exports, foreign direct investment, contractual agreements and establishment of subsidiaries), all of which imply exposure to political risk. After that, political risk and exposure of its basic elements are defined, as well as methods that are applied in the assessment and the management of political risks. This paper concludes with an overview of political risk insurance coverage and sums insured in selected countries, and how political risk is underwritten and priced.

Keywords: political risk management, elements of political risk, national export-import banks

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1. Method of entry into foreign markets

Prior knowledge of the law, history, culture, economics and insurance of the potential foreign country partner, capital power, diplomatic and political relations and willingness to take risks are all aspects of choosing to enter a foreign market. Economic development is operationalized by transcending national boundaries (on which there is unanimity), and the foundations of globalization that bring with them many advantages and opportunities as well as threats. Since the time of Adam Smith there has been practical unanimity among economists, regardless of their ideological position on other issues, that free international trade is in the best interests of countries that trade, and in the interest of the world. The intervention of one state in favor of local companies incites companies in other countries to seek help from their governments to oppose the measures taken by the first government. All trade negotiations become a matter of politics (Friedman and Friedman, 1996, pp. 57 -70). Although called "free" international trade, it is never and nowhere operationalized in its literal sense of "free" because each state sets the rules and manners of treatment, but also takes care of its own interests first.

The method of entry into foreign markets may be in the form of exports, joint ventures and wholly owned subsidiaries. Exports can be operationalized through companies registered for export or directly through the export department, which increases not only financial benefit but risk exposure as well. The structure of exports

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Region / economy	Share							
Years	**'48**	**'53.**	**'63.**	**'73.**	**'83.**	**'93.**	**'03.**	**'08.**
The World	100	100	100	100	100	100	100	100
North America	**28**	25	20	17	17	18	16	13
U.S.	*22*	*19*	*15*	*12*	*11*	*13*	*10*	*8*
South and Central America	11	10	6	4	4	3	3	4
Europe	35	39	48	51	44	45	**46**	**42**
Germany	*1*	*5*	*9*	*12*	*9*	*10*	*10*	*9*
United Kingdom	*2*	*2*	*3*	*4*	*5*	*5*	*4*	*3*
Commonwealth of Independent S.	-	-	-	-	-	-	3	5
Africa	7	7	6	5	5	3	2	4
Middle East	2	3	3	4	7	4	4	7
Asia	14	13	13	15	19	26	26	**28**
China	*1*	*1*	*1*	*1*	*1*	*3*	*6*	*9*
Japan	*0*	*2*	*4*	*6*	*8*	*10*	*6*	*5*

Source: WTO Publications, 2008, International Trade Statistics, WTO Secretariat, Geneva, pp. 10.
Table 1: World merchandise exports by selected economy, 1948 - 2008

has changed substantially over the past 60 years. North America's share in world exports of 28.1% in 1948 has been superseded by Asia, which has achieved participation in the growth of world exports at 27.7% in 2008. Europe remains the region with the greatest growth of world exports, despite the fact that it recorded a reduction from 45.9% to 41.0% in 2008 compared to 2007 (Table 1.).World exports are dominated by countries with oil, gas and water resources, developed countries with automotive and electronics industries, advanced telecommunications and information technologies. When we look at the participation of Serbian exports in global exports, structure and geographic diversification, all findings indicate the necessity of fundamental change. The participation of Serbian exports in total world exports is only 0.05%, and its product that has the largest share of world exports, 1.49%, is fruit. Products that are subject to the world's leading exporters are not present among the top 10 products exported from Serbia. An average of 96.22% of Serbian exports goes to Europe: 13% of its exports go to Bosnia and Herzegovina, 12% to Montenegro, 11% to Italy and 11% to Germany (Statistics Office of the Republic of Serbia). An unfavorable export structure, inadequate geographical diversification, and faster growth in imports than exports have led to a growing trade deficit.

Joint ventures in the international market are set up by companies that undertake foreign direct investment and companies in the host country that will realize foreign direct investment or government agencies. Active management of investment funds facilitate the entry of foreign companies into markets that would not be possible to enter in other circumstances, such as joint ventures with local companies, which is still the only way to enter the Indian market for international insurers (Skipper and Known, 2007, pp. 430.).

Wholly owned subsidiaries are the way of entering foreign markets that involves the greatest exposure to risk, and is typical for multinational companies, requiring active investment management with managerial skills and experience. Multinational companies began to grow in importance after the Second World War, which was one of the initial impulses for the development of international relations, trade and insurance against political risks.

2. Attempt to define and analyze the characteristics of political risk

Political risk means any activity of the state resulting in the reduction of companies' value and capital. Some authors go even further, including political risk activities related to the distinction between domestic and foreign companies, or favoring one or the other, as well as any action of state institutions that produces a threat that may affect the reduction of capital inflows from abroad. Political risk is emerging as a result of government activity and should not be identified with the risk of terrorism, kidnapping or abduction. However, in order to avoid defining it too broadly, political risk generally refers to the damaging activities of the state in the country that implements certain projects. Also, we can distinguish between macro and micro level effects of political risk. The macro level has equal impact on all actors present in a given market, while the micro impact is related to a particular company or industry segments. Political risk is also a very important hidden transaction cost that affects

	Government risk	Instability risk
Company-specific risk	• discriminatory regulations • expropriation of assets • breach of contract	• sabotage • kidnappings • boycotting companies
Country-specific risks	• mass nationalization • regulatory changes • currency inconvertibility	• mass workers' strikes • protests and demonstrations • civil wars

Source: Wagner, 2000
Table 2: Key factors of impact on business operations in foreign markets

the reduction of international trade (Moser, Nestmann and Wedow, 2006).

According to experts at IRMIs, it is necessary to differentiate between two things concerning the definition of political risk (Wagner, 2000). The first distinction that must be made by the company refers to the definition of the company-specific political risks and country-specific political risks. The second differentiation refers to the types of risk: government risk and risk of instability. The company-specific risk of the country is under the influence of country risk and the risk of instability, which includes discriminatory regulations, the risk of expropriation of assets and breach of contract, sabotage, kidnappings, and the boycotting of companies not under the influence of the state. The degree of country risk is also defined by factors arising from the impact of the state or the risk of instability. This degree is determined by the dangers of mass nationalization, regulatory changes or risk of currency inconvertibility, which are influenced by government, to hazards such as mass workers' strikes, protests, demonstrations and civil wars that are factors of the overall impact (Table 2).

The nature of political risk basically distinguishes between categories of investors (direct or portfolio investors) because their exposure to political risks vary. In general, portfolio investors are indirectly affected by certain political changes, such as, for example, a sudden change in interest rates, while the consequences of political risk for direct investors are much deeper and more radical. The gradation of activities ranges from the lowest ones, which have more of a psychological effect on the management of the company and cause some degree of discomfort and produce relatively little damage, to those that have serious consequences, such as expropriation or confiscation of a company's property. Foreign firms may encounter many difficulties in selling goods or services in certain markets, unlike domestic firms. This is indicated by the fact that the countries of Latin America had a special relationship with companies from the United States, representing a "special service" for rich and powerful U.S. companies. Thus, in Latin American countries after changes in the political scene and the arrival to power of politicians who did not nurture friendly relations with the U.S. administration, had leaders well-known for taking away the assets of foreign companies operating in their territory. This was the case in Chile in 1975 and then in Venezuela in 2006 and 2007.

Until 1985, the map of political risk, as the dominant form of political risk, was the confiscation and nationalization of property and assets of foreign companies in newly independent states. One such example is the exiling of the Shah of Iran in 1979, which led to the nationalization of foreign assets and contracts that were concluded with the Iranian government. The 1973 oil embargo and the nationalization of foreign concessions to the oil fields of the Arab countries led to the Yom Kippur War (Wikimedia Foundation Inc.). In this war, the Arab states led by Egypt and Syria attacked Israel, and as a result an oil crisis arose. The OPEC countries sought a way to punish the U.S. for supporting Israel.

Research by the Aon Corporation dealt with the problem of the influence of political risk on the business of 100 companies, with 86% of companies stating that political risk is a high threat to their business. A third of the surveyed companies felt the effects of currency inconvertibility and repatriation, a quarter of them suffered losses due to an embargo, and 18% were subject to expropriation (Aon Corporation, 2001).

3. Insured political risk

Nationalization, confiscation and expropriation are the most flagrant actions undertaken by some governments against foreign companies. Foreign governments may also reject the contracts of foreign companies and impose non-recognition of currency convertibility. A comparative analysis of agencies that deal with political risk insurances found a high level of agreement on the risks of non-convertibility of currency, terrorism and contract termination (Table 3), as well as a lack of full consent with the methodology in Serbia.

Nationalization is a process of forced transitions into state property of large business enterprises of certain industries or the entire industry that had previously been in private hands, at times with compensation, though this is not obligatory. The seized means of production and other immovable assets become a material base for the construction of a totalitarian state and a means of supporting such a system.

Confiscation means the seizure of the assets of a company without compensation from the government. This type of risk refers to the right of the state to take over – to confiscate the assets of a company or individual if it determines that the business or its results achieved by using the property is not in accordance with the law, or has determined that the movable or immovable property was used for unlawful profit acquisition, smuggling, distribution of narcotics and other actions that are contrary to the law.

Expropriation means the forcible seizure of private property in the common interest, which must be interpreted restrictively, with fair compensation linked to the market value of expropriated property (Wikimedia Foundation Inc). Expropriation is carried out for the benefit of the government, and for the realization of public interest, such as the construction of buildings of public importance or the expansion of industrial zones. The first insurance policy against the political risks of expropriation was issued in the United States in 1951(Moran and West, 2005, pp. 12).

Breach of contract (repudiation, rejection, or simple failure to honor the contract): A state may reject the contract or not recognize it because of certain real or fictitious reasons, which are due to the influence of certain factors beyond the control of the company.

Abandonment of the convertibility of currencies: the ability for currency to be exchanged for other currencies when both are recognized in international payments. In order for a currency to be convertible, it must be supported by a stable economy, and the balance of payments may not show greater and longer-term deficits. If a country declares its currency convertible, and these conditions are not fulfilled, the national economy suffers damage, which can lead to a loss of confidence in a given currency and the suspension of its convertibility. Namely, when the Central Bank sets a fixed exchange rate in which there is trade in the foreign exchange market and when at the same time certain restrictions that apply to trade in the foreign exchange market are introduced we say that the currency is non-convertible or does not have full convertibility. It is in the interest of every national economy that its currency is exchangeable for a large number of currencies, in particular for strong and stable currencies (the Euro, U.S. Dollar, Japanese Yen, Swiss franc). For a national economy it is better to have a stable non-convertible currency than a weak convertible one (Business dictionary).

Political instability: the stability of the political environment in a country is one of the key conditions and factors that determine whether foreign investors will invest their capital in an economy. The decentralization of government, simplification and streamlining of the bureaucracy, and the abandonment of political power to local governments by the central government, are just some of the first steps that need to be taken by the state in order to become attractive to foreign investors. One example is the case of China, where foreign companies are faced with risk related to the fact that the local authorities were forced to accept contracts signed by the central government with the companies, and which were not always in the interests of the local authorities. The stability of the political scene, regular elections, normal functioning of parliament, and economic security over the long term will also ensure that the country is ready for the influx of foreign capital and investment.

War is a direct threat and danger to the property and capital of foreign investors and companies. There is division among theorists in defining war in terms of insurance, especially with regard to how it relates to insurance against political risks. The generally accepted definition of war refers to the attempt to define war as the hostile actions of the military forces of different countries. Some analysts expanded this definition to include any kind of civil war, as well as any kind of armed rebellion. An increasing number of insurance companies have tended to seek to exclude insurance related to the protection of the local, national character of everyday conflict, including civil riots or rebellions on a small scale. It is precisely here that the potential problem for insurance companies lies, which relates to the definition of war, armed rebellion or civil unrest. The question is when civil rebellion turns into a civil war. If the insurance company successfully defines the difference and the moment when revolt grows into a serious conflict, then it can include in its portfolio insurance of this type of political risk, and the company investor can, accepting this type of insurance, calmly and safely plan their strategy relating to their performance in foreign markets.

	The elements of political risk to export credit agencies									
agencies	*non-convertibility, currency transfer restrictions, changes in foreign currency payment system*	expropriation, confiscation and nationalization	*war, terrorism, civil unrest riots, revolution*	*Breach and termination of contract*	*default in the nation's financial obligations, the declaration of moratorium*	*changes in legislation affecting the implementation of the project*	obstruction of the arbitration process	*inability to issue licenses, permits or approvals in accordance with the*	embargo, ban on imports	*natural disasters*
MIGA	*X*	*X*	*X*	*X*	*X*					
WB	*X*	*X*		*X*		*X*	*X*	*X*		
AOFI	*X*	*X*	*X*	*X*	*X*				*X*	*X*
ECGD	*X*		*X*	*X*				*X*		
EH	*X*		*X*	*X*	*X*					
EX-IM										
OPIC	*X*	*X*	*X*							
dedication	*86%*	*57%*	*71%*	*71%*	*43%*	*14%*	*14%*	*29%*	*14%*	*14%*

Source: export credit agencies

Table 3: The elements of political risk to export credit agencies

Unpredictable regulatory environment: any company doing business in foreign markets is exposed to the potential risk of discrimination (a distinction made between domestic and foreign investors) coming from the state or its institutions. The forms through which unfairness and inconsistency are manifested are various monetary claims (payment of guaranteed deposits by foreign companies in an amount higher than prescribed), different tax treatments, restrictions in access to resources, sources, their components and distribution. This problem can be resolved to mutual satisfaction and interest if a procurement contract is negotiated between the government and companies. With this contract the company is protected from the discriminatory approach of the country so it can perform equally as well as domestic investors.

The political risks in the Agency for Export Insurance and Financing in Serbia are part of the non-commercial risks. Non-commercial risks include cases where claims cannot be recovered from foreign partners for the following reasons: 1) failure to pay the debt within six months of the agreed maturity date, if the debtor is country, a national organization or person guaranteed by the state; 2) political events in the country of the debtor or war in the country of the nationality of the debtor, 3) moratorium of payments, the inability of the debtor country's currency conversion into convertible currency or prohibition of transfer, until the end of this prohibition, 4) the prohibition of imports of goods or services from a state or national organization as a customer or service user; 5) unilateral termination of the contract from a state or national organization as a customer or service user, except with regard to unilateral termination due to breach of customs and health regulations of the importing state or country of the service users; 6) seizure, damage, destruction or suspension of goods made by the state or its institutions, from the moment of the transfer of goods across the border to the arrival of the foreign debtor and 7) natural disasters. Under non-commercial risks are considered events that cause damage to domestic entities in connection with assets invested in the company, namely: 1) nationalization, expropriation or other similar measures of the state, 2) the inability to dispose of any assets of at least 12 months due to other measures taken by the state in which the investment was made, 3) destruction of or damage to property due to war events in the state in which the property investment is made, or political events in that country (Law on the Export Credit and Insurance of the Republic of Serbia, Sl. Gazette no. 61/2005). The risk of natural disaster that stands out is not a typical political risk and the risks of nationalization and expropriation are applied only to property damage.

4. Managing of political risks – determination and identification of political risks

Prevention, control and management of loss that occurs as a result of unfavorable political events compels companies operating in international markets to identify and establish sources of potential political risks, as well as

their level of exposure, in order to create a successful strategy. Entering foreign markets requires each company to have a clearly defined strategy and tactics: whether to "fit" into the local economy or to keep the level of dependency on the local economy to a minimum (Punnett, Ricks and Mendenhall, 1995 pp. 58).

If the company decides to open their branches in a foreign country it is necessary to study its laws, regulations, the elements of its political and tax system and to do an analysis of interstate relations between the countries of origin and the country in which it is planning the realization of its investments. A study of a potential host country includes the study of its history, government, law, demography (including ethnicity and religious affiliation), and its economic and financial market structure. Companies can use publicly published data and information provided by the state and its agencies, from global financial institutions, or its reliable, private sources. The World Trade Organization obtains information relating to trade policy directly from its member countries. The U.S. Central Intelligence Agency periodically publishes the World Factbook (Publication CIA), which contains the national, demographic and economic statistics of each country. Also, embassies and consulates in foreign countries send reports to their governments through ministries of foreign affairs. Information related to local authorities, counties or regions is more difficult to obtain because it is collected and published more rarely. This is especially important because amid the process of the decentralization of government a growing amount of political power and responsibility is transferred to local administration. Further growth and development of local communities depends solely on the ability and willingness of local management and the entrepreneurial spirit that manifests itself in the given environment. There are many regions in the world that offer such benefits: economic zones in China, the Maquiladora in Mexico, the area of Labuan in Malaysia, the Customs Free Zone in Dubai. Serbia has also joined this global trend thanks to the ability of local management - Indjija, Zrenjanin and Pećinci.

5. Measurement and control of political risk

The aim of measuring political risk is to estimate the negative impact of elements of political risk, i.e. a probability assessment of states taking actions that would be detrimental to the interests of the company that operates in their market. One of the most difficult tasks in assessing political risk is to predict the duration of the negative impact.

5.1. Political Risk Services – PRS

Since 1979 when it was founded, the Agency has been recognized worldwide as an original system for measuring and quantifying risks through two sub-systems: 1) PRS (Political Risk Services), and 2) ICRG (International Country Risk Guide). The final product of this Agency is the study of country risk. The components of the political risk assessment methodology for PRS include:

A. **Government stability:** analysis of government unity, legality and public support. Each component is evaluated by a score of 0-4, with a maximum final score of 12. In 2008, the government of Serbia received 8 points, as a consequence of government cohesion and the establishment of legislative power, but with the divided support of the people. From all of the countries included in the research the German government had the highest number of points (10), which is primarily the result of high cohesion and the legislative power of the government, with a public support subcomponent (1.5) characterized by greater risk when compared to that for the government of Serbia (2.0).
B. **Socio-economic conditions** include the analysis of unemployment, consumer confidence and poverty. The same method of scoring Serbia was evaluated with 2.5 points, which represents a high risk. Risk is the result of high unemployment (0 points) which in 2008 was 14.7% and in 2010 was 20% (Statistics Office of the Republic of Serbia, 2009, unemployment rate), poverty (0.5 points) and consumer confidence. Socio-economic conditions with the lowest risk were typical for the UK (8.5), Germany (8.0) and the USA (8.0).
C. **Investment profile and investment**: Sustainability of the agreement, repatriation of profit, as well as delay in payment are analyzed (max 12 points). Serbia was assessed with the lowest score in relation to all of the observed countries (7.5) which is attributed to delays in payment and contract enforcement capabilities. The investment profiles of the United Kingdom, Germany and the United States were rated as very low risk.

number		components of political risk	max points
1.	A	government stability	12
2.	B	socio-economic conditions	12
3.	C	investment profile and investment	12
4.	D	internal conflicts	12
5.	E	external conflicts	12
6.	F	corruption	6
7.	G	the influence of the military in politics	6
8.	H	religious tensions	6
9.	I	constitution and laws	6
10.	J	ethnic tensions	6
11.	K	democratic accountability	6
12.	L	quality of bureaucracy and administration	4
∑			max 100

Source: International Country Risk Guide ICRG
Table 4: Components of political risk assessment methodology for PRS

D. Internal conflicts. Analysis of this component includes assessment of civil war (danger of coup), terrorism and civil unrest (max 12 points).

E. External conflict includes analysis of the actions of the government, which extend from non-violent external pressure (diplomatic pressure, withholding aid, trade restrictions and sanctions) to violent external pressure such as cross-border wars. Assessment of this component includes war, border conflicts and external pressures (max 12 points)**.** Serbia is characterized by a high risk of international conflict in the context of foreign pressure (1.5 points), and also had the biggest risks among all of the observed countries.

F. Corruption within the political system is a major threat to foreign investment because it distorts the economic and business environment, reduces credibility and confidence in government and contributes to the instability of the entire system. The most common form of corruption, which comes directly from the company, is financial corruption in the form of specific requests for payments and offering bribes, which are related to obtaining import and export licenses and to reducing tax liabilities. According to the methodology of the PRS Group, favoring certain companies, the secret funding of political parties and the creation of suspected links between politics and business is strictly prohibited. There is a maximum of 6 points in this grade. It was estimated that corruption in Serbia (2) destroys the economic and financial environment and concerns bribes in order to obtain permits, licenses and protection.

G. The influence of the military in politics. Attempting to create a civil society, which means creating a society without the influence of the military, is one of the fundamental pillars of modern democracy. In countries where political, civil, and military unrest are common, the army guarantees peace and order. In some countries, the threat of military takeover of the government by force is a high risk, especially if there are signs that the government cannot function effectively, which is an indication that the country has an uncertain environment for foreign investors and companies.

H. Religious tensions can come from the domination of society and/or management of a religious community that seeks to replace civil law with religious law and exclude other religions from political and/or social processes, reflecting an effort by a religious community to become dominant and influential in official government policy, as well as to express their own identity in a way that constitutes a form of domination over other religious communities.

I. The constitution and laws are evaluated separately, and each sub-component consists of 0-3 points. Constitution is estimated by the strength and impartiality of the legal framework, while the law as a sub-component involves an assessment of compliance with the law (max 6 points)

J. Ethnic tensions include assessments of the degree of tension in the country and whether they are attributable to racial, ethnic and linguistic or other ethnic divisions. A lower rating is present in countries where racial tensions and nationalism are expressed, because the conflicting ethnic groups are intolerant.

K. The democratic stability of a government is conditioned by the support that each government

country	Components of political risk by label in accordance with Table 4.												
	A	B	C	D	E	F	G	H	I	J	K	L	07/08
Max points	(12)	(12)	(12)	(12)	(12)	(6)	(6)	(6)	(6)	(6)	(6)	(4)	(100)
Serbia	8,0	2,5	7,5	9,0	7,5	2,0	4,0	5,0	3,5	3,0	5,5	2,0	59,5
UK	7,5	8,5	12,0	9,5	7,0	4,0	6,0	6,0	5,5	4,0	6,0	4,0	80,0
US	7,5	8,0	12,0	10,5	9,5	4,0	4,0	5,5	5,0	5,0	6,0	4,0	81,0
Germany	10,0	8,0	12,0	11,0	10,5	5,0	6,0	5,0	5,0	4,0	6,0	4,0	86,5

Source: "PRS" and the Coplin-O'Leary System™, International Country Risk Guide ICRG
Table 5: Political risk rating 07/08

political risk rating					the level of the risk
0,00	%	-	49,90	%	very high risk
50,00	%	-	59,90	%	high risk
60,00	%	-	69,90	%	medium risk
70,00	%	-	79,90	%	low risk
80,00	%	-	100,00	%	very low risk

Source: "PRS" and the Coplin-O'Leary System™, International Country Risk Guide ICRG
Table 6: Political risk rating scale

Very high risk	00,0 to 49,9 points
high risk	50,0 to 59,9 points
medium risk	60,0 to 69,9 points
low risk	70,0 to 79,9 points
very low risk	80,0 to 100,0 points

Source: International Country Risk Guide ICRG (WC – Worst Case and BC – Best Case)
Table 7: Categories of the combined rating of political, financial and economic risk

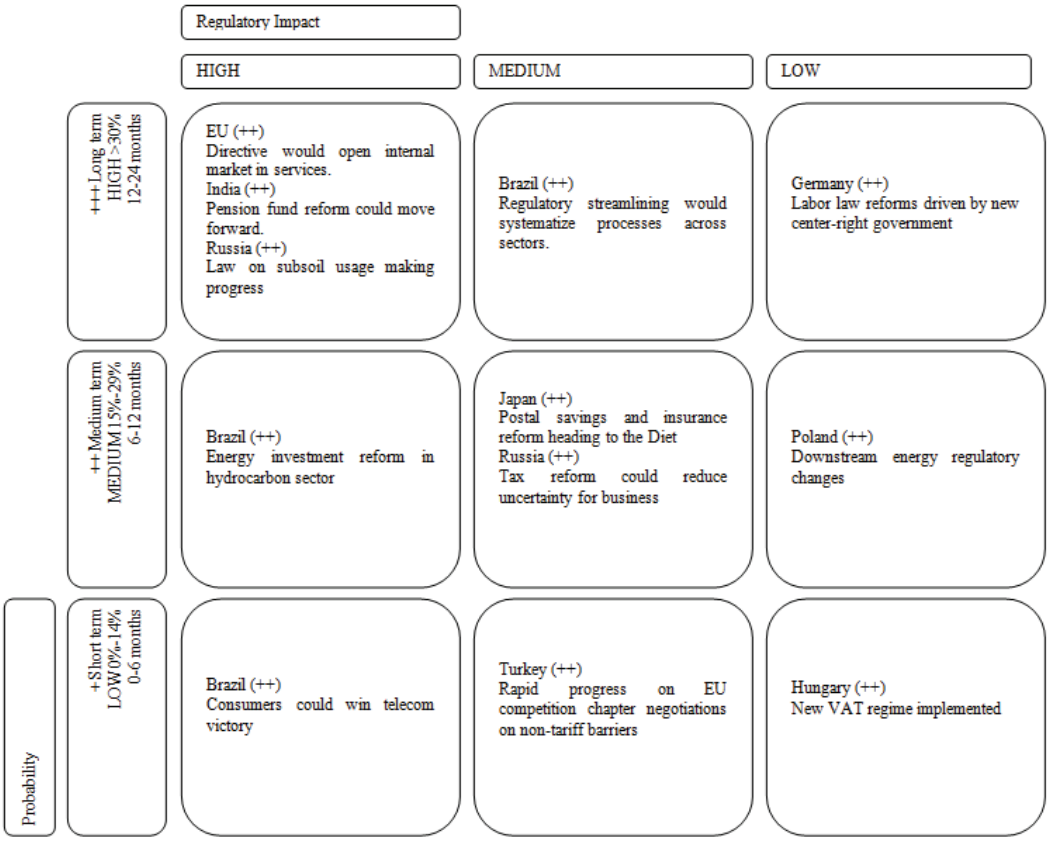
has in parliament, as well as whether confirmation of support is received through elections. Under this component, attention is especially given to the following factors: the existence of free and fair elections for legislative and executive power, the active presence of more than one party in power and the sustainability of the opposition and the cooperation, stability and smooth functioning of the three pillars of government – the legislative, executive and judicial.

L. The quality of bureaucracy and administration. High marks are given to countries where bureaucracy has strength and expertise without drastic submission to political changes. In countries with high marks, bureaucracy tends to be somewhat autonomous from political pressure and has an established mechanism for recruitment and training. Countries that lack a strong, high quality and efficient bureaucracy receive low points because any change in the government implies changes in the bureaucracy. Serbia has low risk in terms of bureaucracy (2 points).

The sum of the values of individual components of political risk in relation to the maximum amount (100) defines the political risk rating, i.e. the level of risk (Table 6.). In July, 2008 Serbia had a high level of political risk (59.50%) and other observed countries had very low risk. The components with very high levels of risk are socio-economic conditions and corruption, while there is very low risk in Serbia in terms of democratic stability.

The methodology for measuring the combined current rating and the prediction of the rating for 1 year and 5 years includes the prediction of the best and the worst variants in the period of the prediction. The combined rating of risk includes the political (PR), financial (FR) and economic (ER) risks, whereas political risk contributes 50% and the remaining two 25%. The combined rating (CPFER) for country X is calculated by using the following formula: CPFER (for country X) = 0,5* (PR + FR + ER).

The combined rating of Serbia in 2007 was 65.8, which falls within medium risk, and 61.8 in 2008, which is also medium risk. The combined rating in 2008 is the result of the high political risk (59.5), medium economic (30.0) and financial risk (34.0). The best variant of the combined rating for the period of up to one year does not lead to essential changes in the rating of Serbia, as the risk level remains medium. For a period of up to 5 years in the context of the best variant, the changes are significant for Serbia, as the combined rating is 73.5 and the country's risk is low. The worst variant of the prediction for the period of up to 5 years puts Serbia in the group of



Source: Integrating Political Risk into Enterprise Risk Management, 2006, Pricewaterhouse Coopers International Limited i Eurasia Group
Table 8: The unique methodology of PwC and EG

countries with a very high risk. A very low combined rating for 2008 was held only by Germany (89.3). The highest value of the combined rating is 100.0 and represents very low risk, and the lowest value of the combined rating is 00.0 and represents very high risk (Table 7).

5.2. PricewaterhouseCoopers International Limited and Eurasia Group - unique methodologies

Eurasia Group has defined a unique methodology for financiers and corporate leaders that represents a synthesis of theories of political science and financial expertise. Knowledge of the political circumstances of each individual country represents the ideal environment for the anticipation of the future and making the right management decisions. Planning operations in a foreign market based on knowledge of its political circumstances and figures, and on awareness of the importance of the ministries and departments that dictate its macroeconomic policy, is certainly a competitive advantage for decision makers. Eurasia Group brings together experts from all the countries on whose knowledge a comparative analysis of a country risk is based and carried out.

The unique methodology (Table 8) is based on the impact of regulations, the probability of regulatory changes and the time dimension. The regulatory influence may be high, medium or low. The probability of the occurrence of regulatory changes may be low (up to 14%), medium (from 15% to 29%), or high (over 30%). The probability of the occurrence of regulatory changes is seen through three dimensions: the short, medium and long terms. For example, the introduction of the new VAT regime in Hungary has a low regulatory impact, with the medium probability of the occurrence of regulatory changes (from 15% to 29%) in the next 6 to 12 months.

5.3. The Methodology of the Organization for Economic Cooperation and Development

The OECD methodology for determining credit and political risk is important from the point of application of a "Gentlemen's Agreement" and determining the minimum premium rates and the cost of capital. The starting point for the formation of the "Agreement," i.e.

year	Serbia	Bosnia and Herzegovina	Croatia	UK	Germany	US
1999.	7	7	5	0	0	0
2004.	7	7	4	0	0	0
2009.	7	7	5	0	0	0
2010.	6	7	5	0	0	0

Source: Country Risk Classifications of the Participants to the Arrangement on Officially Supported Export Credits 1999 – 2010
Table 9: Country risk OECD

for establishing rules for the functioning of the official export credit agency, is striving among exporters to compete in terms of price and quality, and not on payment.

The OECD methodology distinguishes between two models: 1) the Country Risk Assessment Model (CRAM) is based on the assessment of quantitative indicators of country credit risk, based on experience in the settlement of obligations, and the financial and economic situation of the country; 2) Qualitative customized results factors, which are not taken into account (the political situation in the country). Country risk is classified into 8 categories of risk from 0 to 7 (Table 9). Serbia for the past 10 years has always had a rating of 7, i.e., among very high risk countries, and in 2010 the rating improved for the first time after 10 years to a 6. Rating improvement will affect the insurance premium reduction for countries that do business in Serbia, as well as a reduction in interest rates. According to research by the Government Council for the European Integration of Serbia it was determined that companies that are operating with Serbia will pay lower prices for export credit insurance and that interest rates could be lowered by about 0.2% (Government of Serbia).

From the banking sector viewpoint, country risk is gaining importance in the context of the risk management of international public and private loans. The implementation of international loans triggered the following risks: the risk of debtor countries, non-convertibility risk, risks of delays and the inability to collect receivables, and the risks of various rights and legal regulations. Country risk for each bank determines the limit that defines the maximum possible exposure of banks to customers from that country. The maximum exposure to risk is the product of bank capital, a category rating of the country and the macroeconomic indicators of the country. When calculating the minimum active interest rate that should cover the cost of capital and product, banks start from the transfer price of capital, which contains the interest rate margin, the price of country risk and regulatory costs. Price of country risk is exactly proportional to the capital cost and the length of the maturity of the loan. Credit insurance increases the possibility of withdrawing credit from abroad, with a lower political risk meaning a lower interest rate and premium. German insurers (THE GERMAN INSURANCE ASSOCIATION) advocate for the adoption of policy loans by the bank as part of the capital, but it remains unclear whether the credit insurance policy may also apply to political risks or only to commercial ones.

6. Insurance by international or global agencies

International or global agencies in the last 20 years have become a factor for stability in terms of providing assistance and guarantees to investors for the markets, whether in their expressed political or other risks.

6.1. Multilateral Investments Guarantee Agency - MIGA

In 1988 the World Bank established the Multilateral Investment Guarantee Agency – MIGA – which is engaged in promoting foreign direct investment in countries with emerging markets to improve living standards and reduce poverty. Given that 30% of foreign direct investment goes to low-risk, high income countries and only 12% of foreign direct investment goes to high-risk, low-income countries it was necessary to encourage investors to invest in developing countries (Moran and West, 2005, pp. 2). MIGA provides insurance that protects lenders and investors against political risks, and helps developing countries to attract and retain private investment (Multilateral Investment Guarantee Agency, 2009), as well as co-insurance and reinsurance against political risks to MIGA member countries concluded in favor of the private sector. Since its establishment, MIGA has issued guarantees worth 21 billion USD for more than 600 projects in 100 developing countries (Multilateral Investment Guarantee Agency, 2009). MIGA currently has 173 member countries, and has capital of over 1 billion euro. MIGA in its portfolio includes coverage of the following types of risks: expropriation, failure to enforce contracts, war and civil unrest, abandonment of the

convertibility of currencies (it does not provide for the devaluation of the local national currency of the host country). Insurance services involve a combination of these four types of risk, and cover up to 90% of investments and up to 95% of claims, for 15 or 20 years, respectively. MIGA also provides guarantees to local authorities that investors comply with social standards and standards for environmental protection.

Insurance premiums of foreign direct investments from political risks depend on the country risk and project risk. Country risk is the responsibility of the Political Risk Insurance Center, which is a part of MIGA, and a free database on the management of political risks and insurance. Insurance premiums are between 0.45% and 1.75% per year. The premium rate of insurance against political risk depends on country risk, insurance and reinsurance capacity, activities that are the subject of insurance, previous experience with claims and losses, the credit worthiness of the insured, the usefulness of the project that is the subject of insurance, the type and number of commercial/political risks, the period of insurance and the factor of negative selection due to increased competition.

6.2. World Bank insurance program

The World Bank guarantee is issued only with the counter-guarantee of the government. The World Bank guarantees for the project only if the host government is not able to do so. All insurances that originate from this global financial institution can include some of the following risks (the World Bank):

- **Partial risk insurance** refers to risk coverage that can originate if the government or one of its agencies does not comply with all of the obligations towards the company or private investor; the World Bank issues a guarantee to the company that is founded for the realization of projects for special purposes, in favor of the private investor. This insurance is suitable for specific types of concessions, i.e., the transfer of construction plants or processes, through the funding of projects under the B.O.T. System and Public Private Partnership (as a form of cooperation between public service and private companies in order to reduce costs and more efficiently use private expertise).
- **Partial credit insurance** includes protection from all risks related to financing the debt arising from public investment, and insures that the state pay private investors for the work performed; this type of credit insurance is specifically designed with the aim of extending the maturity of the project and improving market conditions.
- **Policies based on the guarantee** give assurance of the payment on principal and interest on the private market to investors that are buying debt securities issued by the IBRD of the member states and whose property provides qualification for certain projects whose risks are covered by the World Bank.

7. Insurance by agencies that are wholly or partially state-owned

Insurances against political risk, particularly from export risks, may come directly from the state, government agencies or from private insurance companies that have the support and assistance of the state.

7.1. United States

The U.S. administration provides support for political risks through the following:

- **The Export Import Bank** was established in 1934 as an American banking corporation that operates as an independent agency of the U.S. government and represents a pillar of the foreign policy of the U.S. administration. As such, this bank is not allowed to provide financial assistance, including insurance to public and private sectors in certain countries that are on a list of restrictions directly determined by the federal government. The Ex-Im Bank, as a part of its portfolio, provides insurance that covers export credit (the risk of bankruptcy, insolvency, credit disability, the risk of uncollectible claims and fraud) and political risk. The Bank has proved very successful in conducting its own policy, which, in its offers includes a combination of credit and political risk. The first variant, the so-called multi-buyer or master policy, provides support and cover for 90% of the business arrangement, and in some cases, the bank can cover up to 100% of contract value on a long-term basis. The second variant relates to the coverage of credit and political risk up to 95% of the value, and in agricultural products up to 98%.
- **Overseas Private Corporation for Trade Insurances – the** Cooperation Treaty from 1948 gives the possibility for a domestic multinational

company to have political risk insurance. Agreements on assistance abroad, which came into force in 1969, reallocated a part of portfolio insurance from the state to the newly formed body of the OPIC, which began operations in 1971. Insurance covers the risk of currency inconvertibility, nationalization, expropriation, confiscation of property by other states and political violence in over 250 countries worldwide. Coming into force at the insured event, the OPIC pays compensation for damage to physical assets and for the loss of business income due to the damage of physical assets. OPIC charges a fee for services, operates completely independently and does not create costs to taxpayers.

7.2. United Kingdom

The United Kingdom in 1919 established a department for export-credit insurance against political risks, which is state-owned and has been providing insurance against political and credit risks. Its basic principles are:

- An export credit insurance policy directed to support lending, and also direct investments; in the case of loss caused by exporting the goods and services in developed countries it covers up to 95% of the loss. The insurance covers insolvency and inability to collect receivables, contractual commitments, currency inconvertibility, the disclaimer of contracts by the state, as well as administrative and other restrictions by the state.
- A liability insurance policy focused on insuring any kind of binding obligations of the insured exporters or investors: unfair calls from unusual political events (war, riots, repudiation of contracts) and that are related to the advanced payment of guarantees, the distribution of priority shares, and the guarantee account; it covers 100% of loss.
- Tenders for contract offers and amendments to deposited bills cover the risk of the unfavorable exchange of credit annuities, which are required to be paid by the company, and whose payment currency is issued in the currency of the country in which the investment projects are implemented.

The department in its business operations uses an agreement on guidelines for export credits that is supported by official export agencies and which limits financing of subsidized trade through the definition of the limits (interest rate, maturity, prepayment and repayment mode), exchange rates and information exchange as part of business practice. Determining the minimum premium rate for the country risk is also defined by the Knaepen Package agreement created in 1999 and that allows for the calculation of premiums that should cover the risk of failure to collect export credits, and to cover long term operating costs and loss in case of credit risk. The coefficient, which refers to the category of country credit risk, is determined by the elements of political risk: a general declaration of the moratorium of loan repayment, the political events that prevent or cause a delay in the settlement of loans, the legal provisions that define the convertibility of currencies, war, expropriation, revolution, insurrection and civil unrest.

7.3. Germany

EULER HERMES (EH) is the best export credit agency and was established in 1917. 68% is owned by Allianz France, 28% by Germany and 4% by EH. EH has a 49% equity ownership in OeKB Beteiligungs-und Management AG, whose insurance of credits includes coverage of political risks. Political risks are risks related to legislative and administrative measures, war, insurrection or revolution, which prevent the payment of secured claims; transfer and conversion risk due to inability to convert or transfer the local currency of the customer due to a moratorium of payment; loss of goods due to political events; loss due to the failure to execute contractual obligations.

EH provides a service of credit insurance directly to the exporter or the bank of the exporter, and insurance through a link with the state of Germany. The Research Center of Deutsche Bank analyzed the dependence of political risk of German exports and insurance on projects from 130 countries in the period from 1991 until 2003, as well as the economic effects of political risk insurance. The main results suggest that political risk is an important obstacle to exports, and political risk in the importing country has a significant negative impact on German exports while export credit insurance has a positive and significant impact on exports. With the aim of determining the interdependence of the insurance of export credit and political risk, the gravity model was used as an econometric ex-post technique with the assumption that trade between Germany and other countries depends on the economic size and all types of

	Insurer	country	established
1	ATRADIUS	Netherlands	1953
2	EH GERMANY	Germany	1953
3	FCIA	USA	1963
4	PWC	Germany	1974

Source: Multilateral Investment Guarantee Agency, 2009, pp. 90-91
Table 10: Private political risk insurers

transaction costs, the transportation costs, information costs and hidden costs such as political risk. Countries with less stable government, with a higher probability of internal and external conflicts and higher levels of corruption have a negative impact on German exporters, i.e. a 1% increase in the political risk index leads to a reduction in exports of 0.1% in the short term and 0.65% in the long term. (Moser, Nestmann and Wedow, 2006.)

7.4. Serbia

Political risk insurance in Serbia is the responsibility of the Agency for Export Credit and Insurance (AOFI). The AOFI was formed in order to reduce the country's balance of payments deficit, increase employment, provide support to domestic legal entities and entrepreneurs, and form the institutional framework to support the development of national exports and export economy and to improve the structure and competitiveness of exports and economic development relations with foreign countries. The activity of the Agency is defined by the Law relating to the insurance of export transactions and overseas investments, financing, co-financing and refinancing of export transactions, financing of export preparation and investments, insurance of export preparation, financing a foreign buyer regarding the export of a domestic legal entity, insurance of domestic banks and other financial institutions from non-commercial risks associated with guarantees for export transactions, issuing guarantees and providing services related to export financing and insurance and investment from non-commercial and commercial risks. The insurance premium charged by the agency depends on the risk of the country of export (according to OECD classification), the volume of exports to be insured, payment terms for the foreign buyer, foreign buyer creditworthiness and the experience of exporters in relation to the payment of claims abroad. The state is responsible for the obligations of the Agency with respect to insurance of the exporter for non-commercial risks to the amount that is determined by the law governing the annual budget of Serbia. European export credit agencies stand out in their businesses in that even though they are state property, the agency must not burden the citizens, and therefore the state budget.

8. Insurance from private insurance companies

The global growth of international trade and investment has led to the occurrence of new private insurers that have entered the market of political risk insurance. In 1974 the Financial Times declared that "the development of private political risk insurance is a consequence of the inability of investors to get the same from the official agency for all types of investment and for all countries". The private sector is dominant in short-term insurance.

The first private credit insurer of political risks is ATRADIUS, which was originally founded with the aim to work together with the Dutch government to provide export credit insurance service to Dutch companies. Political risk is defined as the risk of the government of the customer's country that prevents the fulfillment of transactions or the risk of failure to meet obligations or risks that are beyond the individual responsibility of the costumer. In 2008 portfolios saw their largest growth in revenues by products in areas demanding political risk insurance, around 27.3% (ATRADIUS, 2008, pp. 5).

The U.S. private market of political risk insurance began to develop in the early '70s of the last century. The largest company engaged in political risk insurance is the American International Group (AIG), which has been providing this kind of risk since 1974.

In Serbia there is no private insurance company offering policies against political risk.

9. Conclusion

There is consensus that political risk is an important part of country risk and that the state is the source of these political risks. The majority of the export credit agencies observed (more than 71%) have decided that the basic elements of political risk (Table 3) include: non-convertibility of currency, expropriation, confiscation and nationalization, terrorism and breach of contract. AOFI

Agency	Established	premium insurance	period of insurance in years	Cover in %	Micro and SME companies
MIGA	1985.	0,45% - 1,75%	15 - 20	90%/95%	yes
WB	1944.	0,15% - 0,75%	n/a	100%	yes
AOFI	2005.	n/a	n/a	n/a	not specified
ECGD	1919.	n/a	2-5-15	75%/85%/95%/ 100%	yes
EH	1917.	n/a	n/a	n/a	yes
Ex-Im Bank	1934.	n/a	n/a	95%/100%	yes
OPIC	1971.	n/a	n/a	75%/90%/100%/270%	yes

Source: Export Credit Agencies

Table 11: Overview of the basic elements of agencies that deal with political risk insurance

opted for the above elements of political risk, provided that the above risks in practice do not apply to export credit insurance (because the product does not exist as such), which is not observed with other agencies. Managing political risk, regardless of ownership (transnational, national, private) is generally the responsibility of export credit agencies. The AOFI has not developed a transparent environmental policy and policy against corruption, money laundering and bribery.

86% of the observed export credit agencies chose to provide services to micro, small and medium enterprises, while the AOFI did not specify the orientation of the target group of micro, small and medium enterprises, where this should be done as the total number of registered enterprises in Serbia in 2008. 99% were referred to as micro, small and medium enterprises that employ 59% of the employees, whose turnover represents 61% of the total turnover in Serbia and 53% of the gross value added. Also, SMEs contribute 50% of exports and 51% of all investments (www.economy.rs).

Given that political risk is a part of country risk, it proportionally impacts on price of capital and the rates of insurance premiums. Banks and export credit agencies have come to the same conclusion, namely that country risk is the only "place" where it is possible to carry out a planned reduction in interest rates and insurance premiums. The insurance premium for the observed export credit agencies ranged from 0.15% to 1.75% (Table 11).

Export credit agencies have agreed to export credit insurance in the short, medium and long term, provided that there is no unanimity over the meaning of the terms. Short-term insurance is up to 1 year and up to 2 years of insurance for the Belgian Agency for Credit Insurance. The scale of insurance coverage against political risks ranges from 75% to 270%, while the AOFI has not defined its coverage.

Given the unavailability of an adequate database and the lack of standards it is impossible at the national level to determine the effect of economic management and political risk insurance and the impact on macroeconomic stability in the foreign trade multiplier. Research by the German export credit agency has confirmed the positive multiplication of insurance and political risk.

If export insurance agencies have adequate levels of capital, high-quality products, services that follow global trends, expert staff and competitive premiums, as a consequence of the absence of country risk and political risk, your health insurance as a measure of political risk management directly affects the growth and development economics.

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Abbreviations

MIGA Multilateral Investments Guarantee Agency
WB World Bank insurance program
AOFI Export Credit and Insurance Agency of the Republic of Serbia
ECGD Export Credits Guarantee Department
EH EULER HERMES
EX-IM Export import bank
OPIC Overseas Private Corporation for Trade Insurances

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Primary Energy Consumption, CO2 Emissions and Economic Growth: Evidence from India

Aviral Kumar Tiwari*

Abstract:

This study examined static and dynamic causal relationships between primary energy consumption, gross domestic product, and CO2 emissions for India during the period 1970-2007. We tested for the presence of unit root and cointegration among the variables by incorporating endogenously determined structural breaks in the data. The causality is examined between test variables using Granger's approach (in VAR framework), and Dolado and Lütkepohl's approach. We find evidence of no cointegration relationship among the test variables in the presence of structural breaks. Further, static analysis shows that primary energy consumption does not granger-cause GDP, whereas GDP granger-causes primary energy consumption. The dynamic analysis shows conflicting results on the causal relationship between energy consumption and GDP. Since GDP explains 75.9% of the forecast error variance of primary energy consumption, whereas primary energy consumption explains only 0.96% of the forecast error variance of GDP, we can suggest that India should adopt policies that reduce energy consumption.

Keywords: CO2 emissions, primary energy consumption, economic growth, causality, IRFs, VDs, structural breaks

JEL: Q40, Q43, Q53, Q56 **DOI:** 10.2478/v10033-011-0019-6

1. Introduction

The increasing threat of global warming and climate change has focused attention on the relationship between economic growth, energy consumption, and environmental pollution. A number of studies have examined the relationship between energy consumption and economic growth. This line of inquiry largely emerged from the oil shocks of the 1970's, and the impact of the Kyoto Protocol agreement.[1] It should be noted that economic theories do not explicitly state a relationship among energy consumption, CO_2 emissions, and economic growth. An empirical investigation on the relationship among these variables had been one of the most attractive areas of energy economics literature for the last two decades. Recent years have seen a renewed interest in examining the relationship between these variables. This line of research focuses on the Environmental Kuznets Curve (EKC) or what is also termed the Carbon Kuznets Curve (CKC) hypothesis. The higher economic growth rates pursued by developing countries is largely obtained through consumption of an increasing quantity of commercial energy, which comes at the cost of ignoring technologies that are more efficient. Thus,

[1] The Kyoto Protocol requires that industrialized countries reduce their collective emissions of greenhouse gasses by 5.2% of 1990 levels by the period 2008-2012. The country-specific targets in the Kyoto Protocol may be difficult for some nations to achieve. Developing countries, including India, have been absolved of any responsibility towards reducing emissions in the first commitment period, that is, 2008-12, of the Kyoto Protocol.

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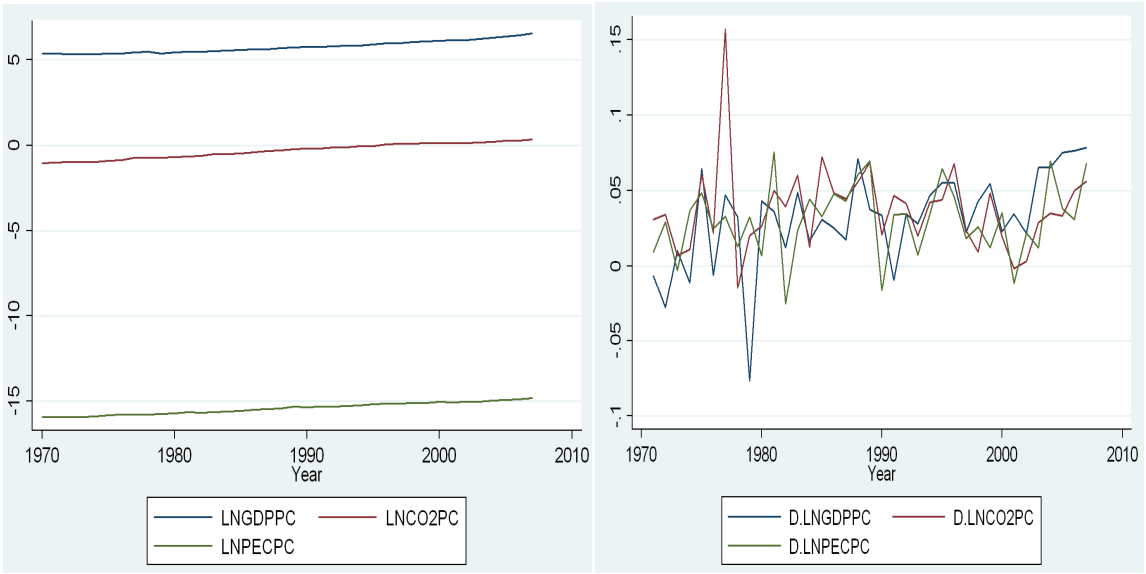

Figure 1: Plots of the variables tested in the study

there is dispute whether energy consumption is a stimulating factor, or is itself a result of economic growth. The increased share of CO_2 emissions in the atmosphere that is a product of the unbridled use of fossil fuels has negative impacts on natural systems. It is a main factor contributing to climate change. In this context, the consumption of coal and oil should be replaced with renewable alternatives, such as wind, solar and hydropower, which do not emit CO_2. The present study will focus on the causal relationship between economic growth (measured by gross domestic product per capita at constant prices of 2000 US$), environmental degradation (measured by carbon dioxide (CO_2) emissions per capita) and primary energy consumption (measured by aggregate primary energy consumption per capita in Million tons oil equivalent) in India.

Figure 1 presents the trend path of the variables tested in log level and log first difference form. It is evident from the figure that primary energy consumption and economic growth have a close relationship over the entire period, thus providing reason to test the causal hypothesis in the Indian case.

The organization of the study is as follows. The second section presents a literature review followed by discussion of the objectives, data used, and econometric methodology in the third section. The fourth section discusses the data analysis and the empirical results. The fifth section concludes the study and provides policy implications.

2. Literature Review

The studies in this area can be classified into four groups based on their findings. The first group comprises studies that find unidirectional causality running from electricity or energy consumption (both at aggregate and disaggregate levels) to GDP. Studies worthy of mention are those by Altinay and Karagol (2005) in Turkey for the period 1950-2000, Lee and Chang (2005) in Taiwan for the period 1954-2003, Shiu and Lam (2004) in China for the period 1971-2000, and Soytas and Sari (2003) in Turkey, France, Germany and Japan, Wolde-Rufale (2004) in Shanghai for the period 1952-1999, and Morimoto and Hope (2004) in Sri-Lanka for the period 1960-98.

Second are those studies that find a unidirectional causality running from economic growth or gross domestic product to electricity or energy consumption. Noteworthy studies are Ghosh (2002) for India during 1950-1997, Cheng (1999) in India for the period 1952-1995, Fatai et al. (2004) in New Zealand and Australia for the period 1960-1999, Hatemi and Irandoust (2005) in Sweden for the period 1965-2000, Cheng and Lai (1997) in Taiwan for the period 1954-1993, Chang and Wong (2001) in Singapore for the period 1975-1995, and Aqeel and Butt (2001) in Pakistan for the period 1955-1996.

Third are those studies that find bidirectional causality. Studies worth noting are Soytas and Sari (2003) in Argentina, Oh and Lee (2004) in Korea for the period 1970-1999, Yoo (2005) in Korea for the period 1970-2002, Glasure (2002) in South Korea for the period 1961-1990, Jumbe (2004) in Malawi for the period 1970-1999, Ghali and El-Sakka (2004) in Canada for the period of 1961-

1997, and Hwang and Gum (1992) in Taiwan for the period 1961-1990.

The fourth group comprises studies that that find no causal linkages between energy or electricity consumption and economic growth. These are Cheng (1995) in the U.S. for the period 1947-1990, Stern (1993) in the U.S. for the period 1947-1990, Akarca and Long (1980) in the U.S. for the period 1950-1968 and 1950-1970, Yu and Hwang (1984) in the U.S. for the period 1947-1979. A comprehensive review of the literature on this topic is provided in many studies, for example Shahbaz, Tang, Shabbir (2011) and Tiwari (2011a, 2011b) and the references therein, among others.

A marriage of these two literatures that brings together the relationship between economic growth, energy consumption and pollution emissions within a Granger-causality multivariate framework is a relatively new area of research. There exist only a limited number of studies in this direction either for developed countries (for example, Ang (2007) for France, Soytas, Sari and Ewing (2007) for the United States) or developing countries (for example, Zhang and Cheng (2009) for China, Ang (2008) for Malaysia, Halicioglu (2009) and Soytas and Sari (2009) for Turkey, Sari and Soytas (2009) for oil-rich OPEC countries). However, to the best of our knowledge there has been no such study conducted for India that analyzes the causality in a multivariate framework with structural breaks in the unit root and co-integration process. Tiwari (2011a, 2011b) analyzes the causality in a multivariate framework, but it fails to incorporate structural breaks in the unit root and cointegration process. Further, use of primary energy consumption is also new in the study as Tiwari (2011a, 2011b) and other studies used electricity consumption as a proxy for energy consumption.

3. Data, Objectives, and Econometric Methodology

3.1. Data and objectives

The present study has taken annual time series data for the period 1970-2007 from the World Development Indicators (WDI) and BP Statistical Review of World Energy[2].

The present study analyzes the static and dynamic relationship among primary energy consumption, CO_2 emissions, and economic growth by incorporating structural breaks in the unit root and cointegration process of these variables. The interest in studying the relationship between primary energy consumption, CO_2 emissions, and economic growth arises from the need to understand the complex links between the three variables. Such an understanding is basic to regulators and investors in deregulated electricity markets in order to design a system that ensures reliability and efficiency.

3.2. Estimation methodology

The stationarity of the variables is tested by using the (Augmented) Dickey Fuller (1979, hereafter DF/ADF) test, Phillips and Perron (1988, hereafter PP) test and Ng and Perron (2001, hereafter NP) test, and in all cases model selection was based on the graphical plot of the variables in question.

However, these tests can yield misleading results when the data series exhibits socks. Therefore, we used the Zivot and Andrews (1992, hereafter ZA) test in our analysis, as it treats the selection of the break points as the outcome of an estimation procedure. The ZA (1992) test tests the null hypothesis of the unit root against the alternative of a one-time structural break with three models: Model A allows a one-time change in the level of the series, Model B permits a one-time change in the slope of the trend function of the series and Model C admits both changes. The regression equations corresponding to these three models are as following.

Model A:

$$\Delta y = \mu + \beta t + \alpha y_{t-1} + \theta DU_t + \sum_{i=1}^{k} c_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

Model B:

$$\Delta y = \mu + \beta t + \alpha y_{t-1} + \gamma DT_t + \sum_{i=1}^{k} c_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Model C:

$$\Delta y = \mu + \beta t + \alpha y_{t-1} + \theta DU_t + \gamma DT_t + \sum_{i=1}^{k} c_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

[2] http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2 and http://www.bp.com/statisticalreview.

where *DUt* and *DTt* are break dummy variables for a mean shift and a trend shift, respectively. The shift occurs at each possible break point $T_B (1 < T_B < T)$. Formally:

$$DU_t = \begin{cases} 1, if, t > T_B \\ 0, otherwise \end{cases} and$$

$$DT_t = \begin{cases} t - T_B, if, t > T_B \\ 0, otherwise \end{cases}$$

where *k* is the number of lags determined for each possible break point by one of the information criteria (AIC in the study). The null hypothesis is $\alpha = 0$, which implies that the series exhibits a unit root with a drift and excludes any structural break points. The alternative hypothesis is $\alpha < 0$, which implies that the series is trend-stationary with an unknown one-time break. Therefore, equations (1), (2) and (3) are sequentially estimated and T_B is chosen so as to minimize the one sided t-statistics for testing $\hat{\alpha} = 0$.

However, the ZA (1992) test incorporates only one structural break in the data even if more than one break is present. To overcome this issue, the Clemente-Montanes-Reyes (1998) unit root test was applied. This test has the following representation of the null hypothesis i.e., H_0 and alternative hypothesis i.e., H_a:

$$H_0 : x_t = x_{t-1} + a_1 DTB_{1t} + a_2 DTB_{2t} + \mu_t \quad (4)$$

$$H_a : x_t = u + b_1 DU_{1t} + b_2 DTB_{2t} + \mu_t \quad (5)$$

In equation-4 and equation-5, DTB_{1t} is the pulse variable equivalent to 1 if $t = TB_i + 1$ and zero if not. Moreover, $DU_{it} = 1$ if $TB_i < t (i = 1,2)$ and if this assumption is violated then it is equal to zero. The modification of the mean is represented by the TB_1 and TB_2 time periods. Further, it is simplified with the assumption that $TB_i = \delta_i T (i = 1,2)$ where $1 > \delta_i > 0$ while $\delta_1 < \delta_2$ (see Clemente-Montanes-Reyes (1998)). If an innovative outlier contains two structural breaks then we can test the unit root hypothesis with the following equation-6:

$$x_t = u + \rho x_{t-1} + d_1 DTB_{1t} + a_2 DTB_{2t} + d_3 DU_{1t} + d_4 DU_{2t} + \sum_{i=1}^{k} c_j \Delta x_{t-1} + \mu_t \quad (6)$$

This equation helps us to estimate the minimum value of the t-ratio through simulations and the value of the simulated t-ratio can be utilized for all break points if the value of the autoregressive parameter is constrained to 1. For the derivation of the asymptotic distribution of the said estimate, it is supposed that $\delta_2 > \delta_1 > 0$, $1 > \delta_2 - 1 > \delta_0$. δ_1 and δ_2 obtain the values in the interval i.e. $[(t+2)/T, (T-1)/T]$ by appointing the largest window size. Further, $\delta_1 < \delta_2 + 1$ was used to show that cases where break points exist in repeated periods are purged (see Clemente-Montanes-Reyes (1998)). To test the unit root hypothesis, a two-step approach was used for the case when shifts are in a better position to explain additive outliers. In the 1st step, the deterministic variable was eliminated from the estimation with the use of the following equation-7:

$$x_t = u + d_5 DU_{1t} + d_6 DU_{2t} + \hat{x} \quad (7)$$

Then, in the second step, the minimum t-ratio was searched and hypothesis $\rho = 1$ was tested with equation 8:

$$\hat{x}_t = \sum_{i=1}^{k} \phi_{1i} DTB_{1t-1} + \sum_{i=1}^{k} \phi_{2i} DTB_{2t-1} + \rho \hat{x}_{t-1} + \sum_{i=1}^{k} c_i \Delta \hat{x}_{t-1} + \mu_t \quad (8)$$

To make sure that $\min t_{\rho\ t}^{IO}(\delta_1, \delta_2)$ congregates, i.e., converges with the distribution, a dummy variable was included in the estimated equation for estimation:

$$\min t_{\rho\ t}^{IO}(\delta_1, \delta_2) \to \inf_{\gamma} = \wedge \frac{H}{[\delta_1(\delta_2 - \delta_1)]^{1/2} K^{1/2}} \quad (9)$$

After confirming that the variables used in this study are non-stationary and have the same order of integration i.e., I(1), the Johansen and Juselius (1990) method of cointegration analysis was adopted. The method employs the VAR system to test for the numbers of cointegration vectors. Its estimation procedure is based on the Maximum Likelihood (ML) method. However, in this case, if structural breaks are not also analyzed it may lead to biased results. There are a number of studies that address testing for cointegration in the presence of structural shifts (for example Hansen (1992), Gregory and Hansen (1996), Campos, Ericsson, and Hendry (1996), Seo (1998), Inoue (1999), Johansen and Nielsen (1993), Johansen, Mosconi, and Nielsen (2000), Arranz and Escribano (2000), Saikkonen and Lütkepohl (2000, hereafter S&L), and Lütkepohl, Saikkonen, and Trenkler (2003)). These studies considered a single equation as well as systems cointegration tests, but none of the proposed tests is suitable for testing the cointegrating rank of a system when the break date is

unknown. For such a situation Lütkepohl, Saikkonen, and Trenkler (2004) proposed a cointegrating rank test for vector autoregressive (VAR) processes with a structural shift at an unknown time. In their case, the shift is assumed as a simple shift in the mean. They modeled a structural shift as a simple shift in the level of the process. The structural break date is estimated based on a full-unrestricted VAR model. In the next step, the Johansen type test was applied for the cointegrating rank to the adjusted series using the following null and alternative hypotheses:

$$H_0(r_0): rk(\Pi) = r_0 \text{ vs. } H_1(r_0): rk(\Pi) > r_0 \tag{10}$$

For a given break date, S&L propose to estimate the parameters of the deterministic part first. Denoting the estimators of μ_0, μ_1, and δ by $\hat{\mu}_0$, $\hat{\mu}_1$, and $\hat{\delta}$, respectively, the test is based on a sample analog of the series x_t obtained as

$$\hat{x}_t = y_t - \hat{\mu}_0 - \hat{\mu}_1 t - \hat{\delta} d_{t\hat{\tau}}, \tag{11}$$

where $\hat{\tau}$ may be replaced by any estimator that satisfies $\hat{\tau} = \tau + Op(1)$ including, of course, $\hat{\tau}$. The series $\hat{x}_t$ can be used to compute LR type test statistics for the null hypothesis $H_0(r_0)$ in the same way as the usual LR test statistic based on the VECM. More precisely, the test statistic can be determined from

$$\Delta\hat{x}_{(t)} = \Pi\hat{x}_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta\hat{x}_{(t-j)} + e_{t\hat{\tau}}$$
$$(t = p+1,\ldots,T), \tag{12}$$

by solving the generalized eigenvalue problem $\det(\hat{\Pi}\hat{M}_T\Pi' - \lambda\hat{\Omega}) = 0$, where $\hat{\Pi}$ is the LS estimator of Π obtained from (12), $\hat{\Omega}$ is the corresponding residual covariance matrix, and

$$\hat{M}_{(t)} = \sum_{t=p+1}^{T} \hat{x}_{(t-j)}\hat{x}'_{(t-j)} - \sum_{t=p+1}^{T} \hat{x}_{(t-j)}\Delta\hat{X}'_{(t-j)} \left(\sum_{t=p+1}^{T} \Delta\hat{X}_{(t-j)}\Delta\hat{X}'_{(t-j)} \right)^{-1} \sum_{t=p+1}^{T} \Delta\hat{X}_{(t-j)}\Delta\hat{x}'_{(t-j)}$$

with $\Delta\hat{X}_{(t-j)} = [\Delta\hat{x}'_{(t-1)} : \ldots : \Delta\hat{x}'_{(t-p+1)}]'$. Denoting the resulting ordered eigenvalues by $\hat{\lambda}_1 \geq \ldots \geq \hat{\lambda}_n$, the LR type statistic for the pair of hypotheses in (10) becomes

$$LR(r_0) = \sum_{j=r_0+1}^{n} \log(1 + \hat{\lambda}_j) \tag{13}$$

Once the cointegrating vectors are estimated among a set of variables one can proceed to carry out VEC modeling. However, Lütkepohl, Saikkonen, and Trenkler's (2004) test of cointegration in the presence of an endogenously determined structural break shows no evidence of cointegration (panel two of Table 3). Therefore, to analyze the static and dynamic causality framework the VAR approach was used, and to see the robustness of the results of the VAR model Toda and Yamamoto's (1995, hereafter TY) and Dolado and Lütkepohl's (1996, hereafter DL) test was applied. The test involves estimating the VAR in levels and testing general restrictions on the parameter matrices. This method is applicable "whether the variables may be stationary (around a deterministic trend), integrated in an arbitrary order, or cointegrated in an arbitrary order". Therefore, the Toda and Yamamoto (1995) causality procedure has been labeled as the long run causality test of the coefficients of VAR. The TY and DL procedure steps are as follows: (i) finding the maximal order of integration (*d*) of variables by conducting unit root tests, (ii) determining the optimum lag length (*k*) of a VAR. (iii) estimating the lag-augmented VAR (*k*+*d*) model, (iv) conducting a Wald test on the first *k* parameters instead of on all parameters in the augment VAR (*k*+*d*) model.

To employ the DL test, first the lag length of an unrestricted multivariate VAR model was estimated and optimal lag length 3 by means of the AIC because of its small sample properties (Liew, 2004) was chosen. Then the following equation was estimated through the Seemingly Unrelated Regression (SUR) approach:

$$\begin{bmatrix} ly_{(t)} \\ le_{(t)} \\ lCO_{2(t)} \end{bmatrix} = \begin{bmatrix} a_{01} \\ a_{02} \\ a_{03} \end{bmatrix} + \begin{bmatrix} a_{11}^{1} a_{12}^{1} a_{13}^{1} \\ a_{21}^{1} a_{22}^{1} a_{23}^{1} \\ a_{31}^{1} a_{32}^{1} a_{33}^{1} \end{bmatrix} \begin{bmatrix} ly_{(t-1)} \\ le_{(t-1)} \\ lCO_{2(t-1)} \end{bmatrix} + \begin{bmatrix} a_{11}^{2} a_{12}^{2} a_{13}^{2} \\ a_{21}^{2} a_{22}^{2} a_{23}^{2} \\ a_{31}^{2} a_{32}^{2} a_{33}^{2} \end{bmatrix} \begin{bmatrix} ly_{(t-2)} \\ le_{(t-2)} \\ lCO_{2(t-2)} \end{bmatrix} + \begin{bmatrix} a_{11}^{3} a_{12}^{3} a_{13}^{3} \\ a_{21}^{3} a_{22}^{3} a_{23}^{3} \\ a_{31}^{3} a_{32}^{3} a_{33}^{3} \end{bmatrix} \begin{bmatrix} ly_{(t-3)} \\ le_{(t-3)} \\ lCO_{2(t-3)} \end{bmatrix} + \begin{bmatrix} a_{11}^{4} a_{12}^{4} a_{13}^{4} \\ a_{21}^{4} a_{22}^{4} a_{23}^{4} \\ a_{31}^{4} a_{32}^{4} a_{33}^{4} \end{bmatrix} \begin{bmatrix} ly_{(t-4)} \\ le_{(t-4)} \\ lCO_{2(t-4)} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (14)$$

where $ly_{(t)}$, $le_{(t)}$ and $lCO_{2(t)}$ denote the logarithms of the real GDP, primary energy consumption, and CO_2 emissions, respectively. To test the causality among the test variable the hypothesis can be constructed that energy consumption does not cause real GDP: $H_0 : a_{12}^{(1)} = a_{12}^{(2)} = a_{12}^{(3)} = 0$ and that real GDP does not cause energy consumption, constructed as: $H_0 : a_{21}^{(1)} = a_{21}^{(2)} = a_{21}^{(3)} = 0$ while these joint hypotheses can be tested by the MWALD test.

Further, diagnostic checks are conducted to test the stochastic properties of the VAR model. We tested for the presence of residuals autocorrelation (this is tested by using the Lagrange Multiplier (LM) test), heteroskedasticity (tested by using the White heteroskedasticity test), normality (tested by the Jarque-Bera (JB) normality test and adopting Urzua's (1997) method of residual factorization (orthogonalization)) and the presence of lag exclusion (tested by conducting the Wald type lag exclusion test).[3]

The F-test in VAR only indicates the Granger-exogenity or endogenity of the dependent variable within the period under consideration (i.e., it only indicates the static causality). In order to analyze the dynamic causality of the system the forecast error Variance Decompositions (VDs) and Impulse Response Functions (IRFs) were computed using a generalized approach, while confidence intervals were constructed with 10000 Monte Carlo repetitions.

4. Data Analysis and Result Interpretations

4.1. Descriptive analysis

Summary statistics of the variables are presented in Table 1.

It is evident from Table 1 that the SD of CO_2 emissions is highest and the GDP lowest, while very close to the SD value of primary energy consumption. The mean value of CO_2 emissions and primary energy consumption are negative while GDP is positive. JB statistics shows that all of the variables used in the analysis have a log normal distribution.

4.2. Unit root, cointegration, granger-causality analysis in a static frame work (using VAR and Dolado and Lütkepohl's approach) and dynamic framework (using IRFs and VDs)

The stationary property of the data series was tested with the use of DF/ADF test, PP test, and NP test based upon the Figure 1 suggest the type of the model to be used. The results of the unit roots are reported in Table 2.

It is evident from Table 2 that all of the variables are nonstationary in their level form and become stationary after the first difference i.e., (I). Further, to see the robustness of the results of the traditional unit root ZA test of one structural break and the CMR test of one break in the case of Innovative Outliers and Additive Outliers was performed and the results are reported in Table 3.

The results of models A, B, and C of the ZA test show that GDP per capita is nonstationary in the level form and structural breaks occurred in the series in 1979, 2002 and 2003. These years in Indian history are characterized as policy shock years. Similarly, primary energy consumption per capita is also nonstationary in the level form and structural breaks in the series occurred in 1987 and 1996. In the case of per capita CO_2 emissions, structural breaks have occurred in 1995, 1997 and 2001 and it is stationary in the level form. The results of the CMR test of one break show different dates for structural breaks than ZA, which is due to the difference in the underlying procedures of testing the break points. However, both results provide the same conclusion that test variables are nonstationary in the level form, whereas they are stationary in the first

[3] For more details on why these tests have been preferred see Tiwari (2011a, 2011b).

	Ln(GDPPC)	Ln(PECPC)	Ln(CO_2PC)
Mean	5.759298	-15.42188	-0.316019
Median	5.711097	-15.38977	-0.262979
Maximum	6.532876	-14.82226	0.359288
Minimum	5.330333	-15.94910	-1.032574
Std. Dev.	0.355009	0.343749	0.436976
Skewness	0.546480	0.016641	-0.164199
Kurtosis	2.134151	1.688451	1.671210
Jarque-Bera (Probability)	3.078406 (0.214552)	2.725342 (0.255976)	2.966421 (0.226908)

Note: Ln(GDPPC) denotes log of Gross domestic product per capita; Ln(PECPC) denotes log of electricity consumption per capita; Ln(CO_2PC) denotes log of CO_2 emissions per capita.
Source: Author's calculation
Table1: Descriptive statistical analysis

Variables	Unit root tests					
	Constant	Constant and trend	DF/ADF (K)	PP (k)	NP	
					(MZa) (k)	(MZt) (k)
Ln(GDPPC)	------	Yes	-0.81194(0)	-0.68639 (1)	0.05191 (0)	0.02117 (0)
D(Ln(GDPPC))	Yes	----	-4.8774* (0)	-4.9307* (3)	-16.483* (0)	-2.7427* (0)
Ln(PEC)	----	Yes	-2.89389 (0)	-2.93676 (2)	-9.91251 (0)	-2.16379 (0)
D(Ln(PEC))	Yes	------	-6.7924* (0)	-6.7924* (0)	-17.4514* (0)	-2.82526* (0)
Ln(CO_2PC)	----	Yes	-1.7721(0)	-1.6853(1)	-6.29739 (0)	-1.72346 (0)
D(Ln(CO_2PC))	Yes	------	-7.1026* (0)	-7.0827* (2)	-17.2730* (0)	-2.91941* (0)

Note: (1) Ln(GDPPC) denotes log of Gross domestic product per capita; Ln(PECPC) denotes log of electricity consumption per capita; Ln(CO_2PC) denotes log of CO_2 emissions per capita. (2) *denotes significance at 1% level. (3) "K" Denotes lag length and "D" denotes first difference. (4) Selection of lag length in NP test is based on Spectral GLS-detrended AR based on SIC and selection of lag length (Bandwidth) and in PP test it is based on Newey-West using Bartlett kernel.
Source: Author's calculation
Table 2: Unit root analysis

Clemente-Montanes-Reyes Unit Root					**ZA unit root test**					
Variables	Innovative Outliers		Additive Outlier		Model A		Model B		Model C	
	t-statistic	Decision	t-statistic	Decision	t-statistic	Decision	t-statistic	Decision	t-statistic	Decision
Ln(GDPPC)	2.761 (1986)	I(0)	-1.621 (2000)	I(0)	-2.490 (1979)	I(0)	-2.671 (2002)	I(0)	-2.677 (2003)	I(0)
D(Ln(GDPPC))	-6.576 (1978)	I(1)	-6.206 (2000)	I(1)	-7.438 (1991)	I(1)	-7.445 (2003)	I(1)	-7.685 (1979)	I(1)
Ln(PECPC)	-1.621 (1983)	I(0)	-1.843 (1990)	I(0)	-3.869 (1987)	I(0)	-2.979 (1996)	I(0)	-3.773 (1987)	I(0)
D(Ln(PECPC))	-7.216 (1988)	I(1)	-7.381 (1987)	I(1)	-7.538 (1990)	I(1)	-7.057 (2003)	I(1)	-7.550 (2001)	I(1)
Ln(CO_2PC)	-1.267 (1983)	I(0)	-2.044 (1990)	I(0)	-4.331 (2001)	I(0)	-4.154 (1997)	I(0)	-3.956 (1995)	I(0)
D(Ln(CO_2PC))	-9.225 (1976)	I(1)	-5.956 (1975)	I(1)	-7.721 (1975)	I(1)	-7.567 (1978)	I(1)	-7.817 (2001)	I(1)

ZA test-Critical values: 1%: -5.57 5%: -5.08 for model when breaks occur in intercept and trend both; Critical values: 1%: -5.43 5%: -4.80 for model when breaks occur in intercept only; Critical values: 1%: -4.93 5%: -4.42 for model when breaks occur in trend only. CMR test critical values for IO and AO models is -4.270 and -3.560 at 5% level of significance, respectively.

Table-3: ZA and Clemente-Montanes-Reyes Unit Root Estimation with one structural break

difference from i.e., I(1). Finally, to validate the findings of one structural break the results of the two-break test of CMR in the case of Innovative Outliers and Additive Outliers was analyzed and the results are reported in Table 4.

It is evident from Table 4 that there is a difference in the identified dates of structural breaks in the cases of the Innovative Outliers' and Additive Outliers' approaches. However, each series is nonstationary in the level form and stationary in the first difference form. This indicates

that all test variables have integration of the order of one i.e., I(1).

Since all variables are I(1) cointegration analysis can proceed. To proceed on to cointegration the first step is the selection of appropriate lag length[4]. Therefore, a joint test of lag length selection was carried out, and (based upon AIC) to take three lags of each variable. Then lag intervals (1, 3) were chosen and a joint test[5] was conducted for the cointegrating vector and model selection. Further, by choosing model 4[6], and the lag interval (1, 3) the JJ cointegration test was carried out. The results of the cointegration test are reported in Table 5.

It is evident from panel 1 of Table 5 that both Trace and Eigenvalue criteria reject the null hypothesis of no cointegrating vector against the alternative of at most one cointegrating vector. Further, to test the robustness of the results of cointegration Lütkepohl, Saikkonen, and Trenkler's (2004) test of cointegration was performed and the results are reported in panel 2 of Table 5. Interestingly, in this case no null hypothesis of cointegration is rejected. This implies that the results reported by the JJ test are unbiased and therefore we cannot conduct the VECM analysis. As a consequence the next step was the Engle-Granger causality analysis in the VAR framework using lag intervals (1, 3), the results of which are shown in Table 6.

It is evident from Table 6 that CO_2 emissions Granger-cause GDP and that CO_2 emissions and primary energy consumption Granger-cause GDP jointly. Further, we find that GDP Granger-causes primary energy consumption.

Further, to check that the conclusions drawn from the VAR model are unbiased we performed diagnostic checks analysis and report the results in Table 7.

It is evident from Table 7 that the specification of VAR is correct as no test rejects the null hypothesis (of course, the null of lag exclusion is rejected, which implies no lag is excluded from the model of any variable). Therefore, in the final step, IRFs and VDs analysis were performed and standard errors in both cases obtained by conducting 10000 Monte-Carlo simulations. A graph of the accumulated IRFs is given in Figure 2.

It is evident from Figure 2 that one SD shock/innovation in GDP, primary energy consumption, and CO_2 emissions increases GDP, primary energy consumption, and CO_2 emissions throughout the 10 years. Whereas by analyzing the results of VDs it was found that GDP, primary energy consumption and CO_2 emissions explains 96%, 0.96% and 2.8% of the forecast error variance in GDP after 10 years. Further, the results of VDs analysis show that GDP, primary energy consumption and CO_2 emissions explain 75.9%, 20.5%, and 3.63% of forecast error variance in primary energy consumption. Finally, the VDs results show that GDP, primary energy consumption and CO_2 emissions explain 64.9%, 19.5%, and 15.55% of forecast error variance in CO_2 emissions. Thus, conflicting results between VDs and IRFs were shown. The IRFs analysis shows evidence of bidirectional causality, whereas VDs analysis shows evidence of unidirectional causality (this is because GDP explains most of the forecast error variance in primary energy consumption and CO_2 emissions and not vice-versa).

In the final step, the DL approach of Granger-causality was applied to test the validity of the results reported by the simple VAR model, with the results presented in Table 8.

It is evident from Table 8 that the results of the DL approach support the results of the VAR based Granger-causality analysis (the only exception is that now CO_2 emissions are found to Granger-cause primary energy consumption).

5. Conclusions, policy implications and limitations

The paper examined the linkage between primary energy consumption, CO_2 emissions, and economic growth in India for the period 1970-2007. The relationship was examined within static and dynamic Granger causality frameworks. The VAR approach and DL approach were used for examining the causality in the

[4] The JJ test has been found to be sensitive to the lag length chosen for the analysis. When the order of VAR i.e., lag length is too short, the problem of serial correlation among the residuals arises and the test statistic will become unreliable. Conversely, if lag length (order of VAR) is too high there will be an upward bias in the test statistics, again causing doubts on the reliability of the estimates of parameters. Therefore, we used Akaike Information Criteria (AIC) because of its small sample properties.

[5] The JJ test has also been found to be sensitive to the choice of deterministic assumptions used in testing cointegration. Johansen (1991) suggests testing the joint hypothesis of the rank order and the deterministic components to choose the right model. This test is known as the Pantula Principal. Since we were not sure whether a deterministic trend is present or whether the VAR also had a linear trend we carried out a joint test and chose the model, which minimizes the value of SIC and AIC and in the case of conflict the theoretically appropriate model was chosen which minimizes the values of SIC of VEC modeling.

[6] It should be noted that the joint test of model selection and cointegrating vector shows that model 5 is appropriate (based upon SIC and AIC) for analysis. However, model 1 and model 5 have been said to be theoretically inappropriate; hence we preferred the model in which we obtained the minimum values of SIC and AIC, i.e., model 4.

Clemente-Montanes-Reyes Unit Root								
Variables	Innovative Outliers				Additive Outlier			
	t-statistic	TB1	TB2	Decision	t-statistic	TB1	TB2	Decision
Ln(GDPPC)	2.123	1981	1993	I(0)	-2.123	1985	1996	I(0)
D(Ln(GDPPC))	-5.768	1977	1981	I(1)	-4.535	1977	1989	I(0)
Ln(PECPC)	-0.918	1983	1993	I(0)	-2.529	1985	1995	I(0)
D(Ln(PECPC))	-7.697	1984	1988	I(1)	-7.168	1987	1998	I(1)
Ln(CO_2PC)	-1.837	1976	1983	I(0)	-2.640	1983	1992	I(0)
D(Ln(CO_2PC))	-9.253	1976	1999	I(1)	-6.596	1975	1998	I(1)

Note: 5% critical value for IO and AO are -5.490 and -5.490 respectively.

Table-4: Clemente-Montanes-Reyes Unit Root Test Two Structural Breaks

Panel 1: Cointegration test- JJ [Trend assumption: Linear deterministic trend (restricted) Lags interval (in first differences): 1 to 3]					
Unrestricted Cointegration Rank Test (Trace)					
H_0	H_a	Eigenvalue	Trace Statistic	5% Critical Value	Prob.**
None*	At most 1	0.572113	54.62906	42.91525	0.0023
At most 1	At most 2	0.393374	25.76656	25.87211	0.0515
At most 2	At most 3	0.227403	8.771928	12.51798	0.1949
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
H_o	H_a	Eigenvalue	Max-Eigen Statistic	5% Critical Value	Prob.**
None *	At most 1	0.572113	28.86250	25.82321	0.0193
At most 1	At most 2	0.393374	16.99463	19.38704	0.1077
At most 2	At most 3	0.227403	8.771928	12.51798	0.1949
Panel 2: Cointegrating rank Tests- Lütkepohl, Saikkonen, and Trenkler (2004): Endogenously determined break date (1975) and trend assumption is linear deterministic trend (restricted) lags interval (in first differences): 1 to 3]					
H_o	H_a	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value
None	At most 1	0.5830443	25.57	28.45	33.76
At most 1	At most 2	0.2675000	9.03	15.83	19.85
At most 2	At most 3	0.0140074	0.50	6.79	10.04

Note: (1)* denotes rejection of the hypothesis at the 0.05 level and **MacKinnon-Haug-Michelis (1999) p-values; (2) Critical values of Lütkepohl, Saikkonen, and Trenkler (2004) test are from Trenkler (2003).

Source: Author's calculation

Table 5: Cointegration tests

VEC Granger Causality Short Run/Block Exogeneity (Wald test/χ^2)			
	Dependent variables		
Independent variables	Ln(GDPPC)	Ln(PECPC)	Ln(CO_2PC)
Ln(GDPPC)	-------	10.37870**	5.673291
Ln(PECPC)	2.012965	------	2.789826
Ln(CO_2PC)	10.05588**	4.666536	-------
Joint hypothesis	15.35898**	11.00509	11.82430

Note: (1) Ln(CO_2PC) denotes log of CO_2 emission per capita; Ln(PECPC) denotes log of primary energy consumption per capita; Ln(GDPPC) denotes log of Gross domestic product per capita. (2) *, and **denotes significance at the 1%, and 5% levels, respectively.

Source: Author's calculation

Table 6: VAR Engle-Granger causality analysis

static framework. Variance Decomposition (VDs) and Impulse Response Functions (IRFs) were used for examining the causality in the dynamic frameworks.

From the analysis of unit root tests it was found that even by incorporating endogenously determined two structural breaks in the data all variables are stationary in their first difference form. Cointegration analysis with incorporation of structural breaks shows that variables under consideration are not cointegrated. Static Granger causality tests show that causality runs from GDP to primary energy consumption and CO_2 emissions to GDP and energy consumption. Dynamic causality analysis analyzed through IRFs shows evidence of a bidirectional causal relationship between the test variables, while dynamic analysis analyzed through VDs show evidence of unidirectional causality running from GDP to energy

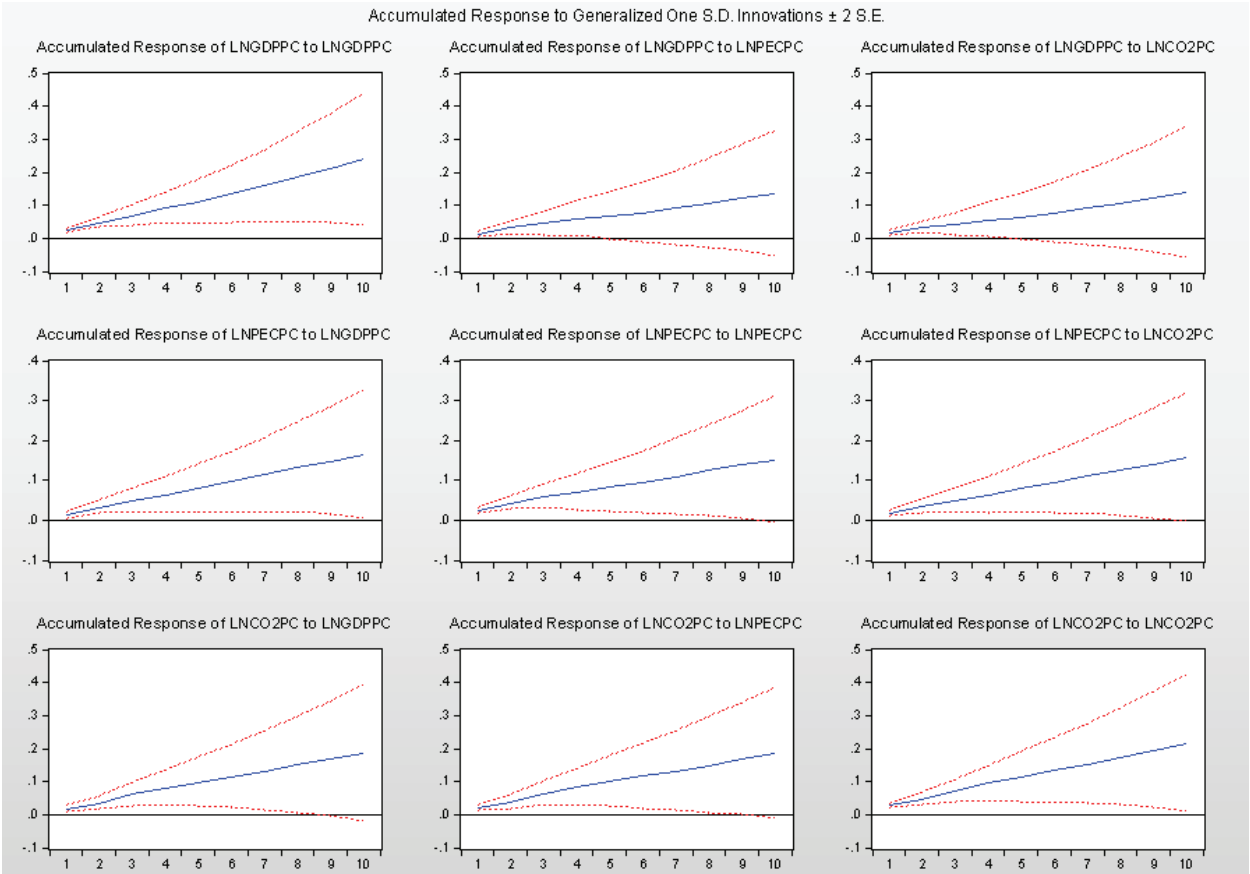

Figure 2: IRFs analysis

VEC Lag Exclusion Wald Tests (Chi-squared test statistics for lag exclusion) for Dlag 2. (Joint test)		P-Value
28.25411***		[0.000865]
VEC Residual Serial Correlation LM Tests		
1lag	5.805719	0.7592
2lag	15.08162	0.0887
3lag	9.387007	0.4023
VEC Residual Normality Tests-Joint J-B test (Orthogonalization: Residual Covariance (Urzua)		
26.21123		0.3964
VEC Residual Heteroskedasticity Tests (Joint test of Chi- square)		
110.7624		0.4084

Note: (1)*, **and ***denotes significant at 1%, 5%, and 10% level respectively.
Source: Author's calculation
Table 7: Diagnostic checks analysis

Null hypotheses	MWALD test
Real GDP per capita does not cause Primary energy consumption per capita	21.01522*
CO_2 emissions per capita do not cause Primary energy consumption per capita	16.53501*
Primary energy consumption per capita does not cause real GDP	2.446093
CO_2 emissions per capita do not cause real GDP per capita	13.83537*
GDP does not cause CO_2 emissions per capita	6.385012
Primary energy consumption per capita does not cause CO_2 emissions	2.032696

Note: (1) *, and **denotes significance at the 1%, and 5%, levels respectively.
Source: Author's calculation
Table 8: TY and DL Engle-Granger causality analysis

consumption and CO_2 emissions. Thus, there exist conflicting findings from the IRFs and VDs. However, it can be concluded that there is strong evidence of unidirectional causality running from GDP to energy

consumption, while energy consumption does not precede economic growth, i.e., GDP. GDP explains most of the forecast error variance of CO_2 emissions, implying that the focus of policymakers should be on sustainability and social welfare rather than per capita income. There are a number of studies that suggest environmental degradation, including air and noise pollution, has a negative impact on life satisfaction (Ferrer-i-Carbonell and Gowdy (2007), Di Tella and MacCulloch (2008), Van Praag and Baarsma (2005), Welsch (2002, 2006), Rehdanz and Maddison (2008), Smyth, Mishra and Qian (2008)). On the other hand, a persistent decline in environmental quality may generate negative externalities for the economy through reducing health, human capital, and hence, productivity in the long-run (Ang (2008)). Energy consumption is not a source of economic growth, hence Indian policy makers can directly cut the consumption of primary energy.

One of the limitations of this study is that the analysis was carried out on aggregate level data. Different industries have different intensities of electricity use, therefore it would be more appropriate to perform analyses at disaggregate levels in order to acquire more insight so that appropriate policy decisions can be used in the face of the deregulation of the Indian economy. A second direction for future research would be to examine the causal relationship between economic growth, pollution emissions, and other potentially relevant variables such as automobile use, health expenditure, and urbanization. A third direction would be to carry out non-linear Granger-causality analysis to check the robustness of the linear causality results.

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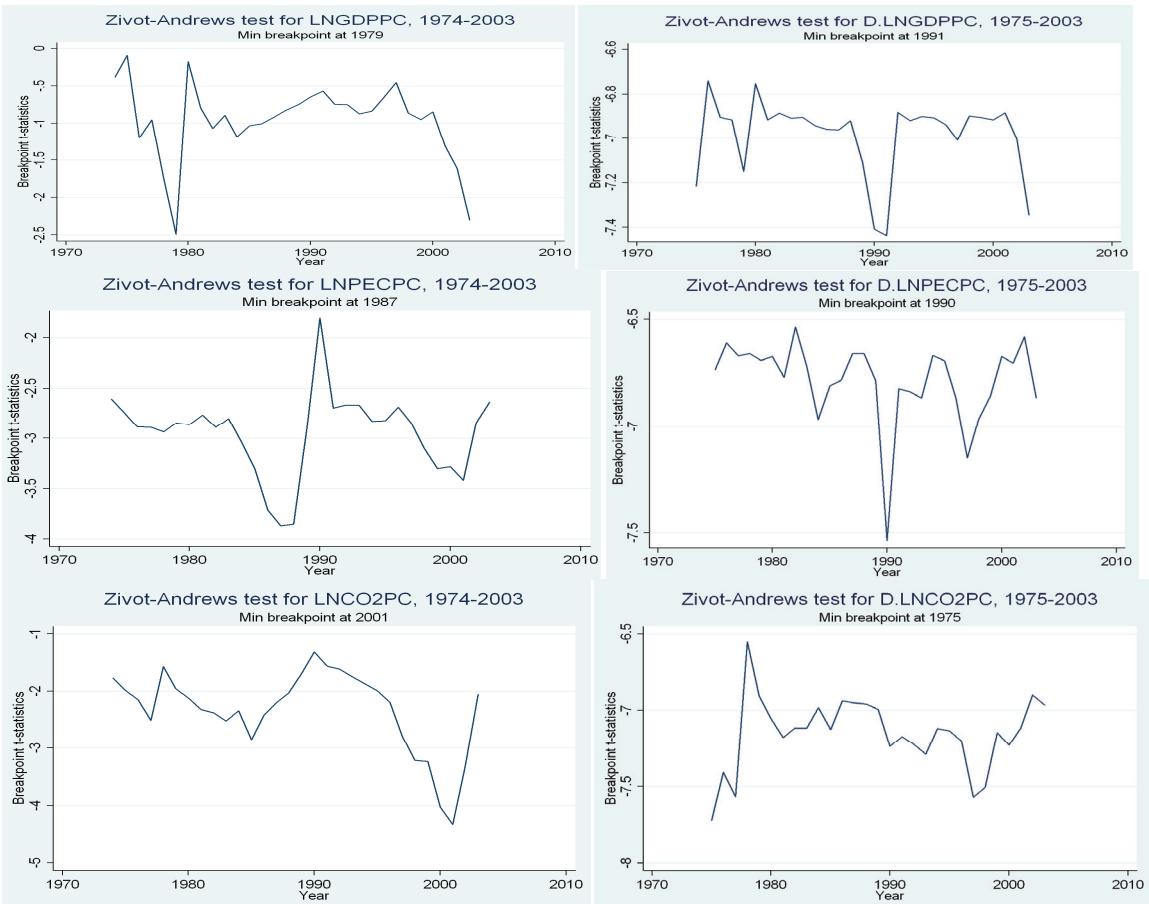
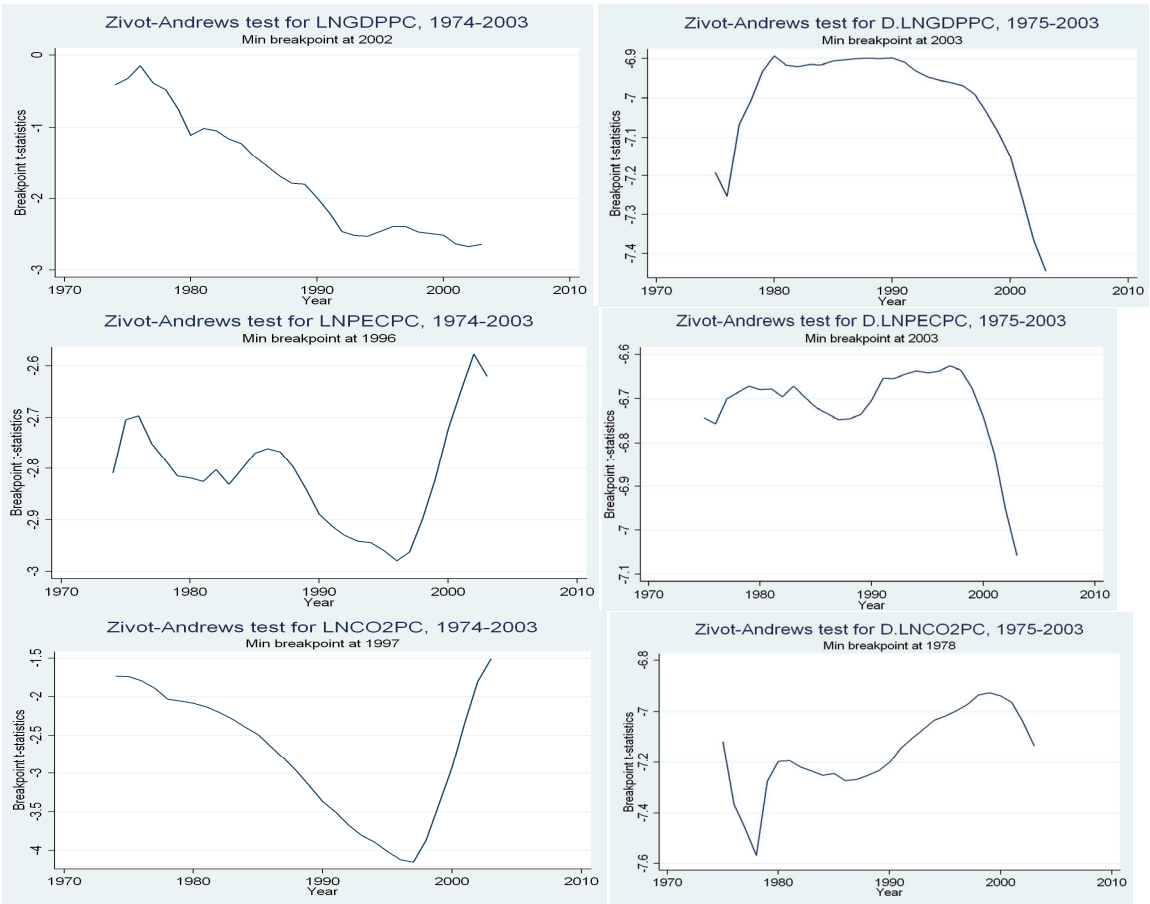
Appendix 1: Plots of ZA and CMR tests of structural breaks in the unit root

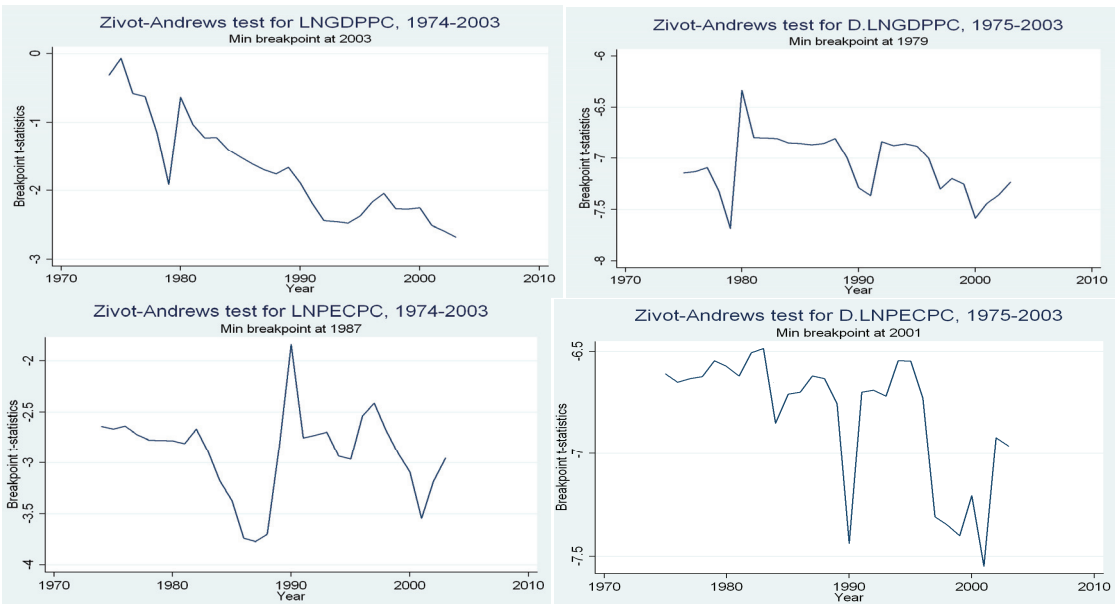
ZA: When break occurs in intercept

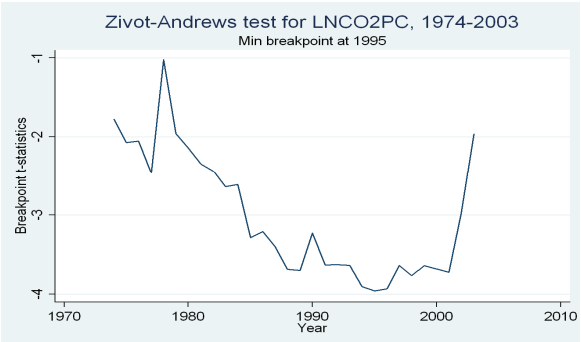


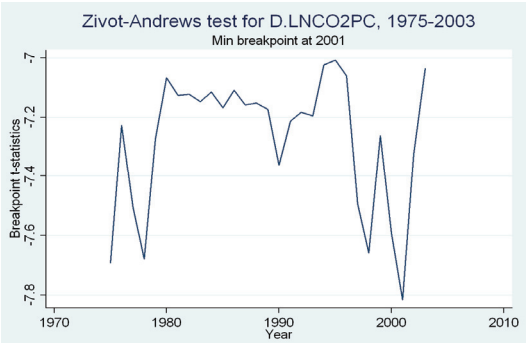
ZA: When break occurs in trend



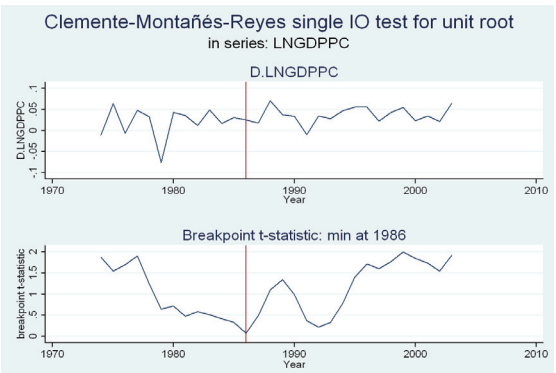
ZA: When break occurs in intercept and trend

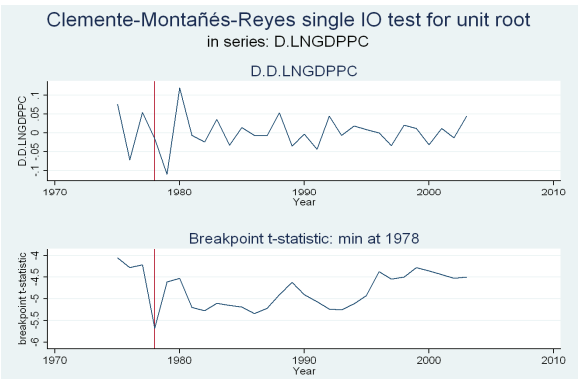


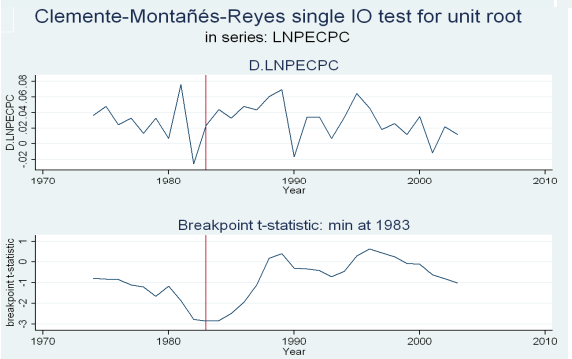


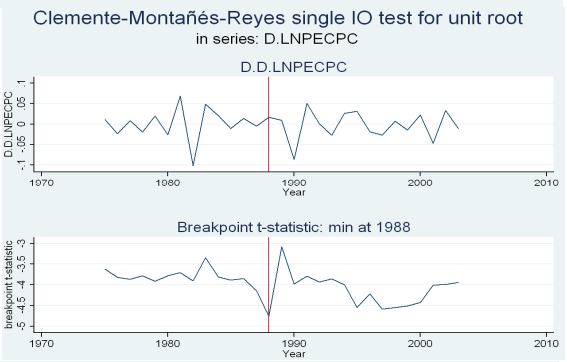


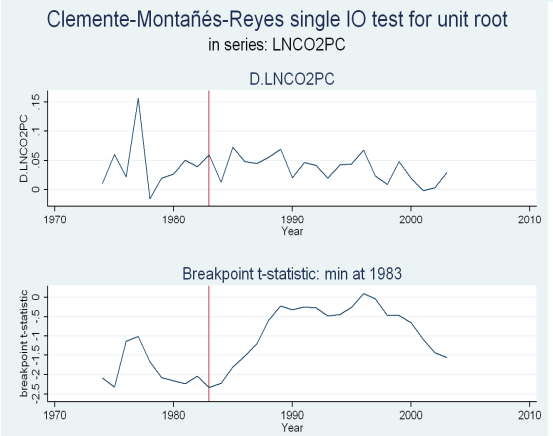
CMR-IO type test: One break in level and first difference form series

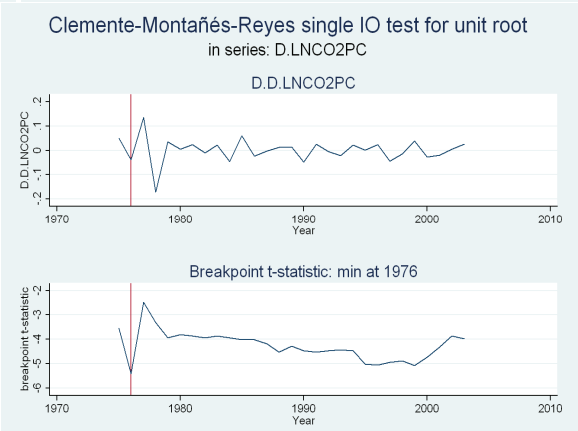




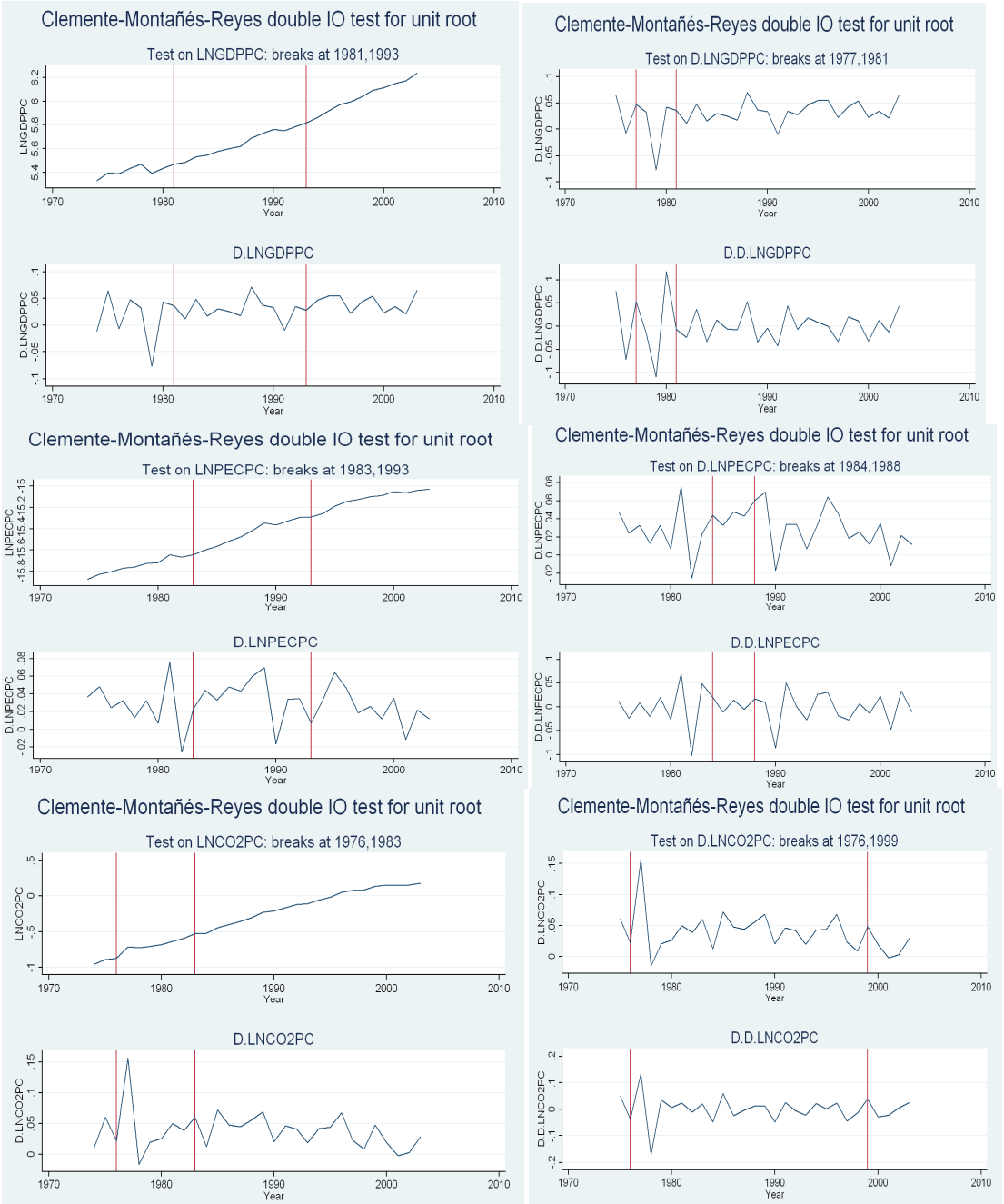




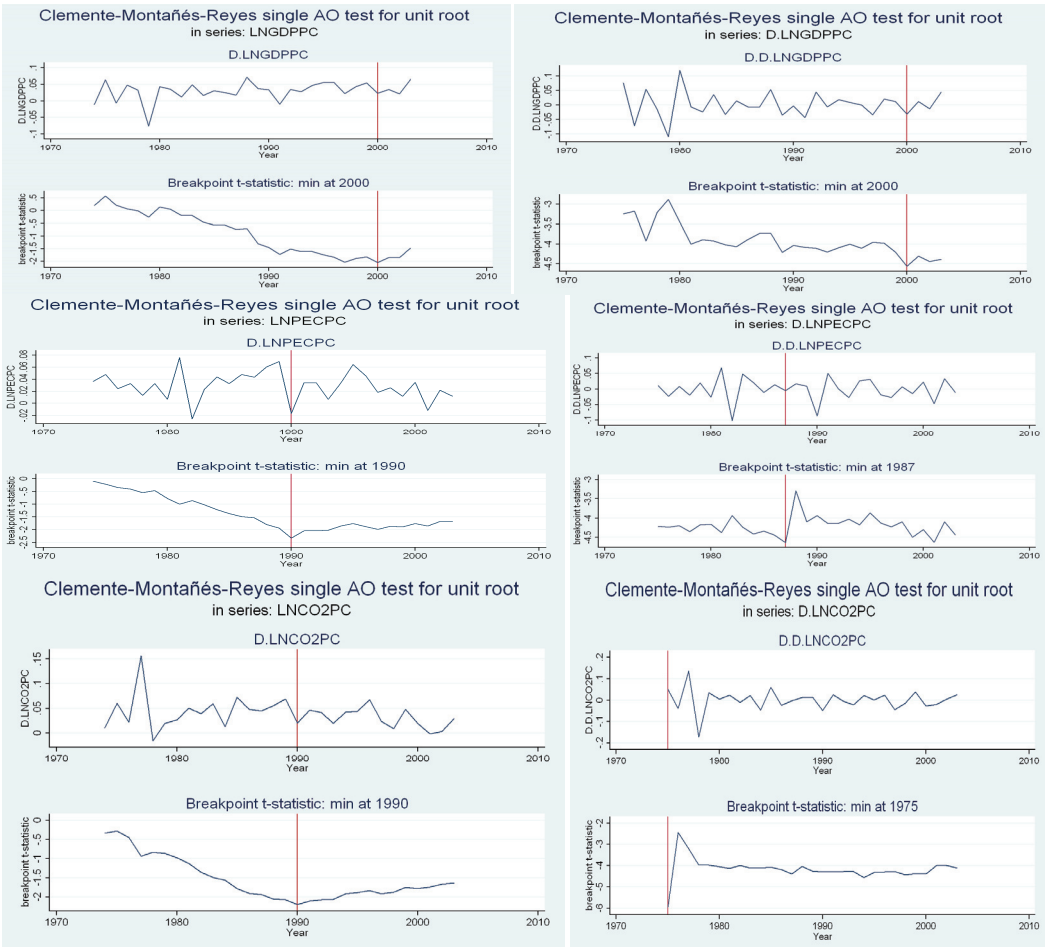




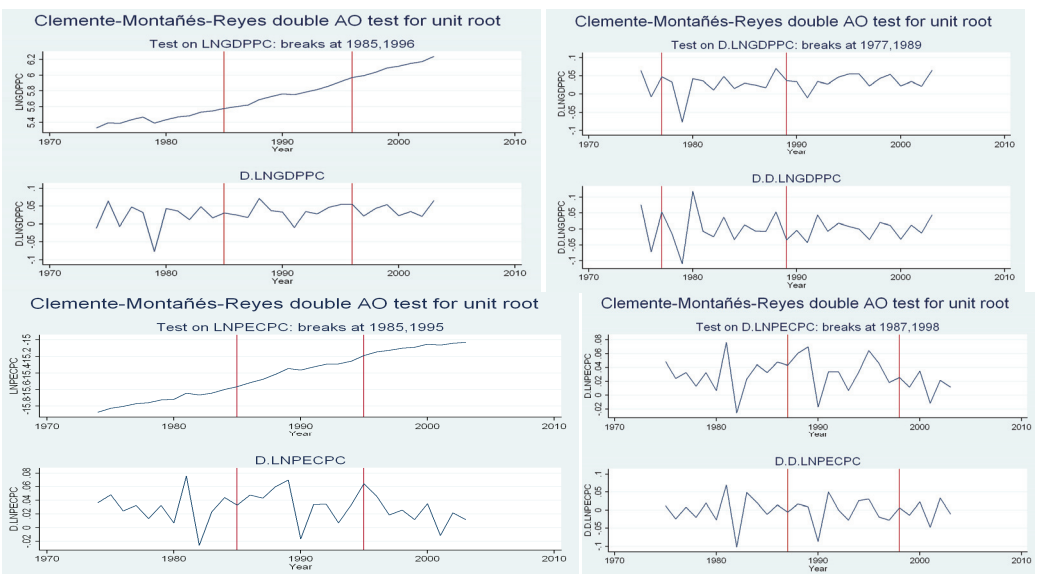
CMR-IO type test: Two break in level and first difference form series

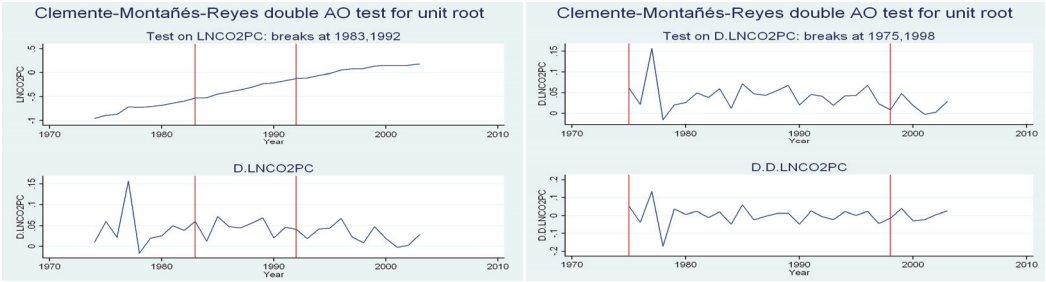


CMR-AO type test: One break in level and first difference form series



CMR-AO type test: Two break in level and first difference form series





Appendix 2: Results of Variance Decompositions (VDs) analysis

Variance Decomposition of Ln(GDPPC):

Period	S.E.	Ln(GDPPC)	Ln(PECPC)	Ln(CO_2PC)
1	0.023649	100.0000	0.000000	0.000000
		(0.00000)	(0.00000)	(0.00000)
2	0.033896	96.97821	3.017912	0.003875
		(5.60373)	(5.40714)	(1.64589)
3	0.041200	91.90075	2.117241	5.982005
		(8.60393)	(5.82539)	(6.54274)
4	0.047692	93.51180	1.819325	4.668880
		(9.52964)	(6.70987)	(6.58109)
5	0.051088	93.73034	1.990674	4.278983
		(10.4379)	(7.45079)	(7.22562)
6	0.056129	94.49577	1.812795	3.691434
		(10.5622)	(7.70588)	(7.10392)
7	0.061536	95.38634	1.514612	3.099048
		(10.5360)	(7.90171)	(6.83340)
8	0.066792	95.58064	1.285690	3.133670
		(10.8404)	(8.18933)	(7.03312)
9	0.072577	95.93198	1.101510	2.966506
		(11.1191)	(8.44613)	(7.18827)
10	0.077601	96.21264	0.964828	2.822532
		(11.6007)	(8.87591)	(7.48609)

Variance Decomposition of Ln(PECPC):

Period	S.E.	Ln(GDPPC)	Ln(PECPC)	Ln(CO_2PC)
1	0.023450	30.73633	69.26367	0.000000
		(12.6502)	(12.6502)	(0.00000)
2	0.032267	53.35559	46.63693	0.007488
		(13.4107)	(13.3282)	(1.73710)
3	0.037438	57.96206	41.31890	0.719046
		(14.9978)	(14.9984)	(3.49750)
4	0.040586	63.45754	35.52800	1.014456
		(15.1056)	(15.0411)	(4.42327)
5	0.044572	66.43932	30.39116	3.169520
		(15.0676)	(14.9058)	(5.72182)
6	0.047540	69.32351	27.17855	3.497941
		(15.0545)	(14.9304)	(5.97923)
7	0.051426	71.88838	24.59577	3.515857
		(15.2068)	(15.1070)	(6.00656)
8	0.054619	73.53076	22.96874	3.500501
		(15.5322)	(15.3705)	(6.18420)
9	0.057425	74.86847	21.69490	3.436638
		(16.0113)	(15.7323)	(6.52594)
10	0.060194	75.90494	20.46750	3.627568
		(16.3617)	(15.9069)	(6.99825)

Variance Decomposition of Ln(CO_2PC):

Period	S.E.	Ln(GDPPC)	Ln(PECPC)	Ln(CO_2PC)
1	0.027759	41.98710	17.06186	40.95105
		(12.6648)	(8.95856)	(10.5541)
2	0.034487	51.20359	18.03576	30.76065
		(13.3895)	(10.6868)	(9.81915)
3	0.045855	61.35616	20.49883	18.14501
		(13.9521)	(12.5345)	(7.71161)
4	0.052149	62.80768	21.53394	15.65838
		(15.2293)	(14.6495)	(8.02096)
5	0.055290	64.02330	21.17449	14.80221
		(16.1040)	(15.7731)	(8.51577)
6	0.059547	64.38948	19.83201	15.77851
		(16.3198)	(16.1753)	(9.06162)
7	0.062906	64.33839	19.11261	16.54899
		(16.7348)	(16.5867)	(9.63411)
8	0.066624	65.01806	18.90046	16.08147
		(17.2137)	(16.9487)	(9.79449)
9	0.070384	65.01228	19.20115	15.78657
		(17.7949)	(17.4856)	(10.1461)
10	0.073185	64.94026	19.50984	15.54990
		(18.3922)	(17.9597)	(10.6118)

Cholesky Ordering: Ln(GDPPC), Ln(PECPC) and Ln(CO_2PC); Standard Errors: Monte Carlo (10000 repetitions)

Technical Efficiency in the Small Scale Industrial Sectors of Punjab and Haryana - A Comparative Analysis

Satinder Kumar, Parminder Singh*

Abstract:

The present study deals with the inter-temporal variations of technical efficiency in the small scale industrial sector of Punjab and Haryana and compares the performance of both states with the small scale industrial sector of India. Data spanning over the period 1972-73 to 2006-07 has been utilized to estimate technical efficiency with the help of data envelopment analysis (DEA) based upon efficiency scores. The empirical analysis confirms that there exists 0.176 percent and 0.470 percent technical inefficiency in the small scale industrial sectors of Punjab and Haryana, respectively. However, at the aggregated All-India level, the technical inefficiency score is 0.449. Thus, the small scale industrial sector of Punjab is comparatively more efficient than that of Haryana and All-India. Moreover, the reform process has adversely affected both the managerial and scale efficiencies of Haryana, whereas an improvement in managerial efficiency has been observed in the small scale industrial sectors of Punjab and All-India. The empirical analysis showed that in the post-reform period both at the All-India level and in Haryana technical inefficiency scores are increasing, whereas in Punjab it is decreasing. Thus, it can be inferred that scale efficiency is an important determinant of technical efficiency in explaining the performance of the small scale industrial sectors of Punjab and Haryana.

Keywords: Small scale industrial sector, Technical efficiency, Managerial efficiency, Scale efficiency, Liberalisation

JEL: R32, R58, D61, C61, G32 **DOI:** 10.2478/v10033-011-0020-0

1. Introduction

The small scale industrial sector has emerged as a dynamic and vibrant sector of the Indian economy due to its contribution to achieving the socio-economic objectives of employment, production, exports, fostering entrepreneurship, contribution to Gross Domestic Product (GDP) and ensuring industrial dispersal. The small scale industrial sector (SSI's) contributes 8 per cent of the country's GDP, 45 per cent of manufactured output, and 40 per cent of exports. The labor-capital ratio in SSI is much higher than in larger industries. Moreover, **SSIs are better dispersed**, and are the second largest employer of human resources after the agriculture sector. (Economic Survey, 2011) The employment in this sector has increased to 29.81 million in 2009-2010 from 3.97 million in 1973-1974 (Annual Report, 2010). Due to this reason this sector was accepted as an engine of economic growth in the early years of planning and the Indian government has initiated various support measures in terms of policies on reservation, revision of investment ceilings, modernization, technological up-gradation, marketing assistance, fiscal incentives, etc., to uplift this

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sector to enable it to play a crucial role in the process of attaining sustained and inclusive growth.

Small scale industry produces a wide range of commodities from ordinary consumer goods to sophisticated goods based on modern technology like electronic goods, television sets, engineering products, etc. Various steps have been taken by the government from time to time, such as establishing the Handloom board, Handicraft board, Cottage industry board, Khadi and Village industry board, etc. to augment the performance of the small scale industrial sector in India. Despite these efforts of the government, 77,723 units in the Indian small scale industrial sector were observed to be sick in the year 2009-10 (RBI, 2010). In the cases of Punjab and Haryana, the number of sick units during the same period was 2,236 and 1,060, respectively (Lok Sabha, 2009). This portrays the gloomy picture of the present status of the Indian small scale industrial sector. The sickness of small scale industries in India in general and Punjab and Haryana in particular occurred due to various reasons, such as the lack of entrepreneurial skills, irregular supply power and raw material, lack of skilled labor, the limited role of financial institutions, inadequate market information, global competition, changes in economic conditions, and the installation of technically defective and outdated technology.

In this context, the basic objective of the present paper is to empirically examine the inter-temporal variations of technical efficiency in the small scale industrial sector of Punjab and Haryana and compare the performance of both the states with the small scale industrial sector of India. For this purpose, the technical efficiency of the small scale industrial sector is analyzed with the help of data envelopment analysis (DEA) both at the All-India level and at a regional level.

In the realm of comparative studies, Nagaraj (1997 and 2003) and Chaudhuri (2002) observed that the growth rate in the manufacturer sector is lower in the post-reform period than in the pre-reform period. Ahluwalia (2006) found deceleration in the growth value added in the manufacturing industry at the aggregate level. Though the results are quite similar, the explanations seem to diverge- while Nagaraj (1997-2003) attributes it to the decline in the role of the government, Ahluwalia (2006) explains the deceleration in terms of the slowdown in reforms. Other studies by Goldar (1985), Little *et al* (1996), Bhavani (1991) and Nikaido (2004) found that technical efficiency is positively correlated with firm size. The conclusion is the same in this study even the methodology appear wander – as Goldar (1985) and Nikaido (2004) apply stochastic frontier analysis (SFA), Bhavani (1991) and Little (1996) apply a translog production function, and further Little (1996) reveals no systematic relationship between employment size and technical efficiency. However, the study of Nikaido (2004) refuted this view by finding the agglomeration of firms to positively affect the measure of technical efficiency, while firm size had a negative effect on the same.

Sivalingam (2008) and Suresh (2009) observed that significant contributions are made by the small scale industrial sector in employment generation as well as rural industrialization. Though the findings are quite similar, the suggestions seem to be different – while Sivalingam (2008) suggested the ingredients for development of SSI are infrastructure development, direct catalytic subsidy, and technical, information and marketing support, Suresh (2009) recommended cost effectiveness, improving the quality of the product, diversifying the production process and confronting challenges by enhancing competitiveness at both intra- and international levels.

Singh (2008) argued that the industrial sector has lagged behind in the post-reform period. Its contribution to the gross domestic product is (GDP) remained at 16 percent throughout the study period, 1980-2002. Thus, he regarded the "impediments to internal trade, labour market rigidities, and barriers in doing business" as responsible for hampering further growth in industry.

In a recent study, Mehta (2011) found a slower trend in the growth-rate of the value added in the post-reform period in the organized manufacturing sector. Further study shows some positive signs of a structural shift within the manufacturing sector, yet the changes were too small to have any significant impact.

Thus, a brief literature review reveals the complexity of the issue, as no consensus seems to be evolving regarding the impact of the reforms on the small scale industrial sector at the regional level. The present study is an endeavor in this direction and tries to enrich the existing void in literature on measuring technical efficiency and its decomposition into managerial and scale efficiency in Punjab and Haryana.

To achieve the desired objective, the paper has been divided into four sections, including the present introduction. Section-II deals with the background of the study. Section-III concentrates on database and methodological issues, whereas, in Section-IV the

empirical results are discussed. Section-V concludes the discussion along with offering policy implications.

2. Background of the Study

Both Punjab and Haryana are agrarian states and contribute 40 percent of the total agriculture production in India. About 75 percent of the total population of these states directly or indirectly depends on agriculture for their livelihood. Punjab and Haryana are self-sufficient in food production and led the country's Green Revolution in the 1960s; Punjab earned the title of India's 'bread basket'. Both states have done remarkably well in the field of agriculture and are now well on their way to rapid industrialization through the coordinated development of small, medium and large scale industries. Both states have predominantly small-scale industry due to the indomitable spirit and entrepreneurial skills of their peoples.

In Punjab, the number of small scale industrial units is 191,639, while there are 340 medium and large scale industries involving fixed capital investment of Rs.5502.94 Crore and Rs.23285.58 Crore, respectively. The industries employ around 938,684 workers compared with 199,342 people in the medium and large scale industrial sector (Directorate of Industries Punjab, 2010).

The main industrial centers in Punjab are Ludhiana, Jalandhar, Amritsar, Mandi Gobindgarh, Batala and Mohali. Ludhiana is known for hosiery and readymade garments, sewing machines and parts, auto parts, industrial fasteners, electrical and electronic industries, etc. Jalandhar is famous for manual tools, pipe fitting, valves and cocks, rubber foot wear and shoes, leather products, sports goods, etc. Mandi Gobindgarh, popularly known as the 'steel town of Punjab', has more than 300 steel re-rolling mills, despite being located far away from natural resources. Batala is famous for its production of machines and machine tools. Amritsar is known for food products, chemicals and chemical products, and paper machinery in addition to being famous for textiles. Mohali is presently known as a hub of the electronics and information technology industry (SISI, 2010).

Haryana has 76,639 SSI units, and 1,347 medium and large scale units, involving fixed capital investment of Rs. 4322.02 Crore and Rs.25832.99 Crore, respectively. About 599,651 workers are employed in SSI units compared to 235,555 persons employed in the medium and large scale industrial sector. (Directorate of Industries Haryana, 2010).

Despite several constraints, the small scale industrial sector in Haryana has responded positively and plays an important role by supplementing and complementing large/medium industries. In Faridabad, Ballabhgarh, Sonepat and Gurgaon, this sector has played a vital role in the ancillary development of tractors, automobiles, electrical and electronic goods, manual/machine tools, bicycle accessories, etc. Small scale industry in Yamunanagar, Jagadhri, and Rewari have taken up the manufacture of stainless steel, aluminum and brass utensils, and earned a good name for the state not only in national but international markets as well. The same is the case with small-scale manufacturers of instruments, mixers and grinders in Ambala, agricultural implements in Karnal, textiles and handlooms in Panipat, basmati rice in Karnal, Kurukshetra and Kaithal and sanitary wares in Bahadurgarh. Many of these SSI units are today equipped with modern machines producing quality products at international standards. About 20 percent of the country's total exports of scientific instruments are from the small scale units of Ambala. The SSI units of Yamunanagar meet 60 percent of the demand for ammunitions boxes for the country's defense forces and the units located in Panipat supply 75 percent of the total requirement of woolen blankets to the Indian army (SISI, 2010).

The SSI sector plays a crucial role in promoting the inclusive growth of developing countries owing to low capital intensity, high potential for employment generation, equal distribution of income and exploitation of locally available resources. Therefore, it is not surprising that since independence, the government has been following a strategy for emphasizing the growth of the small scale sector as an agent for transforming the agrarian economy into a modern industrialized one.

3. Data Base and Methodology

It is evident from the survey of literature on measuring technical efficiency using data envelopment analysis (DEA) that for obtaining DEA efficiency scores a well defined set of output and input variables is necessary (see, Cooper et al. (2007) for details on DEA models). In the present study, we considered only one output (gross output at constant prices) and two inputs (gross fixed capital at constant prices and number of employees).

3.1 Database and Construction of Input / Output Variables

The present study is confined to the period from 1971-72 to 2006-07. The choice of terminal year is governed by the availability of the latest data from the Ministry of Statistics and Program Implementation (MOSPI). All monetary data have been deflated by using appropriate price deflators. The gross output figures at constant prices have been utilized as an index of output. Following Goldar (1986), we preferred the use of 'gross output' in place of 'net output' because depreciation charges in the Indian industries are known to be highly arbitrary and fixed by the income tax authorities, and hence seldom represent true/actual capital consumption.

The gross fixed capital stock has been utilized as a measure of capital input. The standard practice of the perpetual inventory method has been followed here to generate the series of gross fixed capital stock at constant prices. This requires a gross investment series, an asset price deflator, a depreciation rate, and a benchmark capital stock. We followed the procedure adopted by Martin and Warr (1990), Austria and Martin (1995) and Wu (1997) for getting an estimate of the initial value of capital stock. This procedure involves the following steps:

Step 1: Deflating the current price figures of the fixed investment of the SSI in India at constant prices using 'Price index of machinery and machine tools', given by using the relationship:

$$I_t = GFI_t/P_t$$

Where, GFI_t = Fixed Investment at current prices in the year t; and

P_t = Price index of machinery and machine tools in the year t.

Step 2: The logarithm of gross real investment was first regressed against a time trend to obtain its average growth rate ω and a trend value of investment at the beginning of the same i.e., I_0.

Step 3: Making the conventional assumption that the capital stock grows at a steady state at time t_0 the value of capital stock for initial year (K_0) has been then estimated as:

$$K_0 = \frac{I_0}{\omega + \delta}$$

Where, K_0= Gross value of initial capital stock; ω= Estimated growth rate of investment; and δ = Annual rate of discarding of capital. In the present analysis, we have taken the annual rate of discarding of capital to equal 5 percent.

Step 4: After obtaining the estimate of fixed capital for the benchmark year, the following equation has been used for the measurement of gross fixed capital series at 1981-82 prices:

$$K_t = K_{t-1} + I_t - \delta K_{t-1}$$

Where, K_t = Gross fixed capital at 1981-82 prices by the end of year *t*; I_t = Gross real investment in fixed capital during the year *t*; and δ = Annual rate of discarding of capital.

In the present study, the number of employees consisting of both non-production and production workers has been taken as the measure of the labor market. After obtaining all the outputs and factor inputs, the variables have been divided by the number of SSI units operating in India. The figures of number of SSI units have also been downloaded from the same abovementioned source. Thus, the figures obtained by dividing the output and input variables by number of SSI units will provide Gross Output per SSI unit, Labor per unit and GFC per SSI unit in India.

3.2 Measurement of Technical Efficiency

The DEA is a linear (mathematical) programming based method first originated in the literature by Charness, Cooper and Rhodes (1978) as a reformulation of the Farrell's (1957) single-output, single-input radial measure of technical efficiency for the multiple-output, multiple-input case. The subsequent technical development of DEA is extensive, certainly to the point of precluding a survey in this instance. Interested parties are directed to those provided by Charnes, Cooper, Lewin and Seiford (1994)**.** What follows is a general discussion of Seiford and Thrall (1990), Ali and Seiford (1993), DEA, with primary attention directed to model formulation. DEA calibrates the level of technical efficiency on the basis of an estimated discrete piece-wise frontier (or so-called efficiency frontier or best-practice frontier or envelopment surface) made up by a set of Pareto-efficient decision-making units (DMUs).

In all instances, these Pareto-efficient DMUs are located on the efficiency frontier, and compared to the others minimize the use of productive resources given the outputs (input-oriented measure), or maximize the output given the input size (output-oriented measure) and are called the "best practice performers" or "reference units" or "per units" within the sample of

DMUs. These Pareto-efficient DMUs score can surpass. Further, this efficiency frontier provides a yardstick against which to measure the relative efficiency of all other decision-making units (DMUs) that do not lie on the frontier. The DMUs which do not lie on the efficiency frontier are deemed relatively inefficient (i.e. Pareto non-optimal DMUs) and receive a score between zero and one. The efficiency score of each DMU can be interpreted as the radial distance to the efficiency frontier. In short, DEA forms a non-parametric surface frontier (more formally a piece-wise-linear convex isoquant) over the data points to determine the efficiency of each decision-making unit relative to this frontier. It is worth noting here that, in a time-series framework like ours, DMU represents t^{th} year and the best-practice frontier represents the production structure in best-practice years. The formation of frontier is either based upon constant returns-to-scale (CRS) or variable returns-to-scale (VRS) assumptions. The CRS assumption is only appropriate if the small scale industrial sector is operating at optimal scale in all the years under evaluation. When the production operations are non-optimum (i.e. variable returns-to-scale (VRS) prevail), the overall technical efficiency (TE) can be decomposed into pure technical efficiency (PTE) and scale efficiency (SE).

Having illustrated DEA intuitively, we may extend the technique to the multiple-output, multiple-input case. DEA involves the use of linear programming methods to construct a non-parametric piece-wise surface (or frontier) over the data. Efficiency measures are then calculated relative to this surface. Assume there are data K inputs and M outputs for each of T years. For the t^{th} year, these are represented by the column vectors x_t and y_t, respectively. The $K \times T$ inputs matrix, X, and the $M \times T$ output matrix, Y, represent for all T firms. The formulation of LPP to determine technical efficiency can be given as:

$$Min_{\theta_t^{CRS},\lambda}\ \theta_t^{CRS} \qquad (1)$$

Subject to $-y_t + Y\lambda \geq 0,$

$\theta_t^{CRS}\, x_t - X\lambda \geq 0,$

$\lambda \geq 0$

Where θ_t^{CRS} is a TE measure of the t^{th} period under CRS and λ is a $T \times 1$ vector of constants. A separate linear programming (LP) problem is solved to obtain the TE score for each of the T years in the sample. If θ^{CRS} =1, the performance of the small scale industrial sector in the given year is on the frontier and is technically efficient under CRS. However, if θ^{CRS} < 1, then there exists some inefficiencies in the production process of the given year.

The CRS DEA model detailed above provides the overall technical efficiency (OTE) and is only appropriate when all firms are operating at an optimal scale. Factors that may cause a year to be not operating at an optimal scale include imperfect competition, constraints on finance, etc. The measure of technical efficiency detailed in (2) also assumes that many scaled-up and scaled-down versions of the input combinations are also included in the production possibility set. The use of CRS specification when not all firms are operating at the optimal scale results in measures of TE which are confounded by scale efficiencies (SE). The use of the variable returns-to-scale (VRS) permits the calculation of TE devoid of these SE effects.

The CRS linear programming problem can be easily modified to account for VRS by adding the convexity constraint: T1'λ = 1 to the model (2) to provide (see Banker et al. (1984)):

$$\min_{\theta_t^{VRS},\lambda}\ \theta_t^{VRS} \qquad (2)$$

Subject to $-y_t + Y\lambda \geq 0,$

$\theta_t^{VRS}\, x_t - X\lambda \geq 0,$

$T1'\lambda = 1$

$\lambda \geq 0,$

Where θ_t^{VRS} is an efficiency measure (popularly known as pure technical efficiency (PTE) of the t^{th} year under VRS and T1 is a $T \times 1$ vector of one.

This approach forms a convex hull of intersecting planes which envelope the data points more tightly than the CRS conical hull and thus provides pure technical efficiency scores (θ^{VRS}), which are greater than or equal to technical efficiency scores under CRS (θ^{VRS}). Note that the convexity constraint (T1'λ = 1), essentially ensures that an inefficient year is only "benchmarked" against years of a similar size output. That is, the projected point (for that firm) on the DEA frontier will be a convex combination of observed years' performances. This convexity restriction is not imposed in the CRS case. Hence, in a CRS DEA model, a given year's performance may be benchmarked against years that are substantially larger (smaller) than it. In this instance the λ-weights will sum to a value less than (or greater than) one.

Recall that overall technical efficiency (TE) can be divided into pure technical (PTE) and scale efficiency (SE).

A measure of scale efficiency (SE) of the t[th] year can be obtained as:

$$SE_t = \frac{\theta_t^{CRS}}{\theta_t^{VRS}} \qquad (3)$$

Where SE = 1 indicates scale efficiency or CRS and SE < 1 indicates scale inefficiency.

One shortcoming of this measure of scale efficiency is that the value does not indicate whether the DMU is operating in an area of increasing or decreasing returns-to-scale. The latter issue can be determined by running an additional DEA problem with non-increasing returns-to-scale (NIRS) imposed. This is done by altering the DEA model (1) by substituting the T1'λ = 1 restriction with T1'λ ≤ 1, to provide:

$$Min\ \theta_t^{NIRS} \qquad (4)$$

Subject to $-y_t + Y\lambda \geq 0$,

$\theta_t^{NIRS} x_t - X\lambda \geq 0$,

$T1'\lambda = 1$

$\lambda \geq 0$,

Where θ_t^{NIRS} is an efficiency measure of the t[th] year under NIRS and T1 is an $T \times 1$ vector of ones. The nature of the scale inefficiencies (i.e. due to increasing or decreasing returns-to-scale) for a particular DMU can be determined by seeing whether θ^{NIRS} is equal to θ^{VRS}. If $\theta^{NIRS} \neq \theta^{VRS}$ then decreasing returns to scale apply.

4. Empirical Results

Table 1 depicts shows that small scale industries in India are operating at low levels of technical efficiency, 56.4 percent during the year 2006-07. Thus the level of inefficiency amounts to 43.6 percent, which means that the output in the small scale sector can be augmented by 43.6 percent, with the same bundle of inputs if the small scale sector of India follows its best practice. Further, it has been observed that level of technical efficiency varies from the minimum efficiency score of 0.324 during the year 1992-93 to the maximum of 1.000 during the year 1989-90 in Indian small scale industries. It is worth mentioning here that the maximum efficiency score is observed during the pre-reform period, whereas in the post-reform period efficiency declined to its minimum.

A comparison of the average technical efficiency during the two sub-periods (pre-reforms and post-reforms) revealed that the efficiency in Indian small scale industry has declined at the significant rate of 33.57 percent. Such a significant decline indicates the appalling status of the health of the Indian small scale sector and shows that the reform process has left a significant dent on the efficiency performance of Indian small scale industries.

The reference set analysis provides that during the year 1989-90 the Indian small scale sector utilized its optimum capacity and produced a technically efficient output. This year has appeared 26 times out of 36 years in the reference set. Such a high frequency proves that if the industry follows the same practice which it had followed in 1989-90, the difference between actual output and frontier output can be removed. Hence small scale industry can operate efficiently by minimizing the use of inputs.

Table 2 shows that during the entire study period 20.5 percentage points of 44.9 percent overall technical inefficiency has been contributed by managerial inefficiency (PTE) and the rest is explained by scale inefficiency thus both the managerial and scale factors are equally responsible for the overall technical inefficiency in Indian small scale sector. However, the analysis of the impact of the economic reforms on technical efficiency delineates that during the pre-reform period the overall technical inefficiency had been largely explained by managerial sub per formal. The pre-reform period 24.3 percentage points of the 33.8 percent of the overall technical inefficiency have been explained by pure technical in efficiency and rest is caused by scale factor. Thus management was improper in the small scale industry of India during the pre-reform periods.

However, during the post-reform period the trend has been reversed. During this period 15.6 percentage points of the 58.8 percent of overall technical inefficiency (OTIE) is explained by managerial inefficiency and the remaining high proportion is explained by scale inefficiency. The analysis also reiterates our earlier finding that managerial efficiency improved in the small scale sector during the post-reform period. However. a gargantuan decrease in scale efficiency has led the OTE to fall by more than 60 percent during the post-reform periods. The exposure of the small scale industry in world competiveness after 1991, seen improving, the management of the industry under learning by doing process. However, given managerial irregularities, the industry might not be reaching its scale effectiveness and seems scale inefficient during the second sub-period.

One of the major objectives is to compare the performance of the small scale industry of Punjab and Haryana with the performance of the small scale industry of India. The comparison of small scale industry of Punjab with that of India reveals that during the entire period of the study small scale industry of Punjab operated with a comparatively high level of efficiency - 82.3 percent, while over the same period the average OTE for Indian small scale industry was 55.1 percent. Hence the small scale industry of Punjab is relatively better off in comparison to the small scale industry of India. Table 3 also reveals that the level of technical inefficiency in the small scale industry of Punjab is 17.6 percent. It simply means that 17.6 percent more outputs can be produced in the small scale industry of Punjab with the same bundle of inputs. The comparison of OTE over the two sub-periods also shows that technical efficiency has been improved by 4.8 percent during the post-reform period. An average efficiency of 0.848 during the post-reform period in comparison to 0.802 percent during the pre-reform period supports this influence. However the result is the complete inverse of the trends of the Indian small scale industry. For Indian small scale industry, a decline in efficiency over and above 20 percent had been noted during the post-reform period.

Table 4 analyses components of the technical efficiency of the small scale industrial sector in Punjab. It can be observed from the table that 9.2 percentage points of the 17.7 percent OTE were contributed by managerial efficiency and approximately an equal amount of OTE can be explained by scale efficiency. Thus both PTE and SE are equally responsible factors for OTE in the small scale industry of Punjab. However, to explore the factors responsible for an increase in OTE during the post-reform periods we analyze the change in PTE and SE over the two sub-periods of time. The analyses of average PTE and SE scores over the two sub-periods reveal that PTE has increased sustainably from 0.858 in the pre-reform period to 0.971 during the post-reform period, whereas decline in scale efficiency has been observed from 0.937 during the pre-reform periods to 0.874 during the post-reform period. Thus, a substantial increase in managerial efficiency i.e., (PTE) has been observed to be the driving force behind the increase in overall technical efficiency. During the second sub-period the analysis of RTS in the small scale industry of Punjab reveals that from 1983-84 onwards increasing returns to scale are present, and thus modernization and the proper utilization of technology is required to mitigate technical inefficiency in the small scale industry of Punjab.

The analysis of the level of technical efficiency in the small scale industrial sector of Haryana shows that there exists on average 47 percent technical inefficiency in the small scale industry of Haryana. This amount of inefficiency is highest among the average technical efficiency in the small scale industry of all of India as well as of Punjab. It is worth mentioning that 47 percent output can be increased in the small scale industry of Haryana with constant input bundles. In the lines of the SSI of all of India the technical inefficiency during the post-reform periods has increased in the SSI of Haryana contrary to the reduction in technical inefficiency during the post-reform periods in the state of Punjab. A decline in technical efficiency from 0.687 to 0.334 supports our inference; furthermore, during the year 1981-82 the SSI of Haryana was observed to be operating on the best practice frontier; also during this period management in the SSI was proper along with industry operation at the most desired scale size. However, the lowest efficiency, 16.4 percent, was observed during the year 2001-2002.

Analysis of the causes of technical inefficiency in the SSI of Haryana shows that both managerial inefficiency and scale inefficiency equally contribute to overall technical inefficiency in the SSI of Haryana. About 24.10 percent of observed overall technical inefficiency in the SSI of Haryana was contributed by pure technical inefficiency, while the remainder is caused by scale inefficiency. Further, the decline in managerial efficiency (PTE) is a major factor responsible for the decline in the overall technical efficiency of SSI in Haryana during the post-reform period in comparison to pre-reform periods; moreover, the decline in scale efficiency is serious enough and cannot be ignored, as the PTE declined from 0.890 to 0.595 alongside scale efficiency, from 0.771 to 0.645, during the post-reform in comparison to the pre-reform period.

The visualization of return to scale parameters represents the existence of increasing returns to scale since from 1982-83 onwards. Thus modernization of the SSI of Haryana can help it to operate on an optimum scale size of production. These results are the lines of return to scale observed for the SSI of India, as well as that of Punjab. In sum, we can conclude that the Indian SSI operates with a huge level of technical inefficiency, and with the exception of Punjab the reforms process has adversely affected the technical efficiency both at the all India level and in the state of Haryana. Thus, given the

existence of increasing returns to scale, steps must be taken to modernize the production process and upgrade technology in the small scale industrial sector at the national and regional levels.

5. Summary, Conclusions and Policy Implications

The present research paper endeavors to analyze the performance of the small scale industrial (SSI) sectors of Punjab and Haryana, and compare the performance of these two states with the small scale industrial sector of India as a whole. Using the time series data over the period from 1972-73 to 2006-07, technical efficiency scores have been calculated using the technique of data envelopment analysis. The analysis reveals that there exists 0.824 percent and 0.530 percent technical efficiency in the small scale industrial sectors of Punjab and Haryana, respectively. However, at the aggregated All-India level, a technical efficiency score of 0.564 has been observed. Thus, the small scale industrial sectors of Punjab and Haryana are operating with 17.6 and 47.0 percent levels of technical inefficiency, respectively. Also, the technical inefficiency level observed for the Indian small scale industrial sector is 43.60 percent. Hence, the small scale industrial sector of Punjab is comparatively more efficient than Haryana and All-India.

The analysis of the impact of economic reforms on the technical efficiency of small scale industrial sectors of All-India and the aforementioned states reveals that the reform process has adversely affected both managerial and scale efficiencies of Haryana, while an improvement in managerial efficiency has been observed in the small scale industrial sectors of Punjab and All-India. The empirical analysis showed that in the post-reform period both at the All-India level and in Haryana the technical inefficiency score is increasing, whereas in Punjab it is decreasing.

The decomposition of the technical efficiency scores in managerial and scale efficiency components shows that both of these two components are equally responsible for the observed technical inefficiency in the small scale sectors of All-India in general and at the regional level in particular. The analysis of returns-to-scale confirms the existence of decreasing returns-to-scale in the SSI sector of All-India, whereas increasing returns-to-scale have been observed for both of the states under evaluation. Thus, a policy of downsizing is recommended for the India SSI sector, whereas the states of Punjab and Haryana appear to be the exceptions, with increasing returns-to-scale. In both of these states, an increase in the production scale is recommended as technically efficient in the era of liberalization.

Year	Overall Technical Efficiency	Technical Inefficiency	Reference set (Sr. No. of Reference Years)
1971-72	0.570	0.430	19, 36
1972-73	0.568	0.432	36,19
1973-74	0.549	0.451	36,19
1974-75	0.588	0.412	36,19
1975-76	0.537	0.463	36,19
1976-77	0.564	0.436	36,19
1977-78	0.588	0.412	36,19
1978-79	0.523	0.477	19,36
1979-80	0.680	0.320	36,19
1980-81	0.713	0.287	36,19
1981-82	0.662	0.338	36,19
1982-83	0.618	0.382	36,19
1983-84	0.657	0.343	36,19
1984-85	0.693	0.307	36,19
1985-86	0.740	0.260	36,19
1986-87	0.793	0.207	36,19
1987-88	0.857	0.143	36,19
1988-89	0.915	0.085	36,19
1989-90	1.000	0000	26 appearances in reference set
1990-91	0.419	0.581	20* (12 appearances in reference set)
1991-92	0.371	0.629	19,20,34
1992-93	0.324	0.676	19,20,34
1993-94	0.330	0.670	19,20,34
1994-95	0.359	0.641	19,20,34
1995-96	0.373	0.627	19,20,34
1996-97	0.377	0.623	19,20,34
1997-98	0.388	0.612	20,34
1998-99	0.404	0.596	36,19
1999-00	0.408	0.592	20,34
2000-01	0.424	0.576	20,34
2001-02	0.409	0.591	20,34
2002-03	0.422	0.578	20,34
2003-04	0.453	0.547	20,34
2004-05	0.486	0.514	34* (12 appearances in reference set)
2005-06	0.507	0.493	19,36
2006-07	0.564	0.436	36*(20 appearances in reference set)
Entire Period	**0.551**	**0.449**	
Pre-Reforms	**0.662**	**0.338**	
Post-Reforms	**0.412**	**0.588**	

Notes: i) Technical Inefficiency=1-Overall Technical Efficiency; ii) Reference set reflects the number of years set as benchmark years of production and iii) * represents that although the SSI is technically inefficient under CRS environment the PTE score equal to 1 leads it to appear in the year 1990-91 in the reference set.

Source: Author's Calculations

Table 1: Inter-temporal Variations in Technical Efficiency of Indian Small Scale Industry

Year	Pure Technical Efficiency	Scale Efficiency	Returns-to-Scale
1971-72	0.724	0.788	DRTS
1972-73	0.710	0.800	DRTS
1973-74	0.675	0.814	DRTS
1974-75	0.664	0.886	DRTS
1975-76	0.618	0.869	DRTS
1976-77	0.650	0.869	DRTS
1977-78	0.661	0.889	DRTS
1978-79	0.615	0.850	DRTS
1979-80	0.779	0.874	DRTS
1980-81	0.806	0.885	DRTS
1981-82	0.732	0.905	DRTS
1982-83	0.665	0.928	DRTS
1983-84	0.698	0.940	DRTS
1984-85	0.738	0.940	DRTS
1985-86	0.779	0.950	DRTS
1986-87	0.823	0.963	DRTS
1987-88	0.875	0.980	DRTS
1988-89	0.918	0.996	DRTS
1989-90	1.000	1.000	CRTS
1990-91	1.000	0.419	IRTS
1991-92	0.846	0.438	IRTS
1992-93	0.709	0.457	IRTS
1993-94	0.706	0.467	IRTS
1994-95	0.749	0.479	IRTS
1995-96	0.778	0.479	IRTS
1996-97	0.782	0.482	IRTS
1997-98	0.811	0.479	IRTS
1998-99	0.710	0.569	DRTS
1999-00	0.900	0.453	IRTS
2000-01	0.924	0.459	IRTS
2001-02	0.870	0.470	IRTS
2002-03	0.882	0.478	IRTS
2003-04	0.935	0.484	IRTS
2004-05	1.000	0.486	IRTS
2005-06	0.894	0.567	DRTS
2006-07	1.000	0.564	DRTS
Entire-Reforms	**0.795**	**0.704**	**---**
Pre-Reforms	**0.757**	**0.877**	
Post-Reforms	**0.844**	**0.488**	

Notes: i) DRTS represents decreasing returns-to-scale; ii) IRTS represents increasing returns-to-scale; and iii) CRTS represents constant returns to scale.

Source: Author's Calculations

Table 2: Inter-Temporal Variations in Managerial and Scale Efficiency and Returns to Scale in Indian Small Scale Industry

Year	Overall Technical Efficiency	Technical Inefficiency	Reference set (Sr. No. of Reference Years)
1971-72	1.000	0000	1
1972-73	0.994	0.006	2*(9 appearances in reference set)
1973-74	0.998	0.002	3*(0 appearances in reference set)
1974-75	0.868	0.132	2,36
1975-76	0.797	0.203	2,36
1976-77	0.869	0.131	2,36
1977-78	0.869	0.131	2,36
1978-79	0. 858	0.142	2,36
1979-80	0.859	0.141	2,36
1980-81	0.760	0.240	2,36
1981-82	0.728	0.272	2,36
1982-83	0.748	0.252	2,36
1983-84	0.785	0.215	36,28
1984-85	0.764	0.236	36,28
1985-86	0.731	0.269	36,28
1986-87	0.718	0.282	36,28
1987-88	0.695	0.305	36,28
1988-89	0.684	0.316	36,28
1989-90	0.693	0.307	28,25
1990-91	0.686	0.314	28,25
1991-92	0.681	0.319	25,24
1992-93	0.627	0.373	22
1993-94	0.659	0.341	23
1994-95	0.773	0.227	24*(1 appearance in reference set)
1995-96	0.814	0.186	25*(5 appearances in reference set)
1996-97	0.805	0.195	28,25
1997-98	0.843	0.157	28,25
1998-99	0.902	0.098	28*(17 appearances in reference set)
1999-00	0.890	0.110	36,28
2000-01	0.931	0.069	36,28
2001-02	0.904	0.096	36,28
2002-03	0.917	0.083	36,28
2003-04	0.931	0.069	36,28
2004-05	0.931	0.069	36,28
2005-06	0.957	0.043	36,28
2006-07	1.000	0000	36*(22 appearances in reference set)
Entire Period	**0.823**	**0.176**	
Pre-Reforms	**0.802**	**0.195**	
Post-Reforms	**0.848**	**0.152**	

Notes: i) Technical Inefficiency=1-Overall Technical Efficiency; ii) Reference set reflects the number of years set as benchmark years of production and iii) * represents that although the SSI is technically inefficient under CRS environment the PTE score equal to 1 leads it to appear in the year 1990-91 in the reference set.

Source: Author's Calculations

Table 3: Inter-temporal Variations in Technical Efficiency of Punjab Small Scale Industry

Year	Pure Technical Efficiency	Scale Efficiency	Returns-to-Scale
1971-72	1.000	1.000	CRTS
1972-73	1.000	0.994	DRTS
1973-74	1.000	0.998	DRTS
1974-75	0.905	0.960	DRTS
1975-76	0.837	0.952	DRTS
1976-77	0.926	0.938	DRTS
1977-78	0.945	0.920	DRTS
1978-79	0.929	0.924	DRTS
1979-80	0.950	0.904	DRTS
1980-81	0.864	0.879	DRTS
1981-82	0.779	0.934	DRTS
1982-83	0.755	0.992	DRTS
1983-84	0.802	0.979	IRTS
1984-85	0.799	0.956	IRTS
1985-86	0.780	0.937	IRTS
1986-87	0.774	0.928	IRTS
1987-88	0.759	0.916	IRTS
1988-89	0.754	0.906	IRTS
1989-90	0.790	0.877	IRTS
1990-91	0.815	0.842	IRTS
1991-92	0.852	0.800	IRTS
1992-93	1.000	0.627	IRTS
1993-94	1.000	0.659	IRTS
1994-95	1.000	0.773	IRTS
1995-96	1.000	0.814	IRTS
1996-97	0.960	0.838	IRTS
1997-98	0.972	0.867	IRTS
1998-99	1.000	0.902	IRTS
1999-00	0.970	0.917	IRTS
2000-01	0.998	0.933	IRTS
2001-02	0.955	0.947	IRTS
2002-03	0.956	0.960	IRTS
2003-04	0.957	0.973	IRTS
2004-05	0.946	0.984	IRTS
2005-06	0.964	0.992	IRTS
2006-07	1.000	1.000	IRTS
Entire- Period	**0.908**	**0.909**	
Pre-Reforms	**0.858**	**0.937**	
Post-Reforms	**0.971**	**0.874**	

Notes: i) DRTS represents decreasing returns-to-scale; ii) IRTS represents increasing returns-to-scale; and iii) CRTS represents constant returns to scale.

Source: Author's Calculations

Table 4: Inter-Temporal Variations in Managerial and Scale Efficiency and Returns to Scale in Punjab Small Scale Industry

Year	Overall Technical Efficiency	Technical Inefficiency	Reference set (Sr. No. of Reference Years)
1971-72	0.493	0.507	9
1972-73	0.487	0.513	9
1973-74	0.533	0.467	9
1974-75	0.627	0.373	9
1975-76	0.600	0.4	9
1976-77	0.664	0.336	9
1977-78	0.744	0.256	9
1978-79	0.778	0.222	9
1979-80	0.906	0.094	9
1980-81	0.929	0.071	9,11
1981-82	1.000	0.000	11* (15 appearances in reference set)
1982-83	0.808	0.192	11,17
1983-84	0.742	0.258	11,17
1984-85	0.704	0.296	11,17
1985-86	0.731	0.269	11,17
1986-87	0.65	0.35	11,17,21
1987-88	0.642	0.358	17*(17 appearances in reference set)
1988-89	0.598	0.402	27,17
1989-90	0.563	0.437	27,17
1990-91	0.535	0.465	27,17
1991-92	0.497	0.503	21*(8 appearances in reference set)
1992-93	0.451	0.549	27,17
1993-94	0.423	0.577	27,17
1994-95	0.402	0.598	27,17
1995-96	0.367	0.633	17,27
1996-97	0.348	0.652	27,17
1997-98	0.34	0.66	27*(8 appearance in reference set)
1998-99	0.221	0.779	21,11,17
1999-00	0.181	0.819	11,21
2000-01	0.176	0.824	11,21
2001-02	0.164	0.836	11,21
2002-03	0.278	0.722	11,21
2003-04	0.313	0.687	11,21
2004-05	0.364	0.636	17,21,11
2005-06	0.403	0.597	11,17
2006-07	0.41	0.59	11,17
Entire Period	**0.530**	**0.470**	
Pre- reforms	**0.687**	**0.313**	
Post-Reforms	**0.334**	**0.666**	

Notes: i) Technical Inefficiency=1-Overall Technical Efficiency; ii) Reference set reflects the number of years set as benchmark years of production and iii) * represents that although the SSI is technically inefficient under the CRS environment the PTE score equal to 1 leads to its appearance in the year 1990-91 in the reference set.

Source: Author's Calculations

Table 5: Inter-temporal Variations in Technical Efficiency of Haryana Small Scale Industry

Year	Pure Technical Efficiency	Scale Efficiency	Returns-to-Scale
1971-72	0.939	0.525	DRTS
1972-73	0.728	0.669	DRTS
1973-74	0.729	0.731	DRTS
1974-75	0.720	0.871	DRTS
1975-76	0.713	0.842	DRTS
1976-77	0.807	0.823	DRTS
1977-78	0.876	0.850	DRTS
1978-79	0.920	0.846	DRTS
1979-80	1.000	0.906	DRTS
1980-81	0.990	0.939	DRTS
1981-82	1.000	1.000	CRTS
1982-83	0.896	0.902	IRTS
1983-84	0.897	0.828	IRTS
1984-85	0.902	0.780	IRTS
1985-86	0.988	0.739	IRTS
1986-87	0.956	0.680	IRTS
1987-88	1.000	0.642	IRTS
1988-89	0.942	0.635	IRTS
1989-90	0.908	0.620	IRTS
1990-91	0.896	0.597	IRTS
1991-92	1.000	0.497	IRTS
1992-93	0.859	0.525	IRTS
1993-94	0.869	0.486	IRTS
1994-95	0.898	0.447	IRTS
1995-96	0.902	0.407	IRTS
1996-97	0.936	0.372	IRTS
1997-98	1.000	0.340	IRTS
1998-99	0.290	0.762	IRTS
1999-00	0.246	0.737	IRTS
2000-01	0.238	0.737	IRTS
2001-02	0.222	0.737	IRTS
2002-03	0.368	0.755	IRTS
2003-04	0.391	0.800	IRTS
2004-05	0.408	0.892	IRTS
2005-06	0.439	0.918	IRTS
2006-07	0.455	0.901	IRTS
Entire-Period	**0.759**	**0.715**	
Pre-Reforms	**0.890**	**0.771**	
Post-Reforms	**0.595**	**0.645**	

Notes: i) DRTS represents decreasing returns-to-scale; ii) IRTS represents increasing returns-to-scale; and iii) CRTS represents constant returns to scale.

Source: Author's Calculations

Table 6: Inter-Temporal Variations in Managerial and Scale Efficiency and Returns to Scale in Haryana Small Scale Industry

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