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Phone: ++386 (0) 5 610 2021

E-mail: mgt@fm-kp.si

www.mgt.fm-kp.si

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A Decision Support System for Business Location Based on Open GIS Technology and Data

Cornel Ghiță

Institute of World Economics, Romania

cornel.ghita8@yahoo.com

This article presents the architecture, features, and operating mode of a DSS (Decision Support System) aiming to assist entrepreneurs and managers in the process of location decision making. The research assembled concepts derived from theory, findings of empirical studies, together with open GIS (Geographical Information System) software and data, and modelled them into a DSS software tool, according to an original methodology and design. The users are guided step-by-step to input information on their businesses into the DSS (industry, preferences for land-use areas and facility types, weights of key location factors), and are returned two sets of results: one based on own options, and another one aggregate for the industry they operate in. The results consist in the top five locations for the user's firm, as well as for the industry, depicted both in a graphical report (map) and a text report (explanation of results).

Key Words: decision support system for business location, open-source GIS software, metropolitan areas

JEL Classification: C88, D80

Introduction

Nowadays, a variety of geographical information systems are available; among them the most notorious are the electronic maps provided by Internet search services, such as Google, Yahoo!, Bing, etc. Their aim is to find locations, addresses, and provide information for navigation from point A to point B.

The opportunity of the DSS for business location is based on the fact that there are sufficient GIS data and software, some free of charge and open, that can also be used for purposes other than searching places and browsing, namely in management specialized fields. At the same time, GIS technologies are rarely involved in the crucial decision of business site selection. This article offers a new perspective on the strategic decision of business location, by taking advantage of the power of GIS technology, which has rapidly developed in the recent years.

This paper subscribes to the global trend of evolving to knowledge economy and knowledge management systems (Galandere-Zile and Vinogradova 2005, 179–196). The advances of computer and communication technology bring a massive amount of information and knowledge, just a few clicks away. Accordingly, there is a huge amount of open GIS data and open-source GIS software available to be turned into valuable business information. While extensively used in other fields, GIS data are underused in business management.

The DSS currently applies to metropolitan areas. It is restricted only by the territory included in its geographical database. This means it can easily be extended to other metropolitan areas by adding the appropriate geographical information in the system. The DSS software tool is targeted to metropolitan areas and builds upon empirical findings (Ghiță, Scarlat, and Magano 2013; Ghiță et al. 2013), obtained in two European metropolitan areas, respectively Bucharest – Romania, and Porto – Portugal. This paper is dedicated to moving forward from the empirical findings, previously published, to unfolding the architecture, features and operating mode of the DSS, in the form of a software tool built upon this knowledge.

The goal of the research was to create a DSS for business location, which could be rapidly implemented. Accordingly, it was empirically tested and implemented in the author's residential region – Bucharest, belonging to a transitional economy – Romania, where such a tool would be beneficial for the business environment. In the same time, the DSS was conceived as relevant and extendable to metropolitan areas in general, so it had to be empirically tested in another metropolitan area, such as Porto – Portugal, which was the host of the author's doctoral internship.

The DSS was conceived as an open system, i. e. to attract real estate owners or agencies, and cluster-organization, interested in advertising their offer and identity, to input information into the DSS, information that could add value for the users. For example, a user might be interested not only in receiving top five locations, but also in finding available facilities in the areas and being able to contact owners, or adhering to cluster organisations.

The article is organised in sections. The next section presents the concepts derived from literature to be integrated and developed into the DSS. The methodology section refers to the DSS framing in literature and adopted by this research, the basic logic of the DSS and the approach to the business location problem, and the steps undertaken to conduct the

research. Then, the following section is dedicated to a thorough description of the DSS, reinforced by the results obtained by an IT-Software firm using the DSS. The article concludes with the discussion of results, highlighting the main features of the DSS, the benefits brought to business environment, including the DSS limitations, and development perspectives.

Business Location Concepts Derived from Literature

The DSS developed upon several relevant concepts derived from literature, in relation to places: land-use, attractiveness (appeal), accessibility, cost of space, and agglomerations of enterprises.

The father of location theory, von Thünen has developed a still-standing theory of *land use* (Thünen and Hall 1966). According to him, homogenous economic activities coagulate in concentric circles around the town centre (market). Depending on the maximum cost they afford to pay for land (rent, price) and the cost of transport to the market, they chose to locate closer or farther from the town centre. Nowadays, land-use is more than a design shaped by economic factors; it is reinforced by institutional factors (land became object of urban and landscaping planning).

Raicu and Popa highlighted two interrelated concepts in relation to places – *attractiveness* and *accessibility* (Raicu and Popa 2009, 7–13). According to them, the transport action from the initial area (origin) is induced by the attraction exerted by a utility located in another area (destination), and the attractiveness increases proportionally with the number of convergent utilities. Conversely, accessibility is a constraint to attractiveness, as attraction cannot trigger transport without the existence of a proper infrastructure. Although the two concepts are interrelated, they must be measured separately, as *accessibility is a feature of the transport system* (the infrastructure's role is crucial) and not directly related to the dynamic of commuting needs, while attractiveness is the motivation for commuting. Another consequence of the interplay between the two concepts is the *number of potential visitors*, in terms of pedestrian or road traffic in a given area.

Cost minimisation is the key concept of the (neo) classical approach of the location theory. The total cost involves various components such as transport, labour, and *cost of business space*. Dealing with metropolitan areas, we may assume that mobility is reasonably assured in terms of materials and employees, at rather equal costs across the area. While

transport cost is covered by the previous-mentioned concept of accessibility, according to the real estate websites surveyed, there is a lot of variability in the cost of space. This variability can have three main components: distance to the central business district (Alonso 1964), the quality of endowments (utility), and the image and representativeness of the area (prestige) (Reijmer and van Noort 1999).

Another key concept used in the research is the *agglomerations* of industry-related enterprises. While Alfred Marshall was the pioneer of the concept of positive externalities within industrial districts (Marshall 1920), Michael Porter has the merit of a deeper insight into the cluster phenomenon, capturing both the *cooperation* and *competitive* nature of relations between enterprises located within the cluster (Porter 1998, 197–287).

Research Methodology

The goal of the research was to provide not merely a web-based GIS software tool, but a full *decision support system* (DSS) designed to help start-ups or relocating enterprises to find suitable operating sites, according to their needs. Thus, the software tool embedded the theoretical and empirical knowledge gained in a research undertaken between 2010 and 2013, including data inputs from users, accumulated with every location simulation cycle stored in the DSS database.

In a broad perspective, the DSS integrates four components:

1. Own approach to the location problem of enterprises;
2. Results of a questionnaire-driven study performed to track the location behaviour of enterprises (Ghiță et al. 2013);
3. Participants (entrepreneurs, real estate bidders, cluster organizations, and software tool administrators);
4. The GIS software tool itself.

In a strict sense, according to Daniel J. Power, decision support systems constitute a distinct class of information systems, consisting in computer-based interactive systems or subsystems, designed to help decision makers use communications technologies, data, documents, knowledge and/or models to identify and solve problems, in order to complete decision making process (Power 2004, 2015–31).

In this context, the DSS concept presented further, integrates communication technologies (internet, web application), data (geospatial database, and user information input), documents (web forms, maps),

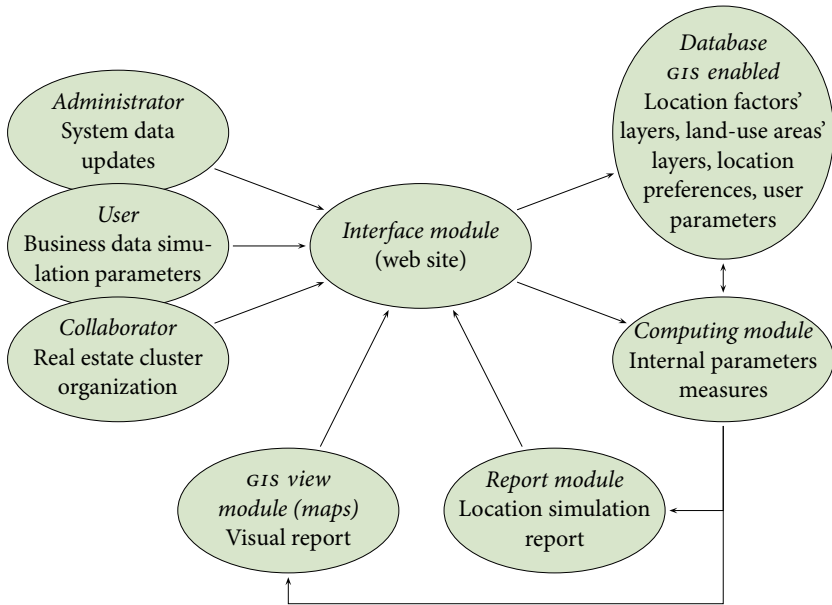


FIGURE 1 Web GIS Software Tool: Basic Concept

knowledge gained in all stages of research (theoretical research, empirical studies, own study based on questionnaires), and models (by simulating the possible options, indicators measuring variants, calibration, and selecting the best option).

Moreover, the DSS operates on an infrastructure consisting of hardware and software, including a GIS-enabled database.

The research uses the concept of *micro-location* to describe own approach, namely the precise identification of suitable operating sites, in small and dense business territories, such as metropolitan areas.

The conceptual design of the GIS software tool is depicted in Figure 1.

The core of the location decision process is identifying the required features of the location, namely the *key location factors*, in order to fulfil business's needs. The mix and weights of location factors is *industry-specific*, and, in consequence, enterprises are grouped by industries. The key location factors, selected in accordance with the concepts derived from literature, the empirical findings, and the logic of the DSS, can be grouped into the following categories: *accessibility*, *attractiveness* (measured by the number of potential visitors), *cost of space* (price or rent), *clustering* behaviour, and *competition* level.

The chosen assessment method of location factors is the *factor rating method*, which is the most used method for valuing location options (Heizer and Render 2013), thanks to its versatility that makes possible to include a wide variety of factors. This method is actually a location adoption of the mathematical weighted sum method.

If required by user, the DSS offers the possibility to render separate results for the *back-office* location, defined as the place in which the company operates manufacturing, services and/or storage, and *front-office* location, defined as the place where the commercial operations are performed (including contact with customers) and also, in most cases, top management. This differentiation is based on the fact that earlier empirical findings in the metropolitan areas, referenced above, reveal a difference between back-office and front-office, in terms of location behaviour.

The site identification process is performed at two zoom levels: *land-use area*, that refers to a functionally compact territory assigned to a certain land-use (e. g. residential area, industrial area, business park, etc.), and *facility type*, that refers to a specific site in the area (e. g. office building, individual commercial space, villa, etc.).

The questionnaire-driven study investigated the *location behaviour of enterprises* in two metropolitan areas – Greater Porto Metropolitan Area (Portugal) and Bucharest-Ilfov Region (Romania). The questionnaire was designed to be applicable to metropolitan areas in general. The results of this study served as a starting point in determination of location factors matrix, weighted by industry, which was embedded afterwards into the DSS software tool.

Participants include people who contribute to the decision support system by information inputs. DSS is designed as an open system, by attracting partners interested in promoting their offers and brands (e. g. real estate agents or facility owners, who lease business sites). There are four types of DSS software access accounts with different privileges and interfaces, corresponding to the categories of participants who can input data: administrator account, user account (entrepreneur), real estate collaborator and cluster organisation collaborator.

The basic geographic information (streets, buildings, administrative boundaries, land-uses, public services, etc.) that forms the underlying layer of the GIS database were downloaded from *OpenStreetMap* (<http://www.openstreetmap.org>) open-licensed under ODBL – *Open Data Commons Open Database License*, briefly stating that data and results obtained from the use or processing of these data must be made available

publicly under the same license (i. e. open and free of charge). The base map data were extracted from the free repository and rebuild inside the DSS database.

Own contribution to the GIS database consisted in adding data to the system, obtained primarily through remote sensing method, or initial data analysis and processing. An example of remote sensing was the identification of the real estate web sites that offered business accommodation. Then, by using the Street View function in Google Maps, most of the business parks in the area were identified (as their precise location was hidden to the public on the real estate web site), and then were drawn as polygons and introduced into geospatial database. An alternative way that has not been used at this stage of investigation is the digital footprint of the population, which can be a source for estimating potential visitors flow.

The basic GIS objects were further refined into layers according to the DSS software tool logic, by appropriate database queries: geometric intersections, joins, splits, and mixed queries. *OpenStreetMap* database was enriched by new defined data (over 300 polygons) saved in 20 new tables. Also, for data processing and extraction were created 7 functions, 187 views (SQL templates, saved as independent entities into the database) and a procedure for updating basic GIS data.

The Architecture of the DSS

The result of this research – the DSS – was modelled into a GIS software tool, designed to assist entrepreneurs and managers in the location decision making. The logic and functionalities of the DSS software tool are described thoroughly in this section, according to the modular structure depicted in Figure 1.

WEB INTERFACE MODULE

The integration between GIS components and internet is accomplished by means of a website, built on a Content Management System platform, namely *Joomla 3.0* (see <http://www.joomla.org>). This CMS platform offers support for *PostgreSQL* (*PostgreSQL 2012*) database system and its GIS extension *PostGIS* (*PostGIS Project 2012*), which, in tandem, store the geographical data, and supply the tools for processing GIS data. Maps are rendered by GIS Server software, namely *GeoServer* (<http://docs.geoserver.org>) (*GIS Tutor 2013*) and displayed on the website with the aid of *OpenLayers* (see <http://trac.osgeo.org/openlayers/browser/trunk/openlayers/examples/proxy.cgi>) software library.

This information is very technical and supplying even more details is beyond the scope of this paper. However, the main point is that several software components are involved in the process of rendering interactive maps on the website, and all the components are open-source and free of charge.

USER DATA FORM

The user data input process consists of the following phases:

1. Edit previous simulation/new simulation – the user can either review one of her/his existing location simulation or launch a new one;
2. Fill in user's input data form:
 - Stage 1 – fill in: a name for the simulation, industry, and number of employees (estimate for first year after location);
 - Stage 2 – specify which activities are subject to the location decision (back-office, front-office, or both). Only if the answer is 'both' an additional section is automatically activated, respectively a question whether back-office and front-office would be located on the same site or in different sites. Depending on the answer to this question, the form resumes with a single column of responses or two (one for the back-office and one for front-office);
 - Stage 3 – choose land-use area, and facility type (multiple checks allowed);
 - Stage 4 – choose type of the real estate offer: building vs. land, rent vs. sell. Also, in this stage, location factors are given weights according to user's needs (total must be 100%);
3. Rendering two sets of results (one set based on user's own simulation, and one set based on the other users' simulations in the same industry).

LAND-USE AREAS' GIS LAYERS

Land-use areas are polygons delineating an area with a specific functionality. The types of areas used in the software are:

- *Industrial/Warehouse Area*: an area for industrial and/or warehouse use;
- *Business Park*: compact area with several modern office buildings;
- *Traditional Trade Area*: high streets and avenues renowned for commercial activities (shops, restaurants, cafes, etc.);

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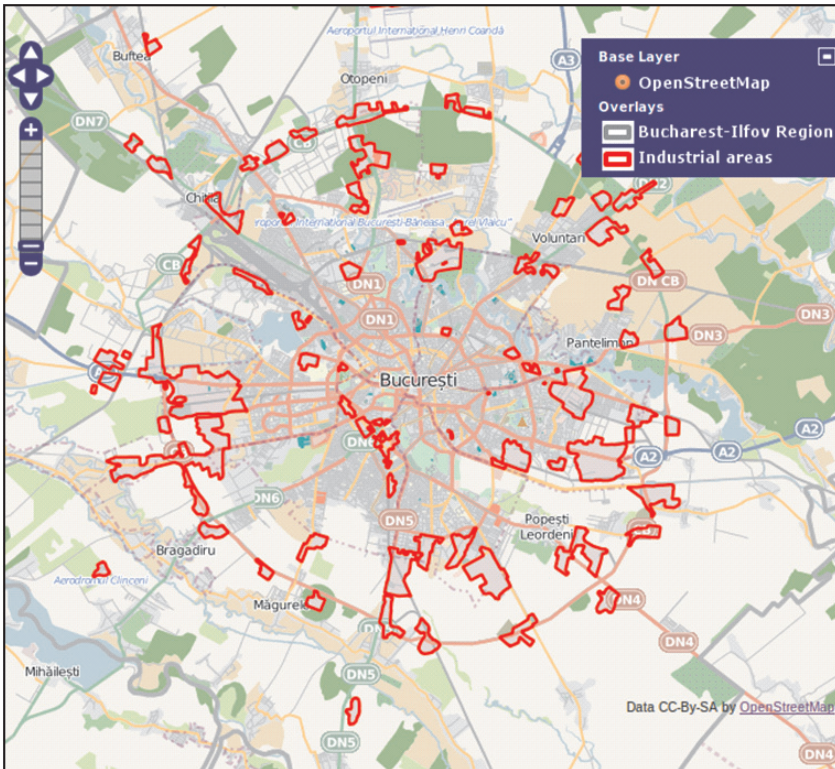


FIGURE 2 Land-Use Layer: Industrial Areas

- *Science and Technology Park*: area specializing in high technology fields (IT, research, electronics, telecommunications, etc.);
- *Urban Residential*: e. g. residential zone within the city of Bucharest and the eight surrounding towns in Ilfov county (excluding land-use areas specified above);
- *Rural Residential*: within villages, having residential use;
- *Rural Non-Residential*: rural – outside localities – excluding special areas that businesses are not allowed in: forests, public infrastructure etc.

An example of such an area layer is depicted in Figure 2. Areas are delineated according to the *principle of covering the entire region of study, with no overlaps*.

LOCATION FACTORS' GIS LAYERS

In order to point out different intensity levels of location factors measured across the map, a set of GIS layers were applied to each factor. These

layers correspond to real ground objects, such as a highway or a public transportation node, surrounded by a buffer (proximity) area. Layers are ordered hierarchically by a scoring scale of 1 to 10 points.

The software uses the following location factors:

1. *Freight accessibility – road*: measured in terms of availability and access speed. This factor takes into account the constraints to the access of trucks over 5 tones capacity (e. g. heavy trucks are restricted to drive in the inner city of Bucharest unless a prohibitive tax is paid), the category of road (affecting the speed and direction of travel), and type of locality – urban/rural (affecting access to markets). As an example to explain how factor scoring works, this factor's set of layers, with the corresponding scores, are presented below:
 - 10 points layer – Main access route (highway access, express road – outside truck restricted area);
 - 8 points layer – Urban – main road (outside truck restricted area);
 - 7 points layer – Rural – secondary road (county road);
 - 5 points layer – Urban – secondary street (outside truck restricted area);
 - 4 points layer – Urban – main street (inside truck restricted area);
 - 3 points layer – Rural – peripheral road;
 - 2 points layer – Urban – secondary street (inside restricted area);
2. *Freight accessibility – railway*: measures the possibility of access to the rail network, given that access can be done only at stations and platforms (industrial and warehouse areas with access to rail transport);
3. *Passenger accessibility – individual vehicle*: quantifies possibility and access speed of the population by own means of transport (car, motorcycle, etc.). This factor considers three concentric polygons, called the 15 minutes, 30 minutes, and 45 minutes isochrones, i. e. limits reached by car in 15, 30 and 45 minutes from ground zero in Bucharest (O'Sullivan, Morrison and Shearer 2000; Paganotti n. d.);
4. *Passenger accessibility – public transport*: access to means (modes) of transport, within maximum distance of 350 m from the station/stop (5 minute walk). This factor takes into account access to various modes of transport and transport capacity. In capacity terms, means (modes) of transport are divided into large capacity means (train, plane, subway, tram) and low capacity (bus, trolley, bus, minibus);

5. *Potential visitors – road traffic*: relates to access and speed to areas, taking into account population density, road class and crossroad rank in relation to the road network;
6. *Potential visitors – footfall traffic*: covers pedestrian traffic areas. It considers proximity to traffic generators, such as public transport stations/stops, leisure areas, main urban-residential crossroads, pedestrian crossings, commercial network concentration areas;
7. *Cost of space*: price/rent level, which follow similar spatial trends. Polygon boundaries were made according to reports from the real estate market, and hierarchy of administrative units in Ilfov county (administrative territory of towns and villages);
8. *Cluster-like behaviour*: targets areas with a high density of companies in the same industry or connected industries;
9. *Lower competition level*: targets areas with a low density of companies in the same industry (applies only to industries with spatial competition behaviour, such as retail, hotels and restaurants, financial services, personal services, etc.).

Similar to the defined land-use areas, the layers belonging to the same factor are bounded by the same principles: to cover the entire territory, but not overlap, with a single exception, that is for the factor ‘potential visitors – footfall traffic’ where overlaps are allowed (stacking of layers adds to the factor intensity).

Figure 3 serves as a graphical representation of factors’ different intensity levels, depicted by the three GIS layers belonging to the factor ‘Passenger accessibility – individual vehicle.’

COMPUTING MODULE

As described in the above section, each factor selected by user in the data input form (so called key factor) has a set of layers, each layer consisting of multiple polygons. Also, the user fills in a relative weight for the selected factors, in a way that she/he considers appropriate for the business. The rule is that all weights must totalize 100%.

Calculations module identifies all possible combinations between selected land-use layers and selected factor’s layers. Combinations are ranked descendent by an aggregate score, summing up for every key factor, each GIS layer score belonging to that certain key factor times the weight given by user to the certain key factor.

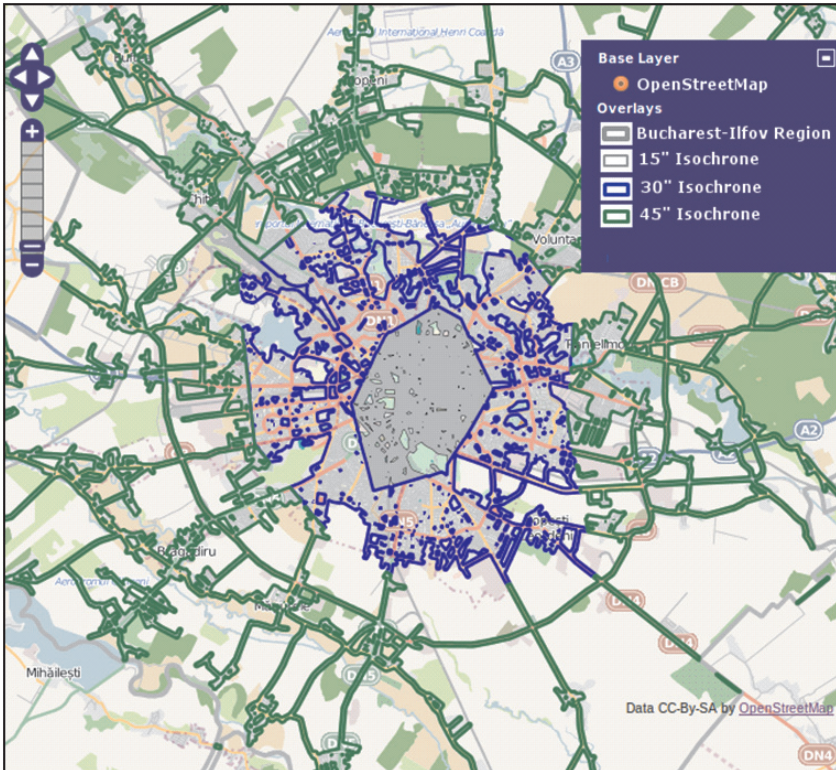


FIGURE 3 Isochrones Layers: Assessing Factor ‘Passenger Accessibility-Individual Vehicle’

Mathematically, this module iterates all *multiple array combinations*, where each array is a factor and the elements of the array are factor’s GIS layers (except for GIS layers of the factor ‘potential visitors – footfall traffic’ which are allowed to overlap and thus each layer is considered independently). Not all the key factors are included, but only those that meet the following two conditions:

- Factor is *selected (weighted) by user* in the input data form;
- Factor’s GIS layers *intersect land-use GIS layers* selected by user in the input data form.

In other words, the algorithm calculates all combinations between arrays $F_{1a}, F_{2b}, F_{3c}, \dots$, where F_1, F_2, F_3, \dots , are the factors, having a number of a, b, c, \dots , elements (GIS layers) intersecting selected land-use areas. At the end of each array is added a null value, so as combinations with missing (null) elements from one or more arrays to be taken into account

as well, that is, embodiments combining a number of elements less than the number of arrays. This model is repeated for each selected land-use area.

Calculation of the score for each combination variant is made by the following relation:

$$W = \frac{\sum_{i=1}^n p_i}{\sum_{i=1}^n P_{\max_i}} \times 100 \quad (1)$$

Where n is the number of arrays (selected factors), p_i is the score of the layer of factor i included in the combination, and P_{\max_i} is the maximum score for factor i (i. e. score of the highest score layer of the factor i).

If there is no intersection between the land-use layer and the factor layers included in the combination, the combination is not feasible, so model skips to the following possible combination. When first feasible combination is identified, it becomes the first (best) location result. The algorithm is continued until it finds the top five location results (having the highest score, and feasible).

LOCATION REPORTS MODULE

This module handles the location results computed after completing user input phase. The results are displayed both in a graphical display (GIS map) and a text display (report), including map's legend. The report includes information on the top five location results, and how their scores are calculated.

The software tool offers two sets of results. The *first set of results* is based on user own options. The *second set of results* is based on the aggregate simulations of the other users in the same industry. The only difference is that for the second set the land-use layers are also weighted by users' choices. In the first set of results, even if multiple land-use layers are selected they are considered equal, because there is only one location simulation. As an example, Figure 4 and the text report below, depicts the first set of results obtained by an *IT-Software Firm* for the location of *back-office*.

If the user has chosen to have distinct locations for back-office and front-office, the first set of results would include separate reports for back-office and front-office. Else, it receives a common set of results for both. On the other hand, the second set of results (the industry set) always includes distinct back-office and front office reports, because it aggregates a large number of location simulations that are unlikely to be identical for

- 10%: Passenger accessibility – individual vehicle
 - 20%: Passenger accessibility – public transport
 - 20%: Potential visitors – road traffic
 - 30%: Cost of space
 - 20%: Cluster-like area
4. Distinct locations for back-office and front-office

Top 5 Location Results

Out of a hypothetical total of 100 points (if all factors overlap at highest intensity) the following scores were calculated:

1. Area 1: 62 points
 - Land-use area: Industrial/Warehouse Area
 - Factors:
 - Passenger accessibility – individual vehicle: 10 points
 - Passenger accessibility – public transport: 20 points
 - Potential visitors – road traffic: 20 points
 - Cost of space: 12 points
2. Area 2: 61 points
 - Land-use area: Urban-Residential
 - Factors:
 - Passenger accessibility – individual vehicle: 10 points
 - Passenger accessibility – public transport: 20 points
 - Potential visitors – road traffic: 16 points
 - Cost of space: 15 points
3. Area 3: 61 points
 - Land-use area: Urban-Residential
 - Factors:
 - Passenger accessibility – individual vehicle: 7 points
 - Passenger accessibility – public transport: 20 points
 - Potential visitors – road traffic: 16 points
 - Cost of space: 18 points
4. Area 4: 59 points
 - Land-use area: Industrial/Warehouse Area
 - Factors:
 - Passenger accessibility – individual vehicle: 10 points
 - Passenger accessibility – public transport: 14 points
 - Potential visitors – road traffic: 20 points

- Cost of space: 15 points
- 5. Area 5: 59 points
 - Land-use area: Industrial/Warehouse Area
 - Factors:
 - Passenger accessibility – individual vehicle: 7 points
 - Passenger accessibility – public transport: 10 points
 - Potential visitors – road traffic: 16 points
 - Cost of space: 6 points
 - Cluster-like area: 20 points

The maximum score that can be obtained by a location result is 100 points (100%), but this is an ideal score that may be achieved only if all factors were selected, and they all stack at their maximum intensity over the selected land-use layer.

Discussion of Results

GIS software tools cover many fields (weather, transport, land-use development plans, etc.). Though, business management field has little support based on GIS technologies. The research presented in this paper aims to cover that gap.

The decision support system (DSS) for the location of enterprises is intended to be applicable to all metropolitan areas. The geographical coverage can be extended by including GIS data from other areas.

The DSS integrates state-of-the-art GIS technologies, i. e. latest versions of GIS open-source software and data. The basic GIS data were obtained from *OpenStreetMap*. The results of the DSS are open to public and free of charge, having the obligation of being rendered under the same conditions as the basic data obtained from *OpenStreetMap*.

The research addresses the issue of location by building a decision support system that integrates four broad components: an approach to the business location of SMEs derived from theory and applied studies; a questionnaire-based study on the location behaviour and related results; participants (software administrator, users and interested partners to popularize their offer or identity, from real estate or cluster bodies); a software tool for business location (the decision support system itself).

The research approach falls within the term *micro-location*, namely the precise identification of suitable operating sites for a certain business.

The DSS is designed to integrate business data from both user input and collaborators (real estate owners/agents, and cluster organizations).

The DSS provides the user with three lists of options: *key location factors* that may be selected and weighted (totalizing 100%), *land-use areas*, and *facility types*. At current stage, the DSS does not offer information on facilities within the top location areas rendered, as it has not yet included real estate collaborators, whose role would be to detail facility offers. The prospective real estate collaborators are supposed to supply geo-tagged information on facilities by filling in their real estate offer forms. At that point those data will be embedded into the DSS, thus location results will provide links to the real estate offers falling within the result areas.

The DSS provides *two sets of results* – one based on user's own options, and another one (aggregate) based on all other users in the same industry. This offers users a means of comparing her/his options and results to other relevant ones. The DSS can provide distinct results for *back-office* and *front-office*, according to user's option. The results are rendered directly into the web browser (the software is web-based), including a GIS report (map) and a text report with thorough explanations on options and results, as well as a map legend.

Users can enter a new simulation or revise an existing one. With each new simulation or review, the DSS database is updated, so the industry results become more relevant. Moreover, the software includes an executable procedure for updating basic GIS data contained in the DSS, to new *OpenStreetMap* database updates.

The problem of measuring the intensity of location factors in the different areas of the study region is very complex. For example, for calculating accessibility or attractiveness intensity, neither the origin nor the destination points are known. Theoretically, any user can place the business anywhere, according to available options. Therefore, factor's intensity is a relative measure, paying the maximum score to polygons where the intensity is the highest and lowering scores for polygons which have lower factor intensity.

In geometric delineation of the land-use areas, the principle used was that *areas do not overlap but cover the entire territory*. The same principle was applied to the layers belonging to the same factor.

In respect of the limitations of the elaborated model, it is important to mention a few aspects. Regarding the extension of the findings of the questionnaire-driven study to all metropolitan areas, in order to quantify firms' location behaviour, it should be mentioned that the results are based on a number of 388 questionnaires in only two metropolitan areas (Porto and Bucharest). Leading metropolitan areas such as London,

Paris, Amsterdam, Rotterdam, Moscow, and Istanbul, or from other continents than Europe were not included. Also, each country or metropolis has its specificity in terms of economy, demography, culture, etc.

This research analysed the behaviour of firms and not the needs or expectations of customers or employees about the business location. It started from the premise that the location of economic activity is a consequence of the reaction of firms to the needs of potential customers. As such subjective factors both from the customer perspective – buyers' behaviour, preferences (Borgers and Timmermans 1986, 25–31), (Naumann 1995) and from the entrepreneur's perspective – attachment to his native place, aspirations, social life (Figueiredo, Guimaraes, and Woodward 2002, 341–61), (Stam 2007, 27–50), were only indirectly addressed.

The set of key location factors used, combined with the specific features of land-use areas, offer a great flexibility in handling users' preferences. However, depending on the characteristics of each business, there may be factors which are not addressed individually, but could decisively influence the location decision.

Regarding further development of the DSS, there is a *quantitative direction* – geographical expansion and a *qualitative direction* – evaluation and treatment, where appropriate, of basic geospatial data, adding new data and involving real estate and cluster collaborators.

The DSS provides benefits to users (entrepreneurs and managers), such as reducing search time, site assessment, connecting with real estate bidders, structuring and prioritizing their location key factors and preferences, increasing their business awareness, quantifying their needs, and providing comparison with other users in the same industry (receive feedback from industry trends).

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Impact of Merger and Acquisitions on Operating Performance: Evidence from Manufacturing Firms in India

Ramachandran Azhagaiah
Pondicherry University, Kanchi Mamunivar
Centre for Postgraduate Studies, India
drrazhagaia@yahoo.co.in

Thangavelu Sathishkumar
Pondicherry University, India
sathishvethathiri@yahoo.com

The present paper is carried out with the objective of studying what shift-in-structure is experienced especially in the operating performance (OP) after merger and acquisitions (M&As) by studying 39 selected acquiring manufacturing firms in India. The firms, which had gone in to the M&As process during the financial year 2006–2007 are only considered for the study. Factor analysis, correlation matrix, multiple regression, and chow test are applied to study the OP of these firms in the pre-and post-merger periods. The study reveals that the M&As process has significant (positive improvement) effect on OP of the acquiring manufacturing firms in India after M&As over the study period.

Key Words: acquisition; corporate restructuring; merger & acquisition; post-merger operating performance; operating performance of Indian industries; long-run operating performance

JEL Classification: G34; L25

Introduction

Largely, corporate restructuring has been a resounding success, which has led to remarkable improvement in corporate performance. Observers of corporate restructuring believe that the gains are attributable to synergetic benefits, sharper forces, better corporate governance, enhancement in managerial incentives and motivation, greater disciplining power of debt, and elimination of cross subsidies. The present study has analyzed operating performance (OP) of manufacturing firms in India in pre-and post-merger period under seven dimensions, i. e. *gross earnings* (GE), *liquidity* (L), *financial risk* (FR), *cost of utilization* (CU), *turnover* (T), *growth*

(G), and operating leverage (OL). The existing literature in the area of research prove differing results, for instance, a sick firm is taken over by a good performer and makes serious attempts to enhance the OP, it is possible to turn it around successfully (Sankar and Rao 1998). The acquiring firms performed better than the industry average in terms of profitability (Pawaskar 2001). The long-term OP following M&As in Japanese firms was positive but insignificant, and there was a high correlation between pre-and post-merger performance (Kruse et al. 2003). The merged firms reacted positively to the merger announcement, and only a few financial variables influenced the share price of the merged firms (Vanitha and Selvam 2007). There was a significant shift (*change*) in the output (*shareholders' wealth*) due to the merger during the post-merger period, which supports a good, significant positive impact of M&As on the shareholders' wealth of manufacturing firms of food industry in India (Azhagaiah and Sathishkumar 2012a). With this background, the present paper is carried out with the objective of analyzing what shift-in-structure is experienced in the OP of the acquiring manufacturing firms after M&As, in India.

Review of Literature

Levine and Aaronovitch (1981) concluded that there was no evidence of any significant difference between the acquiring and target firms for the profit related variables and their growth. Ikeda and Do (1983), who tested OP on parameters such as *profitability, efficiency, growth, and research and development* found that the financial performance in respect of profitability was higher in the post-merger period. Scherer (1988) revealed that most of the firms did not show significant improvement in long-term profitability after M&As. Healy, Palepu and Ruback (1992) found that the merged firms registered improvement in the post-merger OP in comparison to that of their industry peers, these increases from improvements in asset productivity. Lee, Pamela and Gayle (1996) revealed that the horizontal acquisitions showed the strongest predictive ability with the variables such as *long-term debt/total assets, long-term debt/market value, market value/book value, and asset growth and sales growth* showing significance in the post-merger period. Rau and Vermaelon (1998) found that the acquiring firms under-perform during the three years after M&As while tender offers earned a small but statistically significant positive abnormal return. However, the long-term performance of acquiring firms, due to M&As, is not uniform across the firms, which went

for M&As. Pawaskar (2001) elucidated that the acquiring firms were at the lower end in terms of growth, tax and liquidity of the industry, and the target firms performed better than that of the industry in terms of profitability.

Coontz (2004), in the study 'Economic Impact of Corporate Mergers and Acquisitions on Acquiring Firm Shareholder' stated that the companies failed to perform well after mergers and acquisitions in all parameters understudy; the performance was different from different industry; and the performance of company depends on the type of industry in which mergers and acquisitions take place. Dubrovski (2005), in the study 'Restructuring and Business Reengineering in Integrative Process' stated that restructuring has a more significant role for preventing crisis and development, either as internal (organic) growth or growth by the helping hand from partners, in comparison to acute crisis solving itself, when measures having short-term positive effects take priority.

Martynova, Oosting and Renneboog (2006), in the paper 'The Long Term Operating Performance of European Mergers and Acquisitions' analyzed the extent of European companies improved their profitability following the completion of takeover transactions of 155 European M&As completed during 1997–2001 and found that the profitability of the combined firm decreased significantly following the takeover. Means of payment, geographical scope and industry relatedness did not have significant explanatory power on profitability. Companies with excessive cash holdings are negatively related to performance while acquisitions of relatively larger targets result in better profitability of the combined firm subsequent to the takeover.

Mantravadi and Reddy (2007), in the study 'Relative Size in Mergers and Operating Performance: Indian Experience' studied the impact of mergers on the operating performance of acquiring corporate by examining some financial ratios of pre and post-merger periods of firms of public limited and traded companies in India during 1991–2003. They had found that there were minor variations in terms of the impact on operating performance following mergers when the acquiring and acquired firms are of different relative sizes as measured by market value of equity.

Martynova, Oosting and Renneboog (2007) found that the acquiring and target firms significantly outperformed the median peers in the industry prior to the takeovers event, but the profitability of the combined firm decreased significantly following the takeover. Beena (2008) made a

study on 'Trends and Perspectives on Corporate Mergers in Contemporary India' and found that the performance of acquiring firms in 1990–2005 was relatively better as compared to that of the Indian private corporate manufacturing sector. However, the study did not find significant evidence of improvement in their performance in terms of various parameters during the post-merger phase as compared to the pre-merger period.

Sinha, Kaushik and Chaudhary (2010), in a study 'Measuring Post Merger and Acquisition Performance: An Investigation of Select Financial Sector Organizations in India' found that more than half of the merging firms showed improved financial performance in the post-merger period as compared to the pre-merger period; earnings available to equity shareholders and debt-equity ratio showed a significant change in the post-merger period. Srinivas (2010) revealed that the overall long-term repaying capacity of the banks has been improved after the M&As and, which is proved in the case of interest coverage ratio too.

Liargovas and Repousis (2011), in a study 'The Impact of M&As on the Performance of Greek Banking Sector: An Event Study Approach' examined the impact of Greek M&As on the performance of Greek Banking sector during 1996–2009 and rejected the 'semi-strong form' of Efficient Market Hypothesis of the Athens stock exchange; found that bank M&As have no impact and do not create wealth; the operating performance did not improve following M&As. Azhagaiah and Sathishkumar (2011) found that the M&As process has significant impact on the profitability of acquiring firms in India after merger. Verma, Maji and Nair (2013) concluded that the Indian banks, although small in number when compared to their global counterparts, are taking great strides not only within the continental shelf of India, but even beyond its borders too.

The previous studies, mostly, attempted to study the short-run impact, say three years prior to and after the M&As period. Moreover, most of the previous studies undertook almost similar research methods to evaluate OP in the pre-and post-merger periods. With these evidences and supports, the present study is an attempt to measure the impact of M&As on the OP in the long run, say five years prior to merger year and five years after the merger year. The present paper attempts to overcome the limitations of the previous studies by use of chow test. Hence, the present paper aims at to fulfil the research gap in the existing literature in terms of two dimensions, one – long-run impact, and the other – applying chow test to analyse the shift-in-structure (*impact*) in the OP due to M&As.

Statement of the Problem and Significance of the Study

When a firm is merged with another or is acquired by the profit-making firm, it benefits both the firms; hence, it is the order of the day that all firms are interested in resorting to corporate restructuring in the name of M&A. However, the question that often arises is whether all the firms those are merged/acquired end up with increase in OP? As some firms end up with a negative impact on OP (Pawaskar 2001; Coontz 2004) after M&A, the present paper is an attempt to seek answers to the stated question by analysing the impact of M&A on OP by studying 39 selected acquiring manufacturing firms in India, which are listed in one of the leading Indian stock exchanges in India namely the Bombay Stock Exchange which have undergone M&A in the same (related merger) industry during the financial year 2006–2007, and an attempt has been made to study the OP of the acquiring manufacturing firms in India in the long-run, that is, during the period of five years before merger and five years after the merger, that is from 2002 to 2006, and from 2008 to 2012, hence the period of the study is ten years (i. e., from 2002 to 2012; merger year 2006–2007 is not included).

Objectives and Hypotheses Developed for the Study

The motives behind the M&A are, naturally shareholders' wealth maximization, profit maximization, and financial and operating risk minimization. The present paper attempts to analyze the shift in structure in the OP of selected acquiring manufacturing firms of food industry in India, which have adopted the M&A strategy. More specifically, the present paper proposes

1. To analyze the effect of M&A on the attributes of operating performance vs. *gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, and operating leverage* of acquiring manufacturing firms in India; and
2. To study the shift-in-structure (improvement) in the operating performance of acquiring manufacturing firms in India in the post-merger period.

The present paper is attempted to estimate the OP of acquiring manufacturing firms in India in the post-merger period. The study has further attempted to investigate and test if there is any significant change in the results achieved by the acquiring manufacturing firms due to M&A. Based on the objectives, the following hypotheses are developed:

TABLE 1 Number of Merger and Acquisitions in India, 2001–2012

Year	(1)	(2)	Year	(1)	(2)
2001–2002	164	138	2007–2008	202	176
2002–2003	133	114	2008–2009	131	108
2003–2004	141	110	2009–2010	201	147
2004–2005	147	113	2010–2011	170	109
2005–2006	211	176	2011–2012	73	24
2006–2007	228	179			

NOTES Column headings are as follows: (1) announced M&As deals, (2) completed M&As deals. Data compiled from PROWESS data-base provided by CMIE.

H_0^1 *There is no significant impact of attributes of operating performance vs. gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, as well as operating leverage on operating performance of acquiring manufacturing firms in India in the post-merger period.*

H_0^2 *There is no significant shift-in-structure in the operating performance of acquiring manufacturing firms in India in the post-merger period.*

Research Methodology

DATA SOURCE AND PERIOD OF THE STUDY

The study used secondary sources of data, which were collected from the capital market database called Centre for Monitoring Indian Economy Private Limited (Prowess CMIE). Data on OP for a period of five years prior to the merger year and five years after the merger year for each acquiring manufacturing firm were collected. Table 1 reveals that the M&As is highest in number during 2006–2007 in terms of M&As deal announcement (228) as well as M&As deal completed (179), hence the sample units (firms) chosen are based on those firms that ventured in to the M&As process during 2006–2007 only, and are considered for the study for want of analysing the long-run impact of M&As on OP, hence the study period is restricted to 10 years ranging from 2002 to 2012 considering the year 2006–2007 as mid-year, i. e. the year of M&As.

Purposive multi-stage sampling technique is used and the different stages followed are shown in table 2. The number of M&As held in the manufacturing sector in India during 2006–2007 is shown in the table 3.

TABLE 2 Sampling Procedure

Stage 1	Total of 228 firms under the manufacturing and service industries had gone into the M&A deal during the financial year 2006–2007.
Stage 2	Out of 228 firms, 179 firms only have completed M&A deal during the financial year 2006–2007.
Stage 3	Out of 179 firms, 39 firms were eliminated because they did subsequent merger with another target firm in the same financial year, resulting in to the number of firms to 140 for further stage.
Stage 4	Out of 140 firms, 75 firms fall under the manufacturing sector and remaining 65 firms fall under the service sector, hence 75 firms of manufacturing sector only are taken into account for further stages.
Stage 5	Out of 75 firms, full-fledged data are available only for 39 firms of manufacturing sector.
Stage 6	Hence, the final sample comprises 39 acquiring manufacturing firms in India.

TABLE 3 Sector-Wise Number of Merger and Acquisitions Held in the Manufacturing Sector in India, 2006–2007

Industry	(1)	(2)	(3)
Food and Beverage	17	13	7
Machinery	16	12	6
Non-Metallic Mineral Products	10	9	5
Chemicals	24	18	12
Textiles	10	9	05
Metals and Metal Products	8	7	1
Transport Equipment	5	2	1
Miscellaneous Manufacturing	5	5	2
Total	95	75	39

NOTES Column headings are as follows: (1) no. of mergers (before elimination of subsequent M&As), (2) no. of mergers (after elimination of subsequent M&As), (3) full-fledged data available in the data source.

Research Methods for Analysis

The study used ‘factor analysis, correlation matrix, multiple regression analysis, and the chow test.’ Factor analysis is used to analyse underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Correlation co-efficient is used to analyze one-to-one relationship between the selected variables. Multiple regression analysis has been used for estimating as to which part of the increase the merger had impact, by use of various ratios for studying the OP of the acquiring

manufacturing firms in India. Further, chow test is used for studying the shift-in-structure (improvement) in OP due to M&As.

ANALYSIS OF OPERATING PERFORMANCE

The study used regression equation to estimate the determinants of operating performance, say return on equity (ROE) based on predictor (explanatory) variables.

Response Variable

Return on equity (ROE) is the response/criterion variable, which is expressed as a percentage. The ROE is an indicator of firm's profitability by measuring the extent to which the profit is generated by the firm with the money invested by common stock owners. The higher the ratio, the more is the management efficiency in utilizing its equity base and in turn, the better return is to the investors. The OP is measured through ROE (Cabanda and Pascual 2007), and the selected predictor variables to measure the ROE are *gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, and operating leverage*.

Regression equation:

$$ROE = \alpha + \beta_1GE + \beta_2L + \beta_3FR + \beta_4CU + \beta_5T + \beta_6G + \beta_7OL + E, \quad (1)$$

where ROE is return on equity, GE gross earnings, L liquidity, FR financial risk, CU cost of utilization, T turnover, G growth, OL operating leverage, α regression constant, $\beta_1, \beta_2, \dots, \beta_7$ regression coefficients and E error term.

Predictor Variables

The selected predictor variables are gross earnings (GE), liquidity (L), financial risk (financial leverage) (FR), cost of utilization (CU), turnover (T), growth (G), and operating leverage (OL).

INDICATION OF CHOW TEST

The shift-in-structure in respect of OP has been studied with the help of Chow test. The chow test (Chow 1960) was designed to analyze the same variables obtained in two different data sets to determine if they were similar enough to be pooled together. The method, however, could be used to determine if two regression lines are different from one another (Lee 2008a; 2008b). The Chow test for parameter stability confirms that there was a structural change in the estimating equation, and the Chow

test models clearly indicate that for all series under examination, the null hypothesis of more than one structural break time can be rejected (Allaro, Kassa and Hundie 2011).

The impact of M&As on the OP of acquiring manufacturing firms in India is studied through its structural changes and its impact on the acquiring firms of manufacturing sector in India. For this purpose, the period of study has been divided in to two sub-periods – pre-merger period, from 2002–2006 and post-merger period, from 2008–2012. The firms, which had gone in to the M&As process during the financial year 2006–2007 only are considered for the study for want of analysing long-run impact of M&As on OP. The test statistic is as follows:

$$F = \frac{\frac{RSS_w - RSS_g + RSS_j}{k}}{\frac{RSS_g - RSS_j}{n_1 + n_2 - 2k}} \quad (2)$$

This is distributed as F with k and $n_1 + n_2 - 2k$ degrees of freedom, where F is the test statistic, RSS_w residual sum of squares for the whole sample (restricted model), RSS_g residual sum of squares for the pre-merger sub-sample, RSS_j residual sum of squares for the post-merger sub-sample, n number of observations, k number of regressors (including the intercept term) in each unrestricted sub-sample regression and $2k$ number of regressors in both unrestricted sub-sample regressions (whole sample).

Analysis and Discussion

The selected variables are rotated through Varimax with Kaiser Normalization method extracted using principal component analysis and seven major predictor factors are identified and they are interlinked, which are shown in table 4 that the first factor (GPR (0.875), CPR (0.861), EBIT_SR (0.842), NPR (0.835), OPR (0.821), and R_LTFR (0.680)) is gross earnings, which is denoted as GE. The second factor (QR (0.826), WC_SR (0.796), WC_TAR (0.743), and CR (0.657)) is liquidity, which is termed as L. The third factor (PR (0.870) and TD_TAR (-0.848)) is financial risk (financial leverage), which is denoted as FR. The fourth factor (RM_SR (-0.695), S&AC_SR (0.686), P&F_SR (0.671), and EC_SR (0.525)) is cost of utilization, which is termed as CU. The fifth factor (ITR (0.897) and STR (0.893)) is turnover, which is termed as T. The sixth factor (GOEBITR (0.826), GOPR (0.778), and GOFAR (0.488)) is growth, which is termed as G, and the seventh and the final factor (NFA_NWR (0.810) and TL_NWR (0.740)) is operating leverage, which is termed as OL.

The predictor variables in the first factor, viz., GPR (0.875), and CPR (0.861); in the third factor, viz., PR (0.870), and in the fifth factor, viz., ITR (0.897) and STR (0.893) are found to be highly significant dominating in the factor (Varimax with Kaiser Normalization method). The Eigen values 5.089, 2.847, 2.501, 1.865, 1.569, 1.464, and 1.219, respectively, for the factors 1 to 7 are > 1 hence, the study analyzed these seven predictor factors in the pre-and post-merger periods in respect of OP (ROE) and found that these factors are significant in the post-merger period.

Analysis of Determinants of Operating Performance in Pre-Merger Period

Correlation analysis is used to study one-to-one relationship between the selected predictor factors (GE, L, FR, CU, T, G, and OL) and the details are shown in table 5, which reveals that factors, viz., GE, FR, and G have significant positive relationship with ROE (0.5230.01, 0.1680.05, and 0.1460.05) at 1% and 5% level respectively, while factors, viz., L and CU have significant negative relationship with ROE ($-0.2070.01$ and $-0.2210.01$) at 1% level. However, factors vs. T and OL do not show any significant positive/negative relationship with ROE.

The results of regression analysis of M&As on pre-merger OP as well as post-merger OP are presented in table 6. The results reveal that the factors GE, FR, and G have significant positive beta coefficient (6.7380.01, 1.9900.05, and 4.8440.01) on ROE at 1% and 5% level respectively, while the factors viz. L and OL have significant negative beta coefficient ($-2.2020.05$ and $-1.5730.05$) on ROE at 5% level however, the factors vs. CU and T did not show any significant positive/negative beta coefficient. The R^2 and adjusted R^2 is 0.398 and 0.375 respectively, and the critical value of F (df , 7, 187) is 17.6470.01, which is significant at 1% level, reveals that the selected predictor variables affected the OP of acquiring manufacturing firms in India in the pre-merger period too.

Analysis of Determinants of Operating Performance in Post-merger Period

The correlation matrix of factors of OP (see table 7) for the post-merger period shows that factors, viz., GE, FR, and G have significant positive relationship with ROE (0.5110.01, 0.2500.01, and 0.2370.01) while factor OL has a significant negative relationship with ROE ($-0.2830.01$) at 1% level. However, factors viz., L, CU, and T do not show any significant positive/negative relationship with ROE.

TABLE 4 Results of Factor Analysis of Predictor Variables of the Impact of M&As on the Operating Performance (ROE) of Acquiring Manufacturing Firms in India, 2001–2012

(1)	(2)	(3)	Components						
			1	2	3	4	5	6	7
GE	5.089	GPR	0.875	-0.009	0.009	0.123	0.005	0.188	0.005
		CPR	0.861	0.052	0.044	0.059	0.145	-0.104	-0.029
		EBIT_SR	0.842	0.064	0.025	0.193	-0.033	0.273	0.027
		NPR	0.835	0.097	0.201	-0.066	0.094	0.001	0.015
		OPR	0.821	-0.079	-0.200	0.267	0.014	0.227	0.053
		R_LTFR	0.680	-0.108	0.204	-0.240	0.047	0.229	-0.032
L	2.847	QR	0.012	0.826	0.007	-0.083	0.101	0.009	-0.066
		WC_SR	0.034	0.796	-0.179	0.067	-0.058	-0.003	-0.059
		WC_TAR	-0.042	0.743	0.046	-0.145	-0.240	0.111	0.139
		CR	0.044	0.657	0.411	0.015	0.064	-0.015	0.090
FR	2.501	PR	0.216	0.085	0.870	0.034	0.070	0.039	0.051
		TD_TAR	0.007	0.051	-0.848	0.019	-0.127	0.012	0.289
CU	1.865	RM_SR	-0.291	0.176	0.075	-0.695	-0.072	0.047	0.242
		S&AC_SR	0.086	0.173	0.192	0.686	0.120	0.077	-0.016
		P&F_SR	0.034	-0.237	-0.351	0.671	0.099	-0.175	0.079
		EC_SR	-0.464	-0.026	0.169	0.525	-0.281	0.171	-0.257
T	1.569	ITR	0.088	-0.018	0.063	0.130	0.897	0.033	-0.069
		STR	0.092	-0.073	0.125	0.035	0.893	0.121	-0.061
G	1.464	GOEBITR	0.228	0.100	0.018	-0.001	0.083	0.826	0.018
		GOPR	0.242	0.050	-0.071	-0.095	0.047	0.778	-0.068
		GOFAR	-0.045	-0.138	0.293	0.381	0.044	0.488	0.155
OL	1.219	NFA_NWR	-0.062	0.004	0.071	-0.050	-0.098	-0.028	0.810
		TL_NWR	0.123	0.030	-0.287	-0.084	-0.016	0.046	0.740

NOTES Column headings are as follows: (1) factors, (2) eigen value, (3) variable convergence.

The results of regression analysis on the OP of (see table 6) post-merger period reveals that the factor GE has a significant positive beta coefficient (8.1240.01) on ROE at 1% level; which infers that the acquiring manufacturing firms gain more profit by optimum utilization of the available resources in the post-merger period. The factor L has a significant negative beta coefficient (-1.8630.01) on ROE at 1% level, which

TABLE 5 Correlation Matrix of Selected Predictor Factors with Operating Performance (ROE) for Pre-Merger Period (2001–2006) of Acquiring Manufacturing Firms in India

	ROE	GE	L	FR	CU	T	G	OL
ROE	1							
GE	0.523** (0.000)	1						
L	-0.207** (0.004)		1					
FR	0.168* (0.019)			1				
CU	-0.221** (0.002)	-0.179* (0.012)			1			
T				-0.155* (0.030)		1		
G	0.146* (0.042)	-0.143* (0.045)					1	
OL								1

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level.

infers that the acquiring manufacturing firms are able to pay their debts as and when they are due after the merger period. The factor FR has a significant positive beta coefficient (4.3850.01) on ROE at 1% level; which implies that FR of the acquiring manufacturing firms, in relying on the borrowings, is significantly affected by their M&As activity; therefore, the acquiring manufacturing firms are able to repay their external liabilities in the post-merger period. The factor CU has a significant negative beta coefficient (-2.9190.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to improve operating efficiency in respect of CU and are also able to control the expenses in the post-merger period.

The factor G has a significant positive beta coefficient (2.5640.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to increase G after merger and it also infers that they are able to use their internal resources to the maximum extent to maximize profit. The factor OL has a significant negative beta coefficient (-4.5160.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to reduce their OL after merger period by way of reducing the

TABLE 6 Results of Multiple Regression of Selected Predictor Factors on Operating Performance (ROE) of Acquiring Manufacturing Firms in India for Pre-Merger (2001–2006) and Post-Merger (2007–2012) Periods

Variable	Un-standardized coefficients beta value					
	Pre-merger			Post-merger		
	β	t-value	P-value	β	t-value	P-value
(Constant) ROE	12.661	12.970	0.000	12.115	15.184	0.000
Gross Earnings	6.738	8.677	0.000**	8.124	10.787	0.000**
Liquidity	-2.202	-2.591	0.010*	-1.863	-2.772	0.006**
Financial Risk (Leverage)	1.990	2.532	0.012*	4.385	6.005	0.000**
Cost of Utilization	-1.528	-1.951	0.053	-2.919	-3.936	0.000**
Turnover	1.417	1.342	0.181	-0.844	-1.360	0.176
Growth	4.844	3.755	0.000**	2.564	3.886	0.000**
Operating Leverage	-1.573	-2.211	0.028*	-4.516	-5.707	0.000**
R^2	.398			.525		
Adjusted R^2	.375			.507		
F	17.647**			29.473**		
Degrees of Freedom	7,187			7,187		
Number of Observations	195			195		

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level

total liability relative to their net worth, while the factor T does not show any significant positive/negative beta coefficient on ROE; hence, H_0^1 is rejected in respect of factors vs. GE, FR, and G (+ve), L, CU, and OL (-ve).

The R^2 and adjusted R^2 of the regression analysis for the post-merger period is 0.525 and 0.507 respectively and the critical value of F (df, 7, 187) 29.4730.01 is significant at 1% level, which implies that the test statistic (29.4730.01) for post-merger period > 99% critical value (2.64) of F-test, F-value, being significant at 1% level, the analysis implies that there is a significant impact of most of the selected explanatory variables on the OP hence, it is possible to reject the (H_0^1) null hypothesis.

Impact of Merger and Acquisitions on Operating Performance – Application of Chow Test

The result of the chow test (see table 8) reveals that the F-value (2.790.01) is greater than the F limit (2.51) at 1% level for df. 8, 374, hence, H_0^2 is rejected, which implies that the acquiring manufacturing firms have a

TABLE 7 Correlation Matrix of Selected Predictor Factors with Operating Performance (ROE) for Post-Merger Period (2007–2012) of Acquiring Manufacturing Firms in India

	ROE	GE	L	FR	CU	T	G	OL
ROE	1							
GE	0.511** (0.000)	1						
L			1					
FR	0.250** (0.000)			1				
CU		0.173* (0.015)			1			
T						1		
G	0.237** (0.001)						1	
OL	-0.283** (0.000)							1

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level.

TABLE 8 Results of Chow Test for Structural Shift in Operating Performance between Pre-and Post-Merger Periods of Acquiring Manufacturing Firms in India

Sum of square residuals			(4)	(5)	(6)	(7)	(8)
(1)	(2)	(3)					
42395.12	20620.93	19380.19	8	390	2.79**	8, 374	F0.01 2.51*

NOTES Column headings are as follows: (1) whole sample, (2) pre-merger period, (3) post-merger period, (4) number of parameters estimated, (5) number of observations, (6) *F*-value, (7) degrees of freedom, (8) *F*-limit. Computed results from the regression analysis. * For $V_1 = 8$, $V_2 = 374$). ** Significant at 1% level. * Significant at 5% level.

highly significant shift-in-structure (improvement positively) in respect of OP in the post-merger period at 1% level.

Conclusions and Policy Prescriptions

The study examined the OP of acquiring manufacturing firms in India using factor analysis, correlation coefficient, regression analysis, and Chow test to study if there is a significant shift in the OP of acquiring manufacturing firms in the post-merger period based on the annual financial data spanning the years from 2002–2012, for a period of five years prior to the merger (2002–2006) and five years after the merger (2008–

TABLE 9 Summary of the Status of Hypotheses Developed on Operating Performance

Hypotheses	Overall results
H ₀ ¹ There is no significant impact of gross earnings (GE) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of liquidity (L) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ¹ There is no significant impact of financial risk (leverage) (FR) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of cost of utilization (CU) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ¹ There is no significant impact of turnover (T) of acquiring manufacturing firms in India on ROE after M&As.	accepted
H ₀ ¹ There is no significant impact of growth (G) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of operating leverage (OL) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ² There is no significant shift in structure in the operating performance (ROE) of acquiring manufacturing firms in India in the post-merger period.	+ve** rejected

NOTES Regression analysis and chow test analysis. ** Significant at 1% level.

2012) for each of the acquiring manufacturing firm in India. The study is carried out with a sample of 39 acquiring manufacturing firms, which had gone in to the M&As process during the financial year 2006–2007, only for the simple reason that the number of M&As was the highest in 2006–2007 in the recent past decade, and also for want of analysing the long-run impact of M&As on OP in the post-merger period.

The results of the overall analysis reveal that the impact of explanatory factors vs. GE, FR, and G on ROE is found to have highly significant positive beta coefficient, while that of the factors viz., L, CU, and OL on ROE is found to have significant negative beta coefficient at 1% level. However, the factor T on ROE does not show any significant impact. The Chow test *F*-value (2.79) > *F*-limit (2.51) at 1% level, which implies that the acquiring manufacturing firms have significant shift-in-structure (improvement positively) in respect of OP in the post-merger period. The status of hypotheses developed and results on operating performance (ROE) of acquiring manufacturing firms in India are shown in tables 9 and 10.

Hence, the study supports the findings of the existing research stud-

TABLE 10 Summary of Results of Regression and Chow Test for Selected Financial Predictor Factors on Operating Performance (ROE) of Acquiring Manufacturing Firms in India for Pre-Merger (2001–2006) and Post-Merger (2007–2012) Periods

Factors	Pre-merger	Post-merger
Gross earnings	**	**
Liquidity	*	**
Financial risk (financial leverage)	*	**
Cost of utilization	NS	**
Turnover	NS	NS
Growth	**	**
Operating leverage	*	**
F-value (regression)	**	**
Chow test	**	**

NOTES ** Significant at 1% level. * Significant at 5% level. NS – not significant. Computed from the regression analysis.

ies (Long and Young 2007; Vanitha and Selvam 2007; Azhagaiah and Sathishkumar 2011; Azhagaiah and Sathishkumar 2012b) that the M&A process has significant (shift) effect on OP of the acquiring manufacturing firms in India after M&A.

Based on the inference, the following suggestions are put forth, which may help policy prescriptions to improve the OP of acquiring manufacturing firms in the post-merger period.

The factor L has a significant negative beta coefficient with ROE, implying that the acquiring manufacturing firms have the capacity to pay their debts as and when they are due after M&A; however the negative L position will enable decrease the profit as well as the shareholders' wealth, hence the acquiring manufacturing firms should concentrate significantly more on to reduce their debt funds to increase the efficiency of the owners' fund say the equity holders.

The factor T did not show any significant impact on ROE. As T is concerned, it is an established fact that sales has a direct relationship with the performance of the firms i. e. higher sales means more production, which is undoubtedly the result of the best possible utilization of physical sources, i. e., material, machine, and active participation of human resource. Therefore, the acquiring manufacturing firms should use their physical sources to the maximum extent as well.

The study is mainly based on secondary data and is restricted to the acquiring manufacturing firms in India comprising food & beverage, machinery, non-metallic mineral product, chemical, textiles, metals & metal product, transport equipment, and miscellaneous categories. The firms, which originally went in for the M&As process during 2006–2007, and subsequently entered in to M&As process with some other firms are ignored in the study for the simple reason that it requires a further attempt to explore the impact of M&As on OP of firms in a series of M&As process over a series of period.

The study consists of OP of the acquiring manufacturing firms in India, leaving scope for further studies with the similar objectives with reference to other sectors like banking and financial and non-financial firms too. The present study has used ROE only as a measure to study the OP of acquiring manufacturing firms in India. Hence, further studies may be conducted using the responding variable, return on assets (ROA), return on sales (ROS), return on profit (ROP) etc. to measure the OP of acquiring firms in the post-merger period.

The present study has studied the impact of M&As on OP of acquiring manufacturing firms in India in the post-merger period. Hence, further studies may be conducted to analyse the impact of M&As on shareholders' wealth (SW) in the post-merger period of acquiring manufacturing firms in India.

The topic consists of OP of the acquiring manufacturing firms in India therefore, there is further scope to do similar research studies, but of course with other variables like *modes of payment, types of mergers, friendly or hostile*, etc. Further studies may also be conducted using data of other countries or to be more representative, cross country merger deals/worldwide merger deals data may as well be considered. Additionally, weekly data, monthly data or quarterly data may also be used against the use of the annual data that has been applied in this paper, especially to explore the longer-term impact of M&As on the operating performance (ROE).

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The Dynamic Causal Relationship between Electricity Consumption and Economic Growth in Ghana: A Trivariate Causality Model

Bernard N. Iyke

University of South Africa, South Africa

niykeb@unisa.co.za

Nicholas M. Odhiambo

University of South Africa, South Africa

odhianm@unisa.ac.za

This paper examines the dynamic causal relationship between electricity consumption and economic growth in Ghana within a trivariate ARDL framework, for the period 1971–2012. The paper obviates the variable omission bias, and the use of cross-sectional techniques that characterise most existing studies. The results show that there is a distinct causal flow from economic growth to electricity consumption: both in the short run and in the long run. This finding supports the growth-led electricity consumption hypothesis, as documented in the literature. The paper urges policy-makers in Ghana to resort to alternative sources of electric power generation, in order to reduce any future pressures on the current sources of electricity production. Appropriate monetary policies must also be put in place, in order to accommodate potential inflation hikes stemming from excessive demands for electricity in the near future.

Key Words: electricity consumption, economic growth, inflation, co-integration, causality, Ghana

JEL Classification: Q43, C32

Introduction

In recent times, the economic literature has been inundated with the pertinent issue of whether economic growth *Granger-causes* electricity consumption,¹ or whether electricity consumption *Granger-causes* economic growth. Climatic changes, energy crises, hikes in crude oil prices, and excessive carbon emission levels have further added fuel to this debate. Global conferences and academic think tanks are now preoccupied with sustainable energy and similar related issues. The ability to establish the exact causal pattern between electricity consumption and economic growth is of colossal relevance to policy direction, especially for countries that rely heavily on electricity as their sole source of energy.

If the evidence suggests that electricity *Granger-causes* economic growth, then this means that economic policies, which are aimed towards conserving electricity, could be detrimental to economic growth, which inherently enhances poverty, and reduces both job creation and societal welfare (see Ghosh 2002). Furthermore, if economic growth *Granger-causes* electricity consumption, then there might be little to worry about when implementing electricity-conservation policies (see for instance, Asafu-Adjaye 2000; Narayan and Smyth 2005).

The pioneering work of Kraft and Kraft (1978) triggered the interest in the energy consumption-growth debate. Since then, the debate has been extended to specifics, such as the electricity-growth nexus, clean energy-growth, and other related issues. Until this point in time, the energy consumption and economic growth debate had produced conflicting and interesting outcomes. Previous research on this debate was widely conducted for countries in Latin America, the Caribbean and Asia. However, few concentrated on the countries in sub-Saharan Africa (see Odhiambo 2009a) and Ghana's case has been even less researched.

To the best of our knowledge, to date, Lee (2005), Wolde-Rufael (2006), and Akinlo (2008b) are the only available literature on the energy consumption and economic growth debate in Ghana. Furthermore, most of these studies suffer from two main limitations: (a) Omission-of-variable bias, when testing for causality within a bivariate VAR (see Murray and Nan 1994; and Yoo 2005); and (b) over-reliance on cross-sectional data to explain country-specific issues (see Murray and Nan 1994; and Wolde-Rufael 2006). This study, therefore, attempts to overcome these limitations by employing a trivariate ARDL model to examine the causal relationship between electricity consumption and economic growth. Specifically, the study incorporates inflation as an intervening variable that influences both electricity consumption and economic growth. It has been argued that if such a variable is included in the causality framework, the direction of causality could not only change, but the magnitude might also increase (see Caporale and Pittis 1997; Odhiambo 2009a; and Njindan 2013).

The remaining sections of this paper are organised as follows: Section 2 provides an overview of the trends in electricity consumption, economic growth, and inflation in Ghana; Section 3 discusses the relevant literature on the electricity-growth debate; Section 4 presents the methodological issues, the empirical estimations and the analysis; while Section 5 provides the conclusions.



FIGURE 1 The Trends in Economic Growth (GDP), Energy Consumption (EC) and Inflation (INF) (2000–2010; constructed from the World Bank 2014)

Overview of Trends in Electricity Consumption and Economic Growth in Ghana

The economy of Ghana is highly dependent on electricity, particularly hydro-electricity. As the economy continues to undergo transformation, so has the need for electricity increased. As many as 62 per cent of the urban population have access to electricity, compared with 4 per cent of the rural population (Saghir 2002). The electrification rate, as estimated by IEA (2002), is 45 per cent. Between 1971 and 2010, electricity consumption per capita, per capita real GDP, and inflation rate averaged 277.88kWh, US\$ 300.96 and 32.91 per cent, respectively. Figure 1 shows the trends in electricity consumption per capita, per capita real GDP growth, as well as the inflation rate.

From figure 1, real GDP per capita growth increased from 3.3 per cent in 2000 to 5.3 per cent in 2001; electricity consumption per capita, on the other hand, declined from 5.8 per cent to 3.96 per cent over this period. The increase in real GDP per capita growth was associated with a decline in inflation from 37.3 per cent in 2000 to 18.03 per cent in 2001. The graphs appear to indicate that increment in real GDP per capita growth was often associated with declining electricity consumption per capita and vice versa. For example, when real GDP per capita growth increased from 3.9 per cent in 2002 to 4.9 per cent in 2003, electricity consumption per capita declined from 4.5 per cent to -4.2 per cent. Also, when real GDP per capita growth declined from 4.6 per cent in 2006 to 4.2 per cent in 2007, electricity consumption per capita increased from 3.7 per cent to 7.1 per cent. There appear to be no recognisable relationships between

inflation and electricity consumption per capita; and, also, inflation and real GDP per capita growth.

The capacity of the Akosombo Dam and the Aboadze Thermal Plant to meet the electricity needs of the Ghanaian populace has been called into question on several occasions. Despite her inability to meet the electricity consumption needs of the people, Ghana has been a net exporter of electricity to Burkina Faso and Togo for more than two decades; and understandably, questions have been asked on whether this is a laudable idea. Political discourses in Ghana have been inundated with promises of constant electricity supply, but to date, no government has been able to fulfil this promise. The Bui Dam, which has been under construction for some time now, demonstrates a renewed commitment on the part of the government to respond to the public clamour. Currently, power rationing is the only viable tool being used to accomplish load shedding in Ghana, in order to avoid a blackout.

Literature Review

The debate regarding the direction of the causal pattern between energy consumption and economic growth has not yet produced a unanimous conclusion. In the resource and energy economics literature, four main strands are now obvious. The first strand comprises those with the view that energy consumption *causes* economic growth (the energy-led growth thesis); the second strand is made up of those with the conviction that economic growth *causes* energy consumption (the growth-driven energy consumption thesis). The third strand comprises those who believe that energy consumption and economic growth *cause* each other (the feedback thesis); while the fourth strand is made up of those who are of the opinion that energy and economic growth are independent of each other (the neutrality thesis).

Several empirical studies have since corroborated the energy-led economic growth thesis. Among these include: Masih and Masih (1997) for India; Asafu-Adjaye (2000) for India and Indonesia; Wolde-Rufael (2004) for Shanghai; Fatai, Oxley, and Schrimgeour (2004) for Indonesia and India; Lee (2005) for 18 developing countries; Wolde-Rufael (2006) for Benin, Congo DR and Tunisia; Mahadevan and Asafu-Adjaye (2007) for eight net energy importing and exporting countries; Ho and Siu (2007) for Hong Kong; Narayan and Singh (2007) for Fiji Islands; Narayan and Prasad (2008) for nine OECD countries; Akinlo (2008a) for Nigeria; Odhiambo (2009a) for Tanzania; Belloumi (2009) for Tunisia;

Tsani (2010) for Greece; Pao and Tsai (2010) for BRIC countries; Odhiambo (2010) for South Africa and Kenya; Apergis and Payne (2010) for nine South American countries; Al-mulali and Sab (2012) for thirty Sub-Saharan African countries; Ouedraogo (2013) for 15 ECOWAS countries; Shahbhaz, Khan, and Tahir (2013) for China; Muhammad et al. (2013) for Pakistan; Dergiades, Martinopoulos, and Tsoulfidis (2013) for Greece; Aslan, Apergis, and Yildirim (2014) for USA; Odhiambo (2014) for Brazil and Uruguay; and Solarin and Shahbhaz (2013) for Angola. The summary of these selected studies is presented in table 1.

In addition, the growth-driven energy consumption thesis has been confirmed by studies, such as those of Kraft and Kraft (1978) for the USA; Yu and Choi (1985) for the Philippines; Masih and Masih (1997) for India, Indonesia, Pakistan, Malaysia, Singapore and the Philippines; Narayan and Smyth (2005) for Australia; Al-Iriani (2006) for the Gulf Co-operation countries; Wolde-Rufael (2006) for the case of Cameroon, Ghana, Nigeria, Senegal, Zambia and Zimbabwe; Akinlo (2008b) for Sudan and Zimbabwe; Zhang and Cheng (2009) for China; and Odhiambo (2010) for Congo DR. Recent studies have also found evidence in favour of the growth-driven energy consumption thesis. Some of these studies include Ouedraogo (2013) for 15 ECOWAS countries; Stern and Enflo (2013) for Sweden; and Odhiambo (2014) for Ghana and Cote d'Ivoire. Table 2 provides the summary of selected studies in favour of growth-driven energy consumption thesis.

However, there is a group of studies that has confirmed the feedback thesis, in which both energy and economic growth *Granger-cause* each other. These studies include those of Masih and Masih (1997) for Pakistan; Glasure and Lee (1997) for South Korea and Singapore; Asafu-Adjaye (2000) for Thailand and the Philippines; Soytas and Sari (2003) for Argentina; Fatai, Oxley, and Schrimgeour (2004) for Thailand and the Philippines; Oh and Lee (2004) for South Korea; Jumbe (2004) for Malawi; Ghali and El-Sakka (2004) for Canada; Wolde-Rufael (2006) for Gabon, Ghana, Togo and Zimbabwe; Mahadevan and Asafu-Adjaye (2007) for Australia, Japan, Norway, Sweden, UK and USA; Akinlo (2008b) for Ghana, Gambia and Senegal; Wolde-Rufael (2009) for Gabon, Ghana, Togo and Zimbabwe; Belloumi (2009) for Tunisia; and Pao and Tsai (2010) for BRIC countries. Other recent studies which found evidence of feedback causality between energy consumption and economic growth include: Zhang (2011) for Russia; Wesseh and Zoumara (2012) for Liberia; Fuinhas and Marques (2012) for PIGS countries and Turkey;

TABLE 1 Selected Studies on the Energy-Led Growth Thesis

Author(s)	Countries	Methodology	Conclusion(s)
Odhiambo (2014)	Ghana, Cote d'Ivoire, Brazil, and Uruguay (1972–2006)	ARDL-Bounds Testing Procedure	$EC \rightarrow Y$; Brazil, and Uruguay
Aslan et al. (2014)	USA (1973q1–2012q1)	Wavelet Analysis; Granger Causality	$EC \rightarrow Y$
Solarin and Shahbhaz (2013)	Angola (1971–2009)	ARDL-Bounds Testing; VECM Causality Test	$ELC \rightarrow Y$
Shahbhaz et al. (2013)	China (1971–2011)	ARDL-Bounds Test; Granger Causality	$EC \rightarrow Y$
Ouedraogo (2013)	15 ECOWAS Countries (1980–2008)	Panel Cointegration; Causality Tests	$EC \rightarrow Y$ (Long run) $ELC \rightarrow Y$ (Long run)
Muhammad et al. (2013)	Pakistan (1972–2002)	ARDL; Johansen Cointegration; Granger Causality	$EC \rightarrow Y$
Dergiades et al. (2013)	Greece (1960–2008)	Parametric and Non-Parametric Causality Tests	$EC \rightarrow Y$
Al-mulali and Sab (2012)	30 Sub-Saharan African Countries (1980–2008)	Panel Cointegration; Causality Tests	$EC \rightarrow Y$
Apergis and Payne (2010)	9 South America Countries (1980–2005)	Panel Cointegration; Causality Tests	$EC \rightarrow Y$
Odhiambo (2010)	Congo DR, Kenya, and South Africa (1972–2006)	ARDL-Bounds Testing Procedure	$EC \rightarrow Y$; South Africa, and Kenya
Pao and Tsai (2010)	Brazil, Russia, India, and China (1965–2009)	Granger Causality	$EC \rightarrow Y$
Tsani (2010)	Greece (1960–2006)	Toda-Yamamoto Causality Test	$EC \rightarrow Y$ (Aggregated level)
Belloumi (2009)	Tunisia (1971–2004)	VECM	$EC \rightarrow Y$ (Short run)
Odhiambo (2009a)	Tanzania (1971–2006)	ARDL-Bounds Testing Procedure	$EC \rightarrow Y$
Wolde-Rufael (2009)	17 African Countries (1971–2004)	Granger Causality	$EC \rightarrow Y$; Algeria, Benin, and South Africa
Akinlo (2008a)	Nigeria (1980–2006)	VECM; Co-Feature Analysis	$ELC \rightarrow Y$
Narayan and Prasad (2008)	30 OECD Countries (varying samples)	Bootstrapped Causality Tests	$ELC \rightarrow Y$; Australia, Iceland, Italy, Slovakia, Czech Republic, Korea, Portugal, UK
Narayan and Singh (2007)	Fiji Islands (1971–2002)	ARDL-Bounds Testing Procedure	$ELC \rightarrow Y$ (Long run)
Mahadevan and Asafu-Adjaye (2007)	20 Net Energy Importing and Exporting Countries (1971–2002)	Panel Error-Correction Model	$EC \rightarrow Y$; Argentina, Indonesia, Kuwait, Malaysia, Nigeria, Saudia Arabia, and Venezuela
Ho and Siu (2007)	Hong Kong (1966–2002)	VECM	$ELC \rightarrow Y$
Wolde-Rufael (2006)	17 African Countries (1971–2001)	ARDL-Bounds Testing Procedure	$EC \rightarrow Y$; Benin, Congo DR, Tunisia
Fatai et al. (2004)	Indonesia, India, Thailand, the Philippines (1960–1999)	Bivariate Toda-Yamamoto	$EC \rightarrow Y$; Indonesia, and India

Continued on the next page

TABLE 1 Continued from the previous page

Author(s)	Countries	Methodology	Conclusion(s)
Lee (2005)	18 Developing Countries (1975–2001)	Panel Cointegration	$EC \rightarrow Y$
Wolde-Rufael (2004)	Shanghai (1952–1999)	Bivariate Toda-Yamamoto	$ELC \rightarrow Y$
Asafu-Adjaye (2000)	India, Indonesia, the Philippines, and Thailand (varying sample periods)	VECM	$EC \rightarrow Y$; India and Indonesia
Masih and Masih (1997)	India, Indonesia, Pakistan, Malaysia, Singapore, and the Philippines (varying sample periods)	VECM	$ELC \rightarrow Y$; India

TABLE 2 Selected Studies on the Growth-driven Energy Consumption Thesis

Author(s)	Countries	Methodology	Conclusion(s)
Odhiambo (2014)	Ghana, Cote d'Ivoire, Brazil, and Uruguay (1972–2006)	ARDL-Bounds Testing Procedure	$Y \rightarrow EC$; Ghana, and Cote d'Ivoire
Stern and Enflo (2013)	Sweden (1850–2000)	Granger Causality	$Y \rightarrow EC$
Ouedraogo (2013)	15 ECOWAS Countries (1980–2008)	Panel Cointegration; Causality Tests	$Y \rightarrow EC$ (Short run)
Odhiambo (2010)	Congo DR, Kenya, and South Africa (1972–2006)	ARDL-Bounds Testing Procedure	$Y \rightarrow EC$; Congo DR
Wolde-Rufael (2009)	17 African Countries (1971–2004)	Multivariate Causality Tests	$Y \rightarrow EC$; Egypt, Cote d'Ivoire, Morocco, Nigeria, Senegal, Sudan, Tunisia, and Zambia
Zhang and Cheng (2009)	China (1960–2007)	Toda-Yamamoto Test; Generalised Impulse Response	$Y \rightarrow EC$
Akinlo (2008b)	11 Sub-Saharan African Countries	ARDL-Bounds Testing Procedure	$Y \rightarrow EC$; Sudan and Zimbabwe
Wolde-Rufael (2006)	17 African Countries	ARDL-Bounds Testing Procedure	$Y \rightarrow ELC$; Cameroon, Ghana, Nigeria, Senegal, Zambia, and Zimbabwe
Al-Iriani (2006)	Gulf Co-Operation Countries (1971–2002)	Panel Cointegration and Panel Causality Test	$Y \rightarrow EC$
Narayan and Smyth (2005)	Australia (1966–1999)	ARDL-Bounds Testing; VEC Zivot-Andrews Structural Break Test	$Y \rightarrow EC$
Masih and Masih (1997)	India, Indonesia, Pakistan, Malaysia, Singapore, and the Philippines (varying sample periods)	VECM	$Y \rightarrow ELC$
Yu and Choi (1985)	South Korea, the Philippines (1954–1976)	Standard Granger Test	$Y \rightarrow EC$; South Korea
Kraft and Kraft (1978)	USA (1947–1974)	Granger Causality	$Y \rightarrow EC$

Fowowe (2012) for fourteen Sub-Saharan African countries; Stern and Enflo (2013) for Sweden; Amusa and Leshoro (2013) for Botswana; and Solarin and Shahbaz (2013) for Angola. Table 3 provides the summary

TABLE 3 Selected Studies on the Feedback Causality between Growth and Energy Consumption Thesis

Author(s)	Countries	Methodology	Conclusion(s)
Solarin and Shahbaz (2013)	Angola (1971–2009)	ARDL-Bounds Testing; VECM Causality Test	$ELC \leftrightarrow Y$
Amusa and Leshoro (2013)	Botswana (1981–2010)	ARDL-Bounds Testing Procedure	$ELC \leftrightarrow Y$
Stern and Enflo (2013)	Sweden(1850–2000)	Granger Causality; Cointegration Tests	$EC \leftrightarrow Y$
Dagher and Yacoubian (2012)	Lebanon (1980–2009)	Hsiao, Toda-Yamamoto, and ECM-based Causality Tests	$EC \leftrightarrow Y$
Fowowe (2012)	14 Sub-Saharan African (1971–2004)	Panel Cointegration Tests	$EC \leftrightarrow Y$
Fuinhas and Marques (2012)	Portugal, Italy, Greece, Spain, and Turkey (1965–2009)	ARDL-Bounds Testing Procedure	$EC \leftrightarrow Y$
Wesseh and Zoumara (2012)	Liberia (1980–2008)	Bootstrapped Causality Test	$EC \leftrightarrow Y$
Zhang (2011)	Russia (1970–2008)	Toda-Yamamoto	$EC \leftrightarrow Y$
Pao and Tsai (2010)	Brazil, Russia, India, and China (1965–2009)	Granger Causality	$EC \leftrightarrow Y$ (Long run)
Tsani (2010)	Greece (1960–2006)	Toda-Yamamoto Causality Test	$EC \leftrightarrow Y$ (Disaggregated level)
Belloumi (2009)	Tunisia (1971–2004)	VECM	$EC \leftrightarrow Y$ (Long run)
Odhiambo (2009b)	South Africa (1971 to 2006)	Trivariate Granger Causality Test	$ELC \leftrightarrow Y$
Wolde-Rufael (2009)	17 African Countries (1971–2004)	Multivariate Granger Causality	$EC \leftrightarrow Y$; Gabon, Ghana, Togo, and Zimbabwe
Akinlo (2008b)	11 Sub-Saharan African Countries	ARDL-Bounds Testing Procedure	$EC \leftrightarrow Y$; Gambia, Ghana, and Senegal
Mahadevan and Asafu-Adjaye (2007)	20 Net Energy Importing and Exporting Countries (1971–2002)	Panel Error-Correction Model	$EC \leftrightarrow Y$; Australia, Japan, Norway, Sweden, UK, and USA
Wolde-Rufael (2006)	17 African Countries (1971–2001)	ARDL-Bounds Testing Procedure	$EC \leftrightarrow Y$; Egypt, Gabon; Morocco
Oh and Lee (2004)	South Korea (1981q1–2000q4)	VECM	$EC \leftrightarrow Y$
Ghali and El-Sakka (2004)	Canada (1961–1997)	VECM	$EC \leftrightarrow Y$
Jumbe (2004)	Malawi (1970–1999)	Granger Causality	$ELC \leftrightarrow Y$
Fatai et al. (2004)	Indonesia, India, Thailand, and the Philippines (1960–1999)	Bivariate Toda-Yamamoto	$EC \leftrightarrow Y$; Thailand, and the Philippines
Soytas and Sari (2003)	Argentina (1950–1990)	VECM	$EC \leftrightarrow Y$

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of selected studies in favour of feedback thesis. Quite interestingly, there are other studies which do not see any *causal* link between energy consumption and economic growth. Such studies include those of Murray and Nan (1994) for France, Germany, India, Israel, Luxembourg, Nor-

TABLE 3 Continued from the previous page

Author(s)	Countries	Methodology	Conclusion(s)
Asafu-Adjaye (2000)	India, Indonesia, the Philippines, and Thailand (varying sample periods)	VECM	$EC \leftrightarrow Y$; the Philippines, and Thailand
Yang (2000)	Taiwan (1954–1997)	VAR; Engle-Granger	$EC \leftrightarrow Y$
Glasure and Lee (1997)	South Korea, and Singapore (1961–1990)	Bivariate VECM	$EC \leftrightarrow Y$
Masih and Masih (1997)	India, Indonesia, Pakistan, Malaysia, Singapore, and the Philippines (varying sample periods)	MVECM	$EC \leftrightarrow Y$; Pakistan

TABLE 4 Selected Studies on the Neutrality Thesis

Author(s)	Countries	Methodology	Conclusion(s)
Ozturk and Acaravci (2011)	11 Middle East and North Africa (MENA) Countries (1971–2006)	ARDL-Bounds Testing Procedure	$ELC \sim Y$
Acaravci and Ozturk (2010)	Turkey (1968–2005)	ARDL-Bounds Testing Procedure	$EC \sim Y$
Wolde-Rufael (2009)	17 African Countries (1971–2004)	Multivariate Granger Causality	$EC \sim Y$; Cameroon, and Kenya
Narayan and Prasad (2008)	30 OECD Countries	Bootstrapped Causality Tests	$ELC \sim Y$; Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Slovakia, Spain, Sweden, Switzerland, Turkey, and USA
Akinlo (2008b)	11 Sub-Saharan African Countries	ARDL-Bounds Testing Procedure	$EC \sim Y$; Cameroon, Cote d'Ivoire, Nigeria, Kenya, and Togo
Wolde-Rufael (2006)	17 African Countries (1971–2001)	ARDL-Bounds Testing Procedure	$EC \sim Y$; Algeria, Congo, Kenya, South Africa, Sudan
Soytas and Sari (2003)			$EC \sim Y$; Canada, Indonesia, Poland, USA and UK
Masih and Masih (1997)	India, Indonesia, Pakistan, Malaysia, Singapore, and the Philippines (varying sample periods)	VECM	$ELC \sim Y$; Malaysia, Singapore, and the Philippines
Murray and Nan (1994)	Germany, Israel, Portugal, USA, UK, Zambia, France, and Norway (1970–1990)	Granger Causality; VAR	$ELC \sim Y$

NOTES → denotes unidirectional causality, ↔ denotes bidirectional causality, ~ denotes no causality; EC, ELC, and Y represent energy consumption, electricity consumption, and income (GDP), respectively.

way, Portugal, UK, USA and Zambia; Soytaş and Sari (2003) for Canada, Indonesia, Poland, USA and UK; Narayan and Prasad (2008) for twenty-four developed countries; Akinlo (2008b) for Cameroon, Cote d'Ivoire, Kenya, Nigeria and Togo; Wolde-Rufael (2009) for Cameroon and Kenya;

Ozturk and Acaravci (2010) for Turkey; and Ozturk and Acaravci (2011) for eleven MENA countries. Table 4 provides the summary of selected studies in favour of neutrality thesis.

Methodology

ARDL BOUNDS-TESTING PROCEDURE FOR CO-INTEGRATION

The approach adopted in this study for testing the existence of co-integrating relationships between electricity consumption, inflation and economic growth is the ARDL bounds-testing procedure proposed by Pesaran and Shin (1999), which was subsequently generalised by Pesaran, Shin, and Smith (2001). Following recent studies (see Odhiambo 2014), we formulated our empirical ARDL model as:

$$\Delta \ln Y_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln INF_{t-i} + \alpha_4 \Delta \ln Y_{t-1} + \alpha_5 \Delta \ln EC_{t-1} + \alpha_6 \Delta \ln INF_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta \ln INF_t = \rho_0 + \sum_{i=1}^n \rho_{1i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \rho_{2i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \rho_{3i} \Delta \ln Y_{t-i} + \rho_4 \Delta \ln Y_{t-1} + \rho_5 \Delta \ln EC_{t-1} + \rho_6 \Delta \ln INF_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta \ln EC_t = \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta \ln INF_{t-i} + \beta_4 \Delta \ln Y_{t-1} + \beta_5 \Delta \ln EC_{t-1} + \beta_6 \Delta \ln INF_{t-1} + \varepsilon_t \quad (3)$$

Where $\ln Y_t$, $\ln EC_t$, and $\ln INF_t$ are the logarithms of real GDP per capita, electricity power consumption per capita, and annual rate of inflation, respectively; α , β , and ρ are the parameters of the model; Δ is the first difference operator; t is the time period; and ε_t is the error term assumed to be identically and independently distributed (*iid*).

The paper favours the ARDL bounds-testing procedure for co-integration, because it has better finite sample properties, and thus outperforms the Engle Two-Step and the Johansen procedures in small samples (see Pesaran, Shin, and Smith 2001; Narayan and Smyth 2005; Odhiambo 2009a); its estimates are robust even in the presence of endogeneity, whereas the Engle Two-Step and the Johansen procedures are biased under such circumstance; also, the ARDL bounds-testing procedure could

be performed, irrespective of whether the variables are $I(0)$, $I(1)$ or mixed, unlike the other tests (see Pesaran and Shin 1999).

The ARDL bounds-testing procedure for co-integrating relationships follows a non-standard asymptotic F -distribution under the null hypothesis, which maintains that there exists a minimum of one co-integrating vector. Two sets of critical values were constructed by Pesaran, Shin, and Smith (2001) under this null hypothesis. The first set of critical values is constructed under the assumption that variables in the ARDL model are integrated of order zero, $I(0)$.

The second set of critical values is constructed under the assumption that variables in the model are integrated of order one, $I(1)$. We do not reject the null hypothesis of no co-integrating relationship when the F -statistic falls below the lower bound. Similarly, we reject the null hypothesis of no co-integration when the calculated F -statistic is greater than the upper bound. However, the test is inconclusive when the F -statistic falls between the lower and upper bounds.

SPECIFICATION FOR THE GRANGER CAUSALITY TEST

In order to examine the short- and long-run causal linkages between electricity consumption, inflation, and economic growth, the study specifies, in line with previous works (see Narayan and Smyth 2005; Odhiambo 2014), the model:

$$\Delta \ln Y_t = \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \gamma_{3i} \Delta \ln INF_{t-i} + \gamma_4 ECM_{t-1} + \mu_t \tag{4}$$

$$\Delta \ln INF_t = \theta_0 + \sum_{i=1}^n \theta_{1i} \Delta \ln INF_{t-i} + \sum_{i=0}^n \theta_{2i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \theta_{3i} \Delta \ln Y_{t-i} + \theta_4 ECM_{t-1} + \mu_t \tag{5}$$

$$\Delta \ln EC_t = \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta \ln EC_{t-i} + \sum_{i=0}^n \delta_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \delta_{3i} \Delta \ln INF_{t-i} + \delta_4 ECM_{t-1} + \mu_t \tag{6}$$

Where all variables retain the definition provided in the earlier specification. ECM_{t-1} is the error-correction term of the immediate period before t ; this term was formulated from the long-run equilibrium equa-

tion; γ , θ , and δ are the parameters of the model; and μ_t is the *iid* error term for the model.

Evidence suggests that once there exists a long-run relation between the variables, in this case electricity consumption, inflation, and economic growth, then there is a case for causality in one or more directions (see Narayan and Smyth 2005). Nonetheless, we could only establish the direction of the long-run causality between the variables by conducting a test of statistical significance (a *t*-test) on the lagged error-correction term in each equation. The direction of the short-run causal relationships between the variables could also be established by conducting a joint test of statistical significance (an *F*-test) of the explanatory variables in each of the equations (see Oh and Lee 2004; Narayan and Smyth 2005; and Odhiambo, 2009c).

The paper employs the annual time series covering the period 1971–2012. The data were limited, because the records on energy consumption in Ghana were not available before 1971. The data on economic growth, energy consumption, and inflation rate were extracted from the World Development Indicators (World Bank 2014), compiled by the World Bank. Real GDP per capita (constant 2000 US\$) was used to proxy the economic growth; electricity power consumption per capita (kWh per capita) was used to proxy the electricity consumption; and consumer prices (annual percentage change) was used to proxy the inflation.

ANALYSIS OF VARIABLES AND ESTIMATIONS

Stationarity Test

The first step towards investigating the causal relationship between electricity consumption and economic growth in the ARDL framework is to test for the stationary² properties of electricity consumption, inflation, and real GDP per capita. Standard inferences can only be made when the variables in the model are not integrated (or are stationary). Besides, the ARDL bounds-testing procedure only works when the variables are integrated of order zero or one (see Pesaran, Shin, and Smith 2001). Unit-root tests were designed to investigate the stationary properties of the time-series observations.

This study used the Phillips-Perron (PP) test, and the Dickey-Fuller Generalised Least Squares (DF-GLS) test to examine the unit root properties of the variables. These two tests were chosen, because they are able to control for serial correlation when testing for unit roots. The test for unit roots of the variables in levels, not provided here, indicated that the

TABLE 5 Test for Unit Roots in First Difference

Variable	Phillips-Perron		DF-GLS	
$\Delta \ln Y$	-4.063***	-5.402***	-2.888*	-4.753***
$\Delta \ln INF$	-9.125***	-9.353***	-4.384***	-4.539***
$\Delta \ln EC$	-4.905***	-4.837***	-4.565***	-4.518***

NOTES Truncation lag for DF-GLS is based on the Schwert criterion; truncation lag for Phillips-Perron is based on the Newey-West bandwidth; * and *** denote significance at 10% and 1% levels, respectively.

null hypothesis of unit roots could not be rejected. However, the variables were found to be stationary at first difference (see table 5)

Results of ARDL Bounds Test for Co-Integration

Since the variables were found to be $I(1)$ processes, it was likely that they would move together in the long run when they drift apart in the short run. We employed the ARDL bounds-testing procedure to examine the potential long-run relationships between these variables. To do this, we used the Schwarz-Bayesian Criterion (SBC) to establish the optimal lags of our ARDL specifications above. From the SBC, the optimal lags deemed appropriate (not reported here) were found to be 2, 1, and 2 for equations (1), (2), and (3), respectively. Pesaran et al. (2001) emphasized that an F -test on all of the equations (1) to (3) would suffice to examine whether or not there were co-integrating relationships between the variables. Using the optimal lags, we performed an F -test on equations (1) to (3), and reported the results in table 6.

The results show that the F -statistic, 2.71, calculated for equation (1) was less than the lower bound value at 1 per cent, 5 per cent, and 10 per cent levels of significance. To verify this, we estimated the long-run error-correction model. The results (not reported here) show that the error-correction term was positive and insignificant. So, for equation (1), the conclusion was that $\ln Y$ was not a co-integrating vector. Thus, the null hypothesis of no level effects or co-integration was accepted, in that case.

In equation (2), the inflation equation, the F -statistic was clearly greater than the upper bound value at the 10 per cent level of significance. This implies that the null hypothesis of no co-integration was rejected. Therefore, inflation, electricity consumption, and economic growth were said to be co-integrated; and the co-integrating vector was $\ln INF$. Finally, the F -statistic estimated for equation (3), the electricity consumption equation, was greater than the upper bound value 10 per cent level of signif-

TABLE 6 ARDL Bounds Test for Co-Integration

Dependent variable	Function			F-statistic		
lnY	lnY(lnINF, lnEC)			2.71		
lnINF	lnINF(lnY, lnEC)			4.18*		
lnEC	lnEC(lnY, lnINF)			4.59*		
Asymptotic critical values for unrestricted intercept and no trend reported from table CI (iii) of Pesaran et al. (2001, 300)	1%	1%	5%	5%	10%	10%
	$I(0)$	$I(0)$	$I(0)$	$I(0)$	$I(0)$	$I(0)$
	5.15	6.36	3.79	4.85	3.17	4.14

NOTES * Denotes significance at 10% level.

TABLE 7 Granger Causality between Electricity Consumption and Economic Growth

Variable	W-statistics (P-value)			Coefficient†
	lnY	lnINF	lnEC	ECM_{t-1}
lnY	—	1.142 [.565]	.0216 [.989]	—
lnINF	2.588 [.274]	—	9.261 [.001]	-.731 [-5.328]**
lnEC	5.168 [.024]	1.284 [.526]	—	-.247 [-1.846]*

NOTES † [*t*-statistics]; * and ** imply statistical significance at the 10% and 1% levels, respectively.

icance. There was, therefore, evidence against the null hypothesis of no co-integration. The co-integrating vector was, thus, lnEC.

Results of the Granger Causality Test

After establishing co-integrating relationships between economic growth, inflation, and electricity consumption, the next step was to test the direction of the causal relationships between these variables. This was done in two steps. In the first step, we test how the lagged differenced explanatory variables affect the dependent variable, in order to establish the short-run causality, using the Wald test (*F*-test). In the second step, we test for the significance of the lagged error-correction terms, ECM_{t-1} , in order to establish the long-run causality between the explanatory variables and the dependent variable, using the *t*-test. Our results for the causality test are reported in table 7. The results show that there is a unidirectional short- and long-run causal flow from economic growth to electricity consumption in Ghana. The evidence of short-run causal flow from economic growth to electricity consumption could be seen from the *p*-value of 0.024 associated with the joint statistical test of significance of economic growth in equation (6) in table 7.

The long-run causal flow from economic growth to electricity consumption was supported by the negativity and significance of the error-correction term in the electricity consumption equation (equation 6). This results support the growth-led electricity consumption hypothesis found in the literature (see Kraft and Kraft 1978; Narayan and Smyth 2005; among others). Other results show that there was a distinct unidirectional short- and long-run causal flow from electricity consumption to inflation. This finding was supported by the p -value associated with the joint statistical test of significance of electricity consumption, and the coefficient of the error-correction term, which was negative and statistically significant.

Conclusion

The study examined the dynamic causal relationships between electricity consumption and economic growth in Ghana within a trivariate framework. The study was motivated by the fact that the literature on this important debate – the electricity-growth debate – is scant in Ghana. That is, those studies that were specifically done for Ghana are very few in number. Besides, these few available studies on Ghana have two limitations, which render their conclusions questionable: (a) Omission-of-variable bias, when testing for causality within a bivariate model; and (b) over-reliance on cross-sectional data to explain country-specific issues. We resolved these problems by testing for causality in a trivariate ARDL framework. We found electricity consumption, inflation, and economic growth to be co-integrated – with the co-integrating vectors being inflation and electricity consumption – using the ARDL bounds testing for co-integration. The causality test, based on the trivariate ARDL framework, revealed that there was a distinct causal flow from economic growth to electricity consumption in Ghana: both in the short run and in the long run. The results also show that there is a distinct unidirectional causal flow from electricity consumption to inflation in Ghana. This applies both in the short run and in the long run. These results, therefore, support the growth-led electricity consumption hypothesis found in the literature. We urge policy-makers to implement strategies that explore alternative sources of electric power generation in Ghana. This could prevent electric supply shortages – as Ghana could experience rapid economic growth in the future. We also recommend that appropriate monetary policies be put in place to accommodate any potential inflation hikes stemming from excessive demands for electricity in the near future.

Notes

- 1 The original debate was whether energy consumption causes economic growth or economic growth causes energy consumption. The over-reliance of certain economies on electricity—a component of energy—has compelled researchers to narrow the debate to specifics. This work follows suit, since Ghana is more electricity dependent; albeit, the use of oil cannot be discounted (see Lee 2005, for a broad debate).
- 2 A variable is said to be stationary or has no unit root when its moments do not depend on time (see Enders 2004).

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The EU Institutional Reform Model and the Preferences of the Small Member States

Viljar Veebel

Estonian National Defence College, Estonia

viljar.veebel@gmail.com

The success of the proposed institutional reform of the EU is of particular importance in the nearest future, as setbacks to reforms may ultimately result in the loss of credibility of the EU as a whole in the international arena. However, the decision whether the existing 'community model' should be renewed or the federal or the stakeholder model should be preferred is rather complicated, as the visions and interests of the member states of the EU widely differ. The article analyses which of these models will be most achievable and most beneficial from the perspective of the small member state of the EU. The research indicated that the renewal of the existing community model seems to be the most rational choice both in terms of measurable quantitative and qualitative aspects from the small EU member state's perspective. The renewal of the existing 'community model' is also most rational choice in terms of applicability.

Key Words: European Union, federalization, stakeholder model, institutional reform

JEL Classification: F50, F55

Introduction

The hope that the European integration leads without any shadow of a doubt to the economic welfare and political harmony has been cast away in recent years of the financial crisis and the institutional fights (Barroso 2012; Cameron 2013, 1). The list of the challenges for the European Union is long, reflecting not only the problems initiated by the euro zone financial crisis and fiscal imbalances, but also stemming from more fundamental institutional issues in the EU. The lack of transparency in terms of member states' fiscal obligations and the absence of uniformly applicable norms and convincing sanctions are just some examples indicating the need for reforms in the legal and institutional system of the EU.

However, the visions and interests of the member states of the EU in terms of the new institutional structure of the union, the legislative model and the division of competences widely differ. Whereas some EU member states (the United Kingdom, the Czech Republic and Denmark)

rather prefer the renewal of the existing ‘community model’ based on the functional approach, other member states support federalization (Belgium and France) or so-called ‘stakeholder model’ (Germany and Luxembourg). Therefore, even after 60 years of the discussions how the integration should continue, the member states of the EU are again facing the dilemma whether to continue with the existing ‘community model,’ to incline towards the federal state or to continue the reforms in manner already used to institutionalize the European Stability Mechanism (ESM). The topic is of particular importance for the small EU member states, which in general have fewer opportunities and less influence to protect their interests in the international arena.

This paper examines the three main scenarios of the EU institutional reform, asking the question which model is both most achievable and most beneficial for the small member states of the EU. The article is structured as follows. The main EU institutional reform scenarios will be analyzed in a comparative manner in terms of the theoretical expectations and empirical circumstances in Sections 2, 3 and 4. Hereby, the key variables determining the attractiveness of the reform scenario are the current level of national representation and the influence of the EU member states in the institutions, the level of sovereignty to be shared, and the gains returned in terms of security and welfare (see Antola and Lehtimäki 2001, 7). The Estonian case will be used both to illustrate the terms of debates and to indicate the main dilemmas and questions. Section 5 concludes.

The Pros and Cons of the Stakeholder Model as the EU Institutional Reform Scenario

The stakeholder theory that is already used for decades in the organization management (see, for example, Freemann 1984, 42–44; Mitchell, Agle and Wood 1997, 857) has also provided a good basis for analyzing the EU institution building in the academic literature (see Richardson 2006, Chapter 1; etc.). Hereby, the stakeholder model of governance, which involves the EU institutions, national governments and other actors, could be described as a business-driven vision of institution building.

The basic principles underlying the stakeholder model have already been incorporated into the institutional features of the EU, such as the European Stability Mechanism (ESM) and the European Financial Stability Facility (EFSF). Both symbols of the advanced economic and fiscal cooperation in Europe are based on the principles of rationality, economic

TABLE 1 The Representation of the Euro Area Member States in ESM/EFSF Compared to the Share of Country's Population in the Euro Area Total Population

Share of population is bigger than ESM/EFSF contribution key	Share of population is smaller than ESM/EFSF contribution key
Estonia	Belgium
Greece	Germany
Spain	Ireland
Cyprus	France
Latvia	Italy
Malta	Luxembourg
Portugal	The Netherlands
Slovenia	Austria
Slovakia	Finland

NOTES Author's comparison based on the EFSF Framework Agreement (2010) and on data provided by the EU (see <http://www.esm.europa.eu/about/governance/shareholders/index.htm> and <http://europa.eu/about-eu/countries/member-countries>).

reasoning, and profitability, as well as confidentiality, the protection of the interests of creditors, the dominance of majority over the minority in voting procedure in accordance with the distribution of votes, and the differences in the representation of the euro area member states' according to their shares purchased (ESM Treaty 2012). In the ESM and EFSF, each member state of the euro area is allowed to buy shares in accordance with its GDP, and the number of shares bought by the member states also directly determines the weight of country's votes in the future when appointing the governing bodies of the institutions, making the key decisions and re-allocating the funds. Comparing the ESM keys and EFSF contribution keys with the share of country's population in the euro area total population, the small member states of the euro area are rather underrepresented (see table 1; underrepresented Spain and overrepresented Luxembourg should be considered as the exceptions). No compensatory mechanisms have been suggested to make the representation of small euro area member states more visible (ESM Treaty 2012). The same corporate model that has been chosen to govern the ESM and the EFSF is also used in the International Monetary Fund.

The representation of the euro area member states' in ESM and EFSF also differs from their current representation in the European Commission, the European Court of Justice, the European Parliament and the

Council of Ministers. In the Estonian case, country's representation (as stated in the Lisbon Treaty) both in the European Commission and in the Court of Justice is 3.57%, in the European Parliament is 0.8% and in the Council of Ministers is 3.57% if the qualified majority voting is used and 1.23% if the consensus voting is used. According to the division of voting in the community model, calculated average of the Estonian representation in the EU is 2.58%, which is 13.9 times higher than the representation in ESM and 10.1 times higher than representation in the EFSF (author's calculations). It should also be noted that in order to gain the 0.186% voting share in the ESM and 0.255% voting share in the EFSF, Estonia took the responsibility of making the payment of 148 million Euros and as a shareholder to take obligations for up to 3 billion Euros (roughly 2500 Euros per capita), which is almost 50% of the Estonia's central government's budget revenues in the year 2013 (Bank of Estonia 2013).

The difference is even more visible when comparing the actual voting rules with the majority voting rules in the ESM and the EFSF. As stated in the founding treaties of the ESM and EFSF, from the beginning of 2014 Germany, France and Italy have altogether 65% of the votes among the eighteen member states, whereas the rest of the member states will only control 35% of the votes. The decisions will be taken, using the same distribution of votes. As a result, the qualified majority of votes that is needed for decision-making and levelling in 80% could be achieved with the votes of the five biggest euro area member states. At the same time, to pass a legislative act in the Council of the European Union that represents the consensus tradition in the EU, it takes at least 260 votes of 352 votes, which covers approximately 74% of the total number of votes, as well as half-plus-one of the member states (or at least 2/3 of member states if the legal proposal is not initiated by the European Commission) and 62% of the population behind the member states.

Thus, whereas the existing community model of the EU is based on the principles of consolidated democracy, solidarity, transparency, inclusion of all interest groups, and equal treatment of the EU member states, the stakeholder model that was used to build up the ESM and EFSF is rather characterized by the institutionalization logic and the values which are typical to a profit-focused business corporation. This is also the main reason why today the EU finds itself in a situation, where the ESM and the EFSF – the institutions established to find a solution to the financial crisis and to ensure financial stability in the future – neither share the values of the present European Union nor follow the idea of the federal

Europe which is currently a highly debated topic. At the same time, both institutions invoked to 'save' the EU of today and to start building a federation in the future have been legitimized by the mandate received from the Europe's citizens in the past referenda.

The need for such a decisive change in values and rules concerning the joint governance of the EU has been justified by the argument that the current European model which is based on solidarity and overrepresentation of small EU member states is nowadays unsustainable, as due to the qualified majority voting used in the EU decision making procedure it is possible for some indebted small EU member states to ask for additional funds and to block the counterbalancing proposals of 'responsible EU member states' to restructure the debts and to rebalance their national budgets with joint costs (see Lane 2010, 59–60). The corporate stakeholder model is therefore reflecting the opinions of the big member states like Germany, France and Italy, as it reflects the principle that 'the one who pays the bill can also order the music.' At the same time, it should be definitely questioned whether the 0.186% and 0.255% voting shares for the obligation with the possible value of 3 billion Euros is something what Estonia have expected as a form of sharing solidarity in the EU and being an equal partner with the big member states in the European affairs (Veebel and Markus 2013, 61).

Despite the underrepresentation of small euro area member states in the recent European initiatives, Estonia is rather supporting the stakeholder model, stressing that the state functions may be carried out more successfully by using the corporate model of governance within the EU. In addition, the advantages of the stakeholder model in stabilizing the fiscal and financial situation are stressed. In Estonia, the stakeholder model is mainly supported by the Minister of Financial Affairs, Mr. Jürgen Ligi, and the former Prime Minister of Estonia, Andrus Ansip, who has stressed that stakeholder model is both more efficient in terms of decision-making and also more ethical than existing 'community model' as it gives the right of the decision to those countries who actually pay for the policy implementation (Riigikogu 2011).

To sum up, based on the examples of the ESM and the EFSF the stakeholder model provides by far the lowest representation of small member states of the euro area/EU considering their GDP level (such as Estonia) and tends to over-represent large euro area countries with a larger population and a higher level of GDP (like Germany, Italy and France). Understandably, the biggest member states of the European Union tend to

give preference to the stakeholder model rather than the federal model or the renewed ‘community’ model.

The Federal Model as the Potential Scenario of the EU Institutional Reform

Although ‘federalization’ as one possible solution to avoid the financial crises in the future has been particularly stressed during the recent European sovereign debt crisis (see Barroso 2012; Mugge 2011; Schmidt 2010), the debates on the federal Europe are much older. The concept of federalization in Europe was for the first time presented more than 60 years ago, when the European Communities were founded and re-debated 25 years ago, when the Maastricht Treaty was designed. At the Millennium the debates on the federal Europe intensified again during the sessions of the Convention on the Future of Europe, when the European Constitutional Treaty was prepared. However, all of these initiatives and debates have not stated the creation of a federal union as an objective and have ended without any ‘federal trace’ to the official legislation procedure. Instead of it the enhanced cooperation (the idea and slogan of ‘ever closer union’), supranationalism and deepening of the integration have been emphasized in the treaties. Thus, in legal terms the European citizens as the electorate have not given a mandate to the EU policy-makers at any referenda to create a federal union as well as the EU member states? accession treaties to the EU have not foreseen the possibility of the union evolving to a federation.

Against this background, the question should be addressed whether federalization is a native or applicable part of the European integration at all and why has it not been achieved yet (Kregel 2011). Theoreticians of the European integration, like Rosamond (2000), Porto (2004), Weiler (1991) and Hix (1999) have rather been skeptical towards feasibility of federalization based on the historical experience. In practice, the vision of the federal Europe is mostly supported by the political elite of the six founding members (Belgium, France, Germany, Italy, Luxembourg and the Netherlands) of the EU. Two of them, Germany and Belgium, stand out as countries having broad experience with the federal model of governance at the national level. Therefore, it is understandable that well-known top politicians who have openly advocated for a federation – Spinelli, Plevin and Spaak in the early years of the European integration, Fischer in 2000 and Verhofstadt, Cohn-Bendit and Van Rompuy as of now – come from the six founding members of the EU. As regards the top politicians of the

small EU member states, besides Herman Van Rompuy (from Belgium) also José Manuel Barroso from Portugal has openly supported the European federalization idea (see Barroso 2012, 1–3). Some of the member states (Germany, Austria and France) would in some aspects rather prefer more static type of the federation with more strict legal regulations that would grant a more straightforward legal relationship and more effective scrutiny (Raig 2013, 12). At the same time, the United Kingdom, Finland, Sweden, Denmark, Poland, the Czech Republic are rather skeptical as regards the federal model. Whereas the critical attitudes towards federalization were in most of these countries expressed passively, the politicians of the United Kingdom have been the source of active and vocal criticism, which reverberates in the speeches of David Cameron and Nigel Farage. In addition, Timo Soini from Finland and Vaclav Klaus from Czech Republic have expressed some critics towards federalization. All of this makes the smooth transition from the current constellation of the EU member states to the full-fledged federation inconceivable (Hurt and Veebel 2013).

The discussion on the potential EU institutional reform scenarios in the future involves even more questions on the additional value generated by the federal model of Europe in economic and political terms, on the conditions guaranteeing a successful implementation of the model in practice with the existing legal basis, on the effect of the federalization on the representativeness of small EU member states, etc. As suggested by Fischer (2000, 1–2) and Rosamond (2000), the aim of the European federal reform would be to gain more administrative and political control over the fiscal policies of the EU member states, to consolidate already implemented reforms in the financial sector and to reach the fundamentally new qualitative level in the European Union unification process. However, neither in theory not in real terms there is no evidence that federal reforms, Europeanization, and centrally coordinated supervision would increase the economic and fiscal efficiency of the EU, make it more competitive, bring more funds to the EU budget or increase its exports (see Kregel 2011, 7).

One potential risk is that a federal relationship tends to create a situation where problematic member states will not be able to rely on the joint resources and the solidarity principle anymore to solve their debt issues and the responsibility and the cost related to these problems will be transferred on the shoulders of other EU member states. According to the ideal model, a federal reform would lead to a clear, standardized, fixed,

legally binding and stable division of political and institutional power and competencies between the institutions of the EU and the member states, accompanied by coercive and supervisory measures. The stability will be achieved by the uniform approach to all EU Member States despite their differences in terms of economic development, geographic location, social traditions, etc. In real terms the unification means that the over-capitalized gigantic Germany, the miniature Luxembourg and deeply indebted mid-size Greece and Portugal will be treated in the same way. This might at least in short-term improve the financial health of the EU and its member states, but it will be achieved at the cost of slowing down the economic development in economically stronger EU member states. As a result, the EU as a whole will be less able to use its special economic and social differences and advantages (Alesina, Ardagna and Galasso 2008; Kregel 2011, 5).

This leads us also to the main weakness of the federal model of Europe, which is the lack of dynamics, flexibility and progress. On the one hand federalization would contribute to the integration by delegating competences to the joint institutions, on the other hand it would lock it as regards the dynamics of the integration process. Should the countries use the federal model and the financial crisis occurs, it would be impossible to redistribute the competences operatively anymore as it has been done in 2012. In other words, static federalism and dynamic integration mutually exclude each other: static federalism offers stability, peace and stagnation, whereas dynamic integration refers to the gradual development including periodic crises, uncertainty and instability. Both models cannot be followed simultaneously, while opting for the federalization, it also means choosing to stop further developments of integration. Theoretically it is rather questionable whether a stable but stagnant institutional solution guarantees the competitiveness of Europe in the global arena and enhances the common European values. Logically, this choice is rational only in a situation where the EU member states believe that the model of cooperation has exhausted itself to date and that in a current situation the focus should be on safeguarding the previous achievements (Hurt and Veebel 2013, 2–3). At the same time, particularly the top-politicians present federalization as a model which would preserve the strong points of the current neo-functionalist model of integration (mostly its ability to evolve and its flexibility), but it would be topped-up by clearer distribution of competences and scrutiny to prevent possible violations.

For small states, the federal model offers both possible threats and advantages. The advantages are related to the guaranteed level of representation, participation and inclusion in the institutions of the EU, which in some cases might overweight the actual size of the small member states. Federalism sets also some limits to the legal, administrative and cultural 'melting' of the smallest states, as their special competences and representation are to some extent safeguarded. The risks are related to the effects of centralization and unification, which might still reduce the ability of a small state to use some of the country-specific advantages. Additionally, federal legislation rather tends to reflect the needs of big member states in the core Europe than the peripheral problems of small states.

The idea of the federalization of Europe has many supporters also among the Estonian political elite (Ilves 2013, 1), because it is considered as an alternative to the model of the multi-speed Europe, in which the Baltic States would rather be classified as a periphery with all the security concerns and the problems related to the decline in the economic advantages. It has also been stipulated that small and peripheral states are able to defend their interests better in the federal union (Rumm 2013, 2). Federalization is also seen as the best alternative to counter-balance the financial dominance of the big EU member states in the European Stability Mechanism. Based on those arguments the EU policy of the Estonian government has supported the federal model of Europe (Government of Estonia 2011). However, one could rather assume that the birth of the European Federation is delayed in a longer perspective, as the founding treaties of the European integration could only be changed if the European Parliament and all the member states of the EU are consensually supporting it. The choice is whether to go on as a loosely bound confederative union or to create a federation consisting less member states, but having more common interests (Zielonka 2006, 35). Another relatively feasible alternative would be to start developing federalization within the framework of the current treaties, but in particular case the legitimacy of this process is rather questionable in the eyes of the citizens of Europe.

Should the Renewed 'Community Model' Be Considered as a Solution?

The evolutionary logic of the institutional development of the EU is based on the idea of continuous widening and deepening of its competencies to the new fields and new member states. This approach originates from the beginning of the European integration in the 1950s, when

common institutions, regulations, resources, values and objectives were considered as a motivation for more advanced cooperation, which will be beneficiary for all cooperating parties (Haas 1964; Mitrany 1975). Also nowadays, the joint activities and regulations have been a priori seen as something that creates additional value and needs no further justification, be it the common agricultural policy, the euro zone or the Schengen area (Porto 2004). Also in practice, the European integration is characterized by the increasing number of institutional bodies, more comprehensive regulatory framework of markets, constantly growing budget, increasing re-distribution, subsidies, etc. Hereby, the principles of subsidiary and proportionality should guarantee that the national interests of the member states are safeguarded, stipulating that the institutions of the EU must provide proof that the new legislation or initiative creates additional value compared to the already existing national legislation and that the involvement of the institutions of the EU must be limited to what is necessary to achieve the objectives of the EU. In real terms, the representatives of these member states of the EU which do not want to get involved in the new initiatives might rather receive some questions from the presidency or the Commission asking ‘Doesn’t your country wish to contribute growingly to the integration, progress and well-being of Europe?’ The rejection of the new EU legislation is only accepted by the EU if the representatives of the member states could provide the evidence that the new legislation has a negative impact on the particular country and on the wider interests of the union.

In principle, the European model has been successful in granting peace and prosperity to its citizens and so a logical conclusion would be to turn to the additional regulations, institutional inclusion, standardization and evolutionary growth of financing in difficult times. For example, when banking and bond markets have not acted according to the expectations in 2013, new regulations and standards were agreed and supranational bodies were established as a logical solution for most of the EU member states and institutions. Similar logic also applies to the union-wide problems, which are often considered as a result of national peculiarities (Greek budget deficit, Spanish unemployment or Italian productivity) or insufficient legal standardization, which should be eliminated by the common measures (for example, ‘The Fiscal Compact’) (Schmidt 2010, 203–204). Thus, the renewal of the current integration model would be a rational choice.

However, when looking particularly at the effects of the recent ini-

tiatives where the role and the competences of supranational institutions have been increased (like the Lisbon Treaty or the establishment of the *ESM* and the *EFSE*), also negative long-term effects in the form of economic, political and social problems in the *EU* could be witnessed. Firstly, the unemployment rate in the euro zone is higher than in the member states, which have not joined the single currency area. Secondly, the accumulation of debt in some euro area countries (such as Greece, Portugal, Ireland, Spain and Italy) has taken place in the framework of the single currency, where individual responsibility of particular countries was lacking. Thirdly, the rules and regulations set in the framework of the single currency and the euro zone have led to a drastic decrease in the productivity of the countries struggling now with debt, so that they are facing labour market rigidities and difficulties in making payments. A similar tendency could be observed in the field of the Common Agricultural Policy, where seemingly more effective subsidies aggravate the decrease in the productivity and competitiveness year-by-year. Could this lead to a conclusion that the European model of the institutional growth, supranational integration and extensive system of subsidies has still exhausted itself and what should the *EU* do in a situation, where the policies, legislation and rules that have so far been successful are also the main cause of the long-term problems of the European Union?

The same issue has also been debated 10 years ago, when the Treaty establishing a Constitution for Europe has been discussed. Then it has been agreed that updating of the joint legislation and delegating responsibilities to the *EU* could not be stopped, but simultaneously also the procedures of active deregulation and returning competences to the member states should be developed, which would allow them to use their distinctive competitive advantages. On the upside, it would allow to increase the individual responsibility of the member states. On the downside, the implementation of the idea is rather crucial, as it would require the formation of the permanent working group consisting of the representatives of the member states, which would select areas, and issues that need to be regulated on a supranational level as well as estimate whether the joint regulations would bring the desired effects. However, in practice the progress on developing these procedures remained rather limited.

The importance of maintaining some of the characteristics of the existing model of functional integration, also known as ‘community model’

(Rosamond 2000), is particularly important for two reasons. Firstly, existing 'community model' allows membership in the EU also for those countries, which do not want to participate in all the common policies (the United Kingdom, Sweden, Denmark and Ireland have their own interests in terms of common currency or Schengen Visa area). Secondly, existing model allows flexible combination of governance in the framework of supranational and intergovernmental institutions (Weiler 1991, 405). As stipulated by Moravcsik (1998, 35–38), should the proposed model of the European Federation based on the unification bring the member states both less control over political agenda and less competence control, they would not be interested in supporting the process. This might concern particularly the big EU member states, which would be less represented in the federal model than in the stakeholder model or in the existing distribution of votes and seats.

Among the EU member states, the main supporters of the renewal of the existing 'community model' are the small EU member states who would like to retain their over-representation in the institutions of the EU, and the member states which do not support the deepening and widening of the integration in new areas. The main opponents of the model are big EU member states who would like to increase their voting power and those member states who would rather be interested in deepening the integrity level of the EU. From the perspective of the small member states of the EU, particularly in the Estonian case the government's positions as regards the extent of the redistribution of competencies has somewhat changed in the last 10 years. After the accession to the EU in 2004, in Estonia the intergovernmental model was considered as the model, which meets country's values and interests. Estonia also supported the approach that deregulation/market regulation and the principle of subsidiarity should be strongly followed and subsidies should be reduced (see Government of Estonia 2004). The change of attitude as regards the redistribution of competences could be observed in 2007, when governmental representatives stated, that the community model would offer best representation for the small EU member state like Estonia. Increasing regulation and integration have been described as positive tendencies, which contribute to social security and cohesion, and market regulation has been described as being failed in fulfilling people's expectations (see Government of Estonia 2007), as well as principles of market economy and individual responsibility were replaced by the ideas of solidarity and growing competences of joint institutions.

Conclusions: Which Model should be Preferred from the Small EU Member State Perspective

Institutional changes, which have been made in the EU during the recent financial crisis in 2007–2009 and thereafter, rather follow an unexpected logic. Firstly, although the debates on the possible federalization of Europe have been intense in recent years focusing on the ideals and common values in Europe, this does not reflect the current practice. Secondly, in practice also the renewal of the current ‘community model’ has been rejected relatively decisively both in political and economic terms by the member states of the EU, as the politicians who have requested for such a debate (for example, David Cameron and his ‘Speech on The Future of Europe’ 2013) have been seen as the opponents of even more progressive integration. Thirdly, although based on the stakeholder model, new powerful financial institutions like the European Stability Mechanism and the European Financial Stability Facility have been created, the wider and more democratic public participation was not considered necessary although the financial resources gathered in these funds exceed several times the budget of the EU as well as the governance of these institutions substantially differs from the past legitimate logic of the EU. In addition, one should bear in mind that with its 28 member states, it is more difficult than ever to come to any agreement, which satisfies all the parties involved. For this reason, the EU has been criticized both for taking too long to respond adequately to the crises and for trying to bypass the conventional time-consuming decision-making procedures.

The institutional reform of the EU in the future captures a number of risks that need to be taken into account, as setbacks to reforms may deepen the crisis of confidence between the supranational institutions, the member states and their citizens and ultimately result in the loss of credibility of the EU as a whole in the international arena. In principle, the decision which model will be chosen as a basis for the institutional reforms of the EU in the future depends on the current level of national representation and the influence of the EU member states in the institutions, the level of sovereignty to be shared, and the gains returned in terms of security and welfare.

Particularly in Estonia, the question to what extent the sovereignty should be additionally delegated to the institutions of the EU in the framework of the institutional reform has been widely debated before the ratification of the European Constitutional Treaty and the Lisbon

Treaty in the Estonian Parliament, but has been sidelined in the debates over the *ESM*, *EFSF* and European federalization. During the ratification of the Lisbon Treaty, the Estonian government took the view that more integration means more economic benefits and more security, although in terms of independence and sovereignty Estonia had already achieved the maximum when joining the *EU* and *NATO*. The incline towards the federal model and the deepening of the community model were considered as the protection against the increasing influence of the big *EU* member states.

In majority of the institutions of the *EU* Estonia enjoys overrepresentation in contrast to the micro representation in the *ESM* and in the *EFSF*. However, the national representation in the institutions of the *EU* should be interpreted in a broader context, focusing not only on the number of votes or seats, but also on the number of qualified and professional administrative staff available in general. Despite the fact that in the *ESM* and in the *EFSF* the country is rather underrepresented in comparison to their share in the *EU* total population, during the period of the Estonian membership in the *EU* neither public, media nor academia have raised the question whether the national representation of Estonia might be too small in the institutions of the *EU*, as the Estonia's micro representation in the *ESM* and in the *EFSF* is not widely known. The debates on the country's representation in the *EU* have rather been indirect, focusing on the question how to find well-qualified candidates for high-ranking local *EU*-related positions and in the institutions of the *EU*, which may indicate that in real terms country's influence in the institutions of the *EU* is somewhat lower than based on the number of seats in the institutions of the *EU*. What has been communicated more often is the need to avoid the creation of the multi-speed Europe or at least to ensure that in case of its creation Estonia will receive the representation of core members.

In contrast to the country's representation in the institutions of the *EU*, the gains returned in terms of security and welfare have been at the centre of the debates on the delegation of sovereignty in Estonia since the beginning of the euro zone crisis in 2007. During the *EU* membership, the ministers of the Estonian government and the President of the Republic, Toomas Hendrik Ilves have been in agreement that the gains in terms of security and financial support are so remarkable that in principle Estonia is satisfied with the current distribution of votes, as well as the country would be ready to accept any of these three scenarios, including additional payments and reduced representation with the single purpose

to keep the membership. However, the arguments expressed by the government and the president have been slightly different. The President has rather been in favour of the federal model, based on the American federal experience of strong economic and security connections (Ilves and Raidla 2013). However, he has also agreed to the stakeholder model by saying that Estonia would anyway receive more subsidies from the EU than would be the country's contribution to the common budget of the EU and, therefore, Estonia should not complain. At the same time, the Former Prime Minister, Andrus Ansip and the Minister of Finance, Jürgen Ligi have emphasized that the role of the EU in the Estonian economy is increasing, becoming more and more important and is in many aspects already irreplaceable. This statement is also supported by fact that the European subsidies and investments reached 22% of the Estonian budget in 2013. In addition, during the debates over the ESM and the EFSF, they have stressed that the aim of the fiscal reforms is to keep euro zone stable and to share the solidarity at any cost, as this guarantees the best possible economic outcome for Estonia in the long-term perspective.

To sum up, the current research indicated that although federal model has been widely debated in the history of the European integration and the stakeholder model has even been partially tested in practice, the renewal of the existing community model seems to be the most rational choice both in terms of measurable quantitative aspects (votes and seats to be received in institutions and additional resources to be allocated) and qualitative aspects (level of sovereignty to be additionally delegated and actual ability to impact the political decision making) from the small EU member state's perspective. It is also most rational choice in terms of applicability, as both the federal model and stakeholder model need consensual support from the member states of the EU to replace the existing model, whereas some anti-federal member states and small members of the EU which do not want to lose their existing overrepresentation in supranational institutions are against both 'new' models.

Based on the past historical experiences in reforming the institutional system of the EU, the reforms could succeed if the risks stemming from every scenario will be comprehensively analyzed. From the perspective of the small EU member states it is important to map countries objectives as regards the institutional reform of the EU, and then proactively steer the reform process in the direction in which they want to see it going rather than adjust its behaviour in accordance with the positions of other EU member states.

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Toward Modern European Industrial Policy

Matjaž Nahtigal
University of Primorska, Slovenia
matjaz.nahtigal@fm-kp.si

The purpose of this article is to show that the current European Union (EU) legal framework is unnecessarily restrictive and unduly suppresses economic and developmental initiatives in many stagnating regions across Europe. More innovative industrial policies, instruments and measures should be adopted in a highly decentralized manner across the EU. Between the 'laissez-faire' and 'dirigiste' approaches, there is significant room to manoeuvre for more pro-active industrial and development policies. New forms of industrial policies could and should be reinvented and implemented across the EU – not to harm or distort competition, but rather to further enhance it. More than one form and framework exist for a Single Market and for the competition policies. Modern industrial policy presupposes high-quality public institutions with highly competent administration. It requires autonomy and accountability of the public administration to counter the pressures of various interest groups. The proposal to revive and articulate modern types of industrial policies across the EU is a call for comprehensive economic and social restructuring. The task of modern industrial policy is to organize and strengthen capabilities of restructuring in the direction of high-productivity activities.

Key Words: European industrial policy, 'old' and 'new' industrial policy, European legal constraints, regional development

JEL Classification: K20, L50, L52, O25, O43

Introduction

The purpose of this article is to show that the current European Union (EU) legal framework is unnecessarily restrictive and that it unduly suppresses economic and developmental initiatives in many stagnating regions across Europe. In a growth-friendly context, various initiatives and development strategies based on local knowledge and local needs should stem from diverse European regions and member states. If the EU genuinely intends to overcome the protracting economic, financial and social crisis and engage in economic reconstruction, modern types of industrial policy will have to be reinvented. This is true not only for the large parts of European regions and member states that suffer from protracting stagnation, lack of growth, high levels of unemployment and long-term loss

of competitiveness but also for the advanced and successful European regions that want to remain competitive internationally.

Instead of remaining hostage to the dogma of free-market neutrality, the authorities at all levels of European polity should envisage the possibility of broadening and deepening access to markets for more people in more ways (Unger 2007, 144). Spontaneous market initiatives can be combined with the deliberate actions of public authorities. Rodrik (2011) pointed out that markets and governments are complements, not substitutes. High-quality public institutions and good governance of the public sector are the necessary conditions for the successful development of the market economy (Rodrik 2011, 196–208). The term *industrial policy* is used in its broadest sense to refer to any form of deliberate public activity – at the local, regional, national or supra-national level – that contributes to productive capabilities and improved competitiveness. The distinction between the ‘old’ type of industrial policy – predominantly in the form of state intervention in the markets – and the ‘new’ type of industrial policy – in the form of stimulating the creation of firms and promoting innovation and competitiveness (for the distinction between these types, see Bianchi and Labory 2006, xv) – will be taken into account in the discussion on the future of European industrial policy.

In the period when even British government officials like Vince Cable, the Secretary of State for Business, Innovations and Skills, state that ‘pure laissez-faire does not work’ (Wintour and Mulholland 2011), the debate on the possibilities of enhancing the role and scope of modern industrial policy in Europe should finally overcome the traditional ideology. The debate on the future of modern industrial policy in Europe should become a debate on the productive potential of industrial policy and on the strategic partnership between the public and private sectors. The future model should resemble the first period of European integration, with much more room for the member states and their regions to manoeuvre while running and developing their economies. The difference with the traditional industrial policy, however, is that the modern ‘knowledge-based economy’ requires substantially different policies and instruments in order to stimulate high value added, as well as innovative and flexible business practices, in comparison with the ‘old’ style of government interventionism.

The first part of this article will analyze the EU legal framework for industrial policy. The second part will examine the dogma of neutrality of the European Single Market. The third part of the article will discuss the

possibilities to open up space for a plurality of industrial and development policies, using examples of successful regional industrial policies in some of the most advanced European regions. These examples are often neglected in discussions on the future of European industrial policy.

The examples of successful European regions will serve as a source of inspiration and encouragement to disseminate their successful practices to the stagnating European regions. The intention of this discussion is not to propose mechanical imitation of these regions, but rather to offer examples of advanced regions as a source of inspiration.

Finally, by analyzing the existing EU legal framework for industrial policy, this article aims to examine the most successful practices from advanced European regions in order to determine the ingredients and the risks associated with successful industrial policy, as well as how the European legal framework should be adjusted to the need for inclusive and balanced development from the perspective of stagnating European regions, member states and excluded parts of the European population. This adjustment should be made in such a way that opportunities will be opened up for all of the European citizens and businesses that are waiting in vain to experience the anticipated benefits of the laissez-faire version of a European Single Market.

Current EU Legal Framework for Industrial Policy

The current EU framework is primarily based on the concept of negative integration, which is characterized by the member states' gradual loss of many traditional economic powers and instruments. On the other hand, the process of positive integration in the form of harmonization at the European level took a gradual and different path. It has not replicated traditional instruments and powers at the supranational level but rather has focused on harmonization and the adoption of common standard. The debates regarding which areas, competences and instruments should be transferred to the European level have been a source of constant discussion and conflict, most notably during the Convention on the Future of Europe, which attempted to clarify divisions of competences and powers.

The idea behind the Single Market version of European integration and completion is that the liberalized Single Market should provide immense benefits for its participants and actors. Assessments and estimates about the benefits of the Single Market were presented in the well-known 'Cecchini' report 'Europe 1992 – The Overall Challenge' (Commission of the European Communities 1988) This report calculated an enormous

reduction of costs due to the removal of remaining barriers, enormous improvements of efficiency due to improved competition and economy of scale and a substantial boost of employment.

In the context of the Maastricht treaty, these estimates and anticipated gains presented the basis for the completion of the Single Market, which was a key goal of European leaders and European institutions to which all other priorities, policies and instruments at the national and European levels should be adjusted. The less the governments would try to distort the Single Market, the faster the remaining barriers are being removed the greater would be benefits and efficiency gains emanating from the Single Market.

Other goals, such as the reduction of inter-regional disparities within the EU, the preservation of the social welfare at the level of member states, and the adoption of any form of industrial policy – in the form of either ‘old’ or ‘new’ industrial policy – could be employed only to the extent that doing so would not interfere with the completion of a Single Market. The completion of a Single Market has become a goal in itself. The motto for uncritical supporters of a European Single Market as the regional version of the free market continues to be that the more complete the Single Market becomes, the better things will be for everyone (Pelkmans 2011).

In the context of the completion of a Single Market, industrial policy – which was already diluted because of the unclear division of competences and the general shift toward economic orthodoxy on the global and European level – has become constrained. More often than not, industrial policy has involved merely the lip service of European officials with little actual substance.

Article 157 EC (ex Article 130), which is dedicated to Industry, can be understood in the context of the Article 4 EC governing principle of ‘open market economy with free competition.’ As explained by Pelkmans (2006, 60), both EU and its member states have committed themselves to the governing principle of internal market governance, which narrowed the scope for industrial policy: ‘[S]ince member states have explicitly agreed with this set-up, one could interpret the framework as a quasi-institutional denial to fall back on interventionist industrial policy in the future.’

Even this highly constrained reference to industrial policy in Article 157 EC was very difficult to adopt during the Maastricht negotiation. The Article itself has an explicit limitation preventing the adopting of any measures, which could lead to a distortion of competition. Article 157

EC has become Article 173 of TFEU after adoption of the Lisbon treaty, whereby the role of Commission in the second paragraph has become marginally more specified. No other changes to this Article 157 EC (ex Article 130 EC) were made since its adoption during the Maastricht negotiation.

The limitations of the scope of industrial policy in the European legal framework can be explained by the historical background of their institutional development, national preferences according to the ‘varieties of capitalism’ concept, and negotiation strategies behind the adoption of the article on industrial policies. The historical background of this topic was analyzed by Fioretos (2001, 227), who pointed out that, before the Maastricht treaty, ‘the EC’s industrial policy had primarily been designed for market liberalization and the abolishment of discriminatory subsidies, and nowhere could one find a statement suggesting that the Community have an activist and interventionist industrial policy.’ All of the key actors had in mind their own preferences and interests. Britain, for example, opposed the adoption of industrial policy because of its (at that time) superior performance ‘by enhancing market mechanism [...] thus, the primary concern for the British was to extend the economic area regulated by the EC in a fashion that would enhance the market mechanism and provide British firms with an environment they were accustomed to and that would ensure their competitive edge.’ (Fioretos 2001, 231–232, footnotes omitted). On the other hand, France advocated a more proactive industrial policy based on its *dirigiste* tradition of an interventionist industrial policy; together with Italy, France advocated for greater authority of the European Commission in the area of industrial policy to strengthen the competitiveness of European industry (Fioretos 2001, 227). The attempt to ‘trump competition policy’ and the restrictions on state aid were also supported by the Belgian government (Church and Phinnemore 2002, 345).

Finally, Germany stood as another key actor between the maximalist French proposal and the minimalist British proposal. Germany was supportive of the insertion of an industrial policy clause committed to horizontal industrial policy and large-scale research projects. This was consistent with the German regulatory tradition in the area of industrial policy and with the German interests: ‘[T]he German position rests on regulatory principles of the coordinated market economy (CME), and the calculation that a limited EC industrial policy have beneficial effects for German producers in areas (especially high-tech) where the German

market economy has been relatively weak' (Fioretos 2001, 238, footnotes omitted).

The background context of insertion of the article on industrial policy is particularly revealing for several reasons. First, it shows that the key actors in the EU acted based on their preferences and the interests of the industries, as well as based on the industrial policy tradition in the key member states. Second, the aim of the key member states was to secure or even improve the position of their industries on the internal market. Third, neither the balance between competition and proactive industrial policy nor the outcome of the crucial provisions of the Maastricht treaty and all subsequent treaties is objective and neutral; rather, these are the result of bargaining powers, national preferences and beliefs regarding how the governing principles and rules should shape a European Single Market.

Despite various attempts to substantially redefine the relations among cohesion, research and development, proactive policies and the undistorted markets, the conclusion is that the principle of undistorted competition enjoys primacy (Church and Phinnemore 2002, 346). In this highly constrained context, the EU and the member states did develop several instruments and policies in the areas of research, improved skills, innovations, and various schemes to support small and medium size enterprises (SMEs). On the other hand, sectoral and specific industrial policy almost entirely disappeared (Pelkmans 2006, 73).

The European legal framework with respect to the role and scope of industrial policy has not changed significantly over the last two decades. During the Convention on the Future of Europe, the working group on economic governance under the chair Klaus Hänsch was established to explore, among other topics, the changes in the area of economic coordination, but it did not present any particular new proposal of enhanced cooperation with respect to industrial policy (see the European Convention 2002).

In the last two decades, sporadic attempts have been made to more strongly articulate industrial policy at the European level and the level of the member states. One such attempt was the report of former Dutch Prime Minister Wim Kok and others in 2003, when the EU was confronted with low rates of growth, increased unemployment and the unsuccessful implementation of the Lisbon treaty. In the report, the governments and the EU were urged to take a more proactive stand in the areas of infrastructure and knowledge. In Kok's foreword to the report,

he stated that the member states must take primary responsibility to act and the EU must support them (Kok 2003). The report also addressed the need to reskill workers in traditional industries in order to adapt to the needs of the ‘knowledge-based economy’ throughout the EU. As an example, the report mentioned the successful restructuring of Italian industrial districts with the help of small firm growth and the dissemination of knowledge and innovations among a network of firms (25). However, even the occasional calls for more aggressive industrial policy across Europe, such as those offered by Kok, were described as ‘too little too late’ by Pelkmans (2006, 66).

Persistence of the Dogma of Neutrality of a European Single Market

At the heart of the EU’s framework is the belief that the European Single Market version of the free market, free of any distortion, will work most efficiently. They claim that in order to overcome the current protracted economic, financial and social crisis – which is the largest crisis since the beginning of the EU – it is necessary to implement more of a Single Market (Pelkmans 2011).

However, proponents of the current version of the European Single Market as the best possible answer to all of the economic, financial and social difficulties in Europe tend to forget several things. First of all, they tend to ignore the fact that the existing European legal framework, which has been in place for the last two decades, is a result of bargaining powers, national interests and preferences rather than a result of the natural, neutral development of the European Single Market. There is no single best possible version of a market economy to which all countries should universally aspire in any given economic, social and legal context.

Second, the benefits from the established European Single Market, as stated in the Cecchini Report, were grossly overestimated.

At the same time, and perhaps even more remarkably, the costs of the established European Single Market were largely ignored. Any legal framework for the market economy creates distributional effects. As noted by Tsoukalis (2006), one of the leading experts on the European integration, a Single Market created ‘winners’ as well as ‘losers.’ ‘Interestingly enough, the Cecchini report had virtually nothing concrete to say about the likely distribution of costs and benefits, apart from acknowledging the problem and expressing the hope that redistributive policies, supported by an active macroeconomic policy, would provide adequate

compensation to losers or, even better, help weaker economies and regions to face the strong winds of completion unleashed by the elimination of barriers' (Tsoukalis 2006, 657–662).

Third, the last two decades, during which the current EU legal context of a Single European Market has been in place, do not represent the most successful period of European integration. In fact, the current context helped to create an increasing number of stagnating regions. The empirical evidence for this claim can be found in the latest edition of the Eurostat Regional Yearbook: 'Out of the 271 NUTS level 2 regions in the EU for which data are available, the unemployment rate increased between 2007 and 2010 in 215 regions, remained unchanged in seven and fell in 49' (Eurostat Union 2012, 78).

This evidence on European regional disparities clearly shows the strong impact of the economic and financial crisis in the EU, which makes the current framework of the European Single Market grossly inadequate to cope with the magnitude of the crisis. Without a comprehensive and proactive EU-wide response to the crisis, the entire EU project is becoming increasingly unsustainable.

Fourth, in the period when the existing EU legal framework was put in place, a major shift in the organization of production, from Fordist mass production to post-Fordist flexible production, occurred in many developed and developing countries around the world. Whereas the goal of Fordist production is to produce large quantities of standardized goods with the lowest possible costs to pursue economy of scale, the goal of post-Fordist flexible production is to produce small quantities of high value added products tailored to the needs of individual customers. This new type of production requires substantial changes in the organization of production, teams and firms, and has important implications for supporting institutions, as it is based on constant innovations and improvements of products and technologies. Michael Piore and Charles Sabel, the pioneers in the area of flexible specialization, showed in their study that, contrary to conventional wisdom, Fordist mass production is not always the most efficient type of production. It can work efficiently in the context of stable demand; however, in the context of unstable, constantly changing demand, the flexible specialization can be a more efficient means of production and organization of production. The shift from Fordism to post-Fordism requires major organizational changes, changes in production and reskilling of workers, and it presupposes shifts in public policies and supporting institutions (Piore and Sabel 1984, 28–30). The shift from the 'old' to the 'new' type of industrial policy presents an important

part of the shift from traditional Fordist mass production to the modern, post-Fordist type of production. It seems that, during the creation of the framework for a Single Market, the European decision-makers overlooked these important historical shifts in the areas of production, organization of production, competition, and supportive public institutions. Only a small number of advanced European regions or member states can be described as post-Fordist – that is, highly innovative, flexible, dynamic, cohesive and knowledge-based.

Fifth, following the above discussion, the more appropriate debate during the protracted European economic, financial and social crisis should not be whether we need ‘more’ or ‘less’ of a Single Market, but rather what kind of a Single Market European member states and their regions, businesses, entrepreneurs, employees and citizens really need. We need a more dynamic, supportive environment, as well as institutions at various levels of European polity that can translate business ideas and entrepreneurial initiatives into the practical market economy context.

We can conclude this chapter on the persistent dogma of neutrality of the Single Market by stating that the sooner we leave behind this dogma, the greater will be the chances for revitalization of a large part of the European regions and member states. In order to achieve institutional reconstruction, more diversity, more policy space, and more ideas and initiatives should grow from the bottom-up. Now that even the most free-market-oriented government in the EU, the UK government (or at least its State Secretary for Business, Innovations and Skills Vince Cable) is contemplating the need for new types of industrial policy, there is no reason for the EU legal framework to remain overly constrained and biased against the new types of industrial policy.

Rethinking the Modern European Industrial Policy

In the process of integration through law, the EU and its member states have departed from the ‘old’ type of industrial policy to the highly constrained legal context of the weak type of industrial policy under the primacy of a Single Market. It has been widely accepted that the undistorted free market is the best guarantee for the efficiency and productivity of European economies. Two decades after the completion of a Single Market, the discussion should begin on how to revive modern, ‘new’ type of industrial policy all levels of European polity. Two decades after the adoption of the Maastricht treaty, it is becoming clear that the current particular version of a European Single Market may be beneficial for European retainable industries – that is, established industries effectively

protected from new entrants due to high costs and lack of insufficient support for start-ups – but at the high cost of excluding almost everybody else. The idea of the strong articulation of the ‘new’ type of industrial policy should begin to replace the dogma of neutrality of a European Single Market. There is evidence that many supportive institutions, instruments and policies to facilitate the restructuring are needed if increasingly large number of stagnating European regions and member states. The requirements to compete successfully in the period of the ‘knowledge-based economy’ are substantially more difficult than the requirements to compete successfully in the period of Fordist mass production. The former include, for example, a high quality of education provided to all citizens; strong labour market institutions providing training for constant reskilling; financial institutions providing and supporting the long-term development of highly innovative firms, especially small and medium size firms and start-ups; and many other supportive institutions and proactive policies.

The distinctive need to rethink European industrial policy for the twenty-first century began to be addressed by former Dutch Prime Minister Kok but was abandoned due to the virtual period of growth based on cheap credit before the European bubbles finally burst. The peripheral regions are paying an extraordinary price, and increasingly many of the core regions are doing so as well.

Before Kok’s report, the importance of industrial policy was mentioned in the white paper on growth, competitiveness and employment (Commission of the European Communities 1993, 14), which stated that ‘while industrial policy continues to be controversial no one is in any doubt as to the responsibility of governments and of the Community to create an environment as favourable as possible for company competitiveness.’ The subsequent development of European integration all but marginalized any development of industrial policies across Europe. However, today’s record levels of unemployment, bleak labour market perspectives, low growth rates and large number of stagnating regions and member states clearly remind us that the time is ripe to revive European industrial policy.

What would the ‘new’ European industrial policy look like? First, it would be important not to repeat the one-size-fits-all technocratic approach without taking into account the immense diversity in terms of economic development and social cohesiveness. More innovative industrial policies, instruments and measures should be adopted in a highly

decentralized way. The role of European institutions should be to maximize the manoeuvre room for regional and national experimentation in production and the organization of production (Unger 2001, 3). Additionally, European institutions can learn from successful examples and disseminate them to other parts of the EU, not to mechanically imitate successful practices from one region to another, but rather to present successful examples as a source of inspiration and encouragement to other stagnating European regions (Unger 2001, 3).

The 'new' European type of industrial policy, therefore, should be decentralized and participatory by invoking ideas and initiatives from local producers, should be pluralistic in order to adjust to the different needs and different productive potentials of different European regions and should be experimentalist in order to permanently adjust, correct and improve the strategic partnership between the private and public sectors. The shift toward modern types of industrial policy began with the shift from Fordist mass production to post-Fordist flexible production. On the other hand, European industrial policy, instead of trying to transform its 'old' type of industrial policy to the 'new' type of industrial policy, has mainly tied the hands of European institutions, national governments and regional authorities. The reliance on the Single Market in the last two decades trumped or diluted all other attempts to develop a more pro-active approach toward steering and developing the economy.

What has been mainly overlooked, ignored and legally suppressed in the European context is the transformation toward 'new' industrial policy, which has been pursued by some of the most advanced, innovative, competitive and cohesive regions around the world. The characteristics of the 'new' type of industrial policy were summarized by Best (1990, 11) in his analysis of the emergence of post-Fordist regions engaging in what he described as *The New Competition*: 'The New Competition can be distinguished from the old in four dimensions: organization of the firm, types of coordination across phases in the production chain, organization of the sector, and patterns of industrial policy. The New Competition is about strategic actions within each dimension. The term "strategic" refers to market-shaping activities in contrast with market-reacting responses.'

The comparative analysis of the emergence of *The New Competition* as one possible and advanced type of 'new' industrial policy shows that successful regions around the world – including Japan, the US, China and advanced European regions – have developed various new forms of cooperation and competition in the same segments of production.

The new form of industrial policy is both much broader, in terms of scope and instruments, and much less interventionist. Harvard Law Professor Roberto Unger and Tamara Lothian from Columbia University (2011), one of the leading proponents of new, transparent, innovative and imaginative forms of collaboration between the public and private sector, is convinced that the new types of industrial policy should be agnostic about sectors. In a joint piece on the possibilities to overcome the ongoing economic, financial and social crisis, among other proposals, Lothian and Unger (2011, 49) advocate the need to reinvent industrial policy means to establish 'a form of strategic coordination between governments and firms that is pluralistic, participatory, and experimental. Its aim is to help make the conditions and instruments of advanced production available to larger parts of the economy and the society.' The focus of such a policy should be on small and medium size enterprises as the key source of jobs and output. More specifically: 'Its method should be the expansion of access to credit, to technology, to advanced knowledge and practice, to facilities for the organization of networks of cooperation that combine the benefits of flexibility of scale. It's characteristic concern should be to propagate successful organizational and technological innovations wherever they may arise' (Lothian and Unger 2011, 49). On this basis, Lothian and Unger have developed several components of modern industrial policy pursuing socially inclusive and broad-based economic development.

Perhaps the closest to the idea of decentralized cooperation as the new, reinvented form of industrial policy was achieved in some of the advanced European regions and member states. The examples of Emilia Romagna, Piedmont and other Italian regions should be mentioned, as should local public-partnerships in Ireland. Innovative policies and high-quality education in Finland as a basis for entrepreneurial and technological progress offer further examples of successful European industrial policies (for more detailed analysis of advanced European regions, see Nahtigal 2013).

Italian cooperative regions serve as examples of decentralized, flexible cooperation and partnership between the private and public spheres. They created a system that became known as the system of cooperation competition, in which dense networks of small and medium-sized enterprises in industrial districts cooperate and compete at the same time in the same segments of production. While this system may not be entirely compatible with the European rules of competition, in recent decades it has helped these Italian regions to develop one of the most advanced systems of production, innovation, cooperation, and competition in the

world. The system is highly inclusive, and its level of social cohesion is at the highest level (Nahtigal 2013, 612).

The problem with these examples across the EU is that, despite their potential broader implications, they remain limited to a very small number of advanced European regions. The true goal of EU economic and social recovery, therefore, is to expand and further innovate instruments and policies. This goal has led to the call for fewer legal constraints at the European level and for more room to manoeuvre at the regional and national levels across the EU to implement the 'new' modern types of industrial policy. It should be noted that a Single Market and modern types of industrial policy are not necessarily mutually exclusive; the possibility to redefine certain tenets of a European Single Market depends on our common understanding of its content and legal framework. European regions and member states should not be left to the mercy of the invisible hand. They should not primarily depend on the European transfers, which are not allocated – at least not in sufficient amounts. It is not even feasible to have a Transfer Union to sufficiently support the excluded and stagnating European regions and member states. Instead, these regions and member states should be empowered and equipped to restructure and revive their economies and societies based on their potential, initiatives and aspirations.

Conclusions

Between the laissez-faire and dirigiste approaches, there is a large amount of room to manoeuvre to develop more pro-active industrial and development policies. New forms of industrial policies can and should be reinvented and implemented across the EU – not to harm or distort competition but rather to further enhance it. More than one form and framework exist for both a Single Market and the competition policies. On the European level, a legal framework and policies should be adopted that would be able to steer between foreclosing and opening the markets and between negative and positive aspects of competitive policies. A new balance must be achieved, both at the European level and at the level of European regions and member states, to allow for more manoeuvre room, more space for development and more instruments and policy tools for the European regions and member states. Advocates of modern, advanced forms of industrial policies have increasingly put forth convincing arguments as to why industrial policy, especially in its modern form, should not be abandoned. In the last few decades, when industrial policy was mentioned or implemented, it was deemed as obsolete and outdated. During the pro-

tracted crisis, however, even the most developed countries in many cases returned to the instruments of 'old,' traditional types and 'new,' modern types of industrial policy. Examples include the restructuring of GM with the abundant help of the US federal government, the large support for 'green' investments in the car industry around the world, the various measures taken by the German federal government in the case of Opel and many other examples. Massive support for the financial institutions in the US and EU should be mentioned in this context.

Ha-Joon Chang, professor of development economics from Cambridge University, argues for the adoption of a more balanced and subtle approach toward the theory and practice of industrial policy. Industrial policy has been an important instrument throughout economic history, and almost all of the leading industrial nations in the world have implemented it in various ways throughout their economic progress (Chang 2009). As can be witnessed from the recent years of crisis, the most advanced countries in the world did not hesitate to return to various measures of industrial policy when they needed it. The existing legal constraints in the European and subsequently national contexts are increasingly difficult to defend theoretically and practically. The need to rebalance and redefine the constrained rules of a Single Market is becoming increasingly visible.

Of course, more space and more scope for modern industrial policy should not be viewed as a simple magic wand. It is only one additional instrument in an effort to revive ailing European industries and regions. A similar approach should be applied in the context of international trade rules. On the other hand, industrial policy can be also ineffective. There are many examples of failed industrial policy efforts in both developed and developing countries. Modern types of industrial policy have additional safeguards, but there is no ultimate guarantee about its efficiency, which depends on many factors, including transparency and accountability of the policy-makers. For this reason, modern industrial policy has to steer between Scylla and Charibdis; as described by Unger (2007, 144–145); it has to avoid the 'twin evil' by steering between bureaucratic dogmatism and favouritism. There is a distinct risk of abuse of the instruments and tools of industrial policy. Modern industrial policy presupposes high-quality public institutions with highly competent administration. It requires autonomy and accountability of the public administration to counter the pressures of various interest groups.

While there are dangers and risks involved in carrying out modern types of industrial policy, the alternative – doing nothing – almost cer-

tainly leads to continuous stagnation. In all likelihood, it may lead to a strong hierarchy on the Single Market – that is, a strong concentration of economic development in only a small number of advanced EU regions and member states. The proposal to revive and articulate modern types of industrial policies across the EU is a call for comprehensive economic and social restructuring. The task of modern industrial policy is to organize and strengthen capabilities of restructuring in the direction of high-productivity activities. Rodrik (2007), one of the leading proponents of modern industrial policy for the twenty-first century, warns that restructuring is not an automatic process but rather requires a collective, deliberative approach: ‘[I]ndustrial policy is a *process* of strategic collaboration between the private and public sectors, where the objectives are to identify blockages and obstacles to new investments and to design appropriate policies in response’ (Rodrik 2007, 234–245).

The proposal to broaden the scope and objectives of industrial policies in the existing European legal framework is only one of the first steps toward comprehensive European restructuring, the ultimate goal of which should be to create a more balanced, more inclusive and more pluralistic Europe than we witness within the increasingly restrictive European framework.

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**Sistem za podporo pri odločanju o poslovni lokaciji,
ki temelji na odprti tehnologiji in podatkih GIS**

Cornel Ghiță

Članek predstavlja sestavo, značilnosti in način delovanja sistema DSS (Sistem za podporo odločanju), katerega namen je pomagati podjetnikom in direktorjem pri postopku odločanja o poslovni lokaciji. Raziskava je zbrala teoretične koncepte in izsledke empiričnih študij, skupaj z odprto programsko opremo in podatki GIS (Geografski informacijski sistem) ter jih v skladu z izvirno metodologijo in obliko pretvorila v programsko orodje za DSS. Uporabniki so vodeni korak za korakom pri vnašanju informacij o njihovih podjetjih v DSS (industrija, preference za področja rabe zemljišča in vrste objektov, teža ključnih dejavnikov lokacije) in nato dobijo dva niza rezultatov: prvi temeljijo na lastni izbiri, drugi pa na industriji, v kateri poslujejo. Rezultati so sestavljeni iz petih najboljših lokacij za uporabnikovo podjetje kot tudi za industrijo, opisani pa so tako v obliki grafičnega poročila (zemljevid) kot tudi besedilnega poročila (razlaga rezultatov).

Ključne besede: sistem za podporo pri odločanju o poslovni lokaciji, odprtokodna programska oprema GIS, območja velemest

Klasifikacija JEL: C88, D80

Managing Global Transitions 11 (4): 101–120

**Vpliv združitve in prevzema na uspešnost poslovanja:
dokazi proizvodnih podjetij v Indiji**

Ramachandran Azhagaiyah in Thangavelu Sathishkumar

Članek je bil pripravljen s ciljem proučiti izkušnjo spremembe v strukturi predvsem na področju uspešnosti poslovanja po združitvi in prevzemu, in sicer na podlagi 39 izbranih prevzemnih proizvodnih podjetij v Indiji. V študijo so bila zajeta samo podjetja, ki so šla skozi postopek združitve in prevzema v proračunskem letu 2006–2007. Analiza dejavnikov, korelacije matrike, multipla regresija in preizkus Chow se uporabljajo za preučevanje uspešnosti poslovanja teh podjetij v obdobjih pred in po združitvi. Študija je pokazala, da ima proces združitve in prevzema pomemben (pozitiven) vpliv na izboljšanje poslovanja prevzemnih proizvodnih podjetij v Indiji po združitvi in prevzemu v času raziskave.

Ključne besede: prevzem, prestrukturiranje podjetij, združitve, združitve in prevzem, uspešnost poslovanja po združitvi, uspešnost poslovanja indijske industrije, dolgoročna uspešnost poslovanja

Klasifikacija JEL: G34, L25

Managing Global Transitions 11 (4): 121–139

Dinamično vzročno razmerje med porabo električne energije in gospodarsko rastjo v Gani: trivariatni model vzročnosti

Bernard Njindan Iyke in Nicholas M. Odhiambo

Članek preučuje dinamično vzročno povezavo med porabo električne energije in gospodarsko rastjo v Gani v okviru trivariatnega ARDL, za obdobje med letoma 1971 in 2012. Članek se izogne pristranskosti opuščanja spremenljivk in uporabi presečnih tehnik, ki so značilne za večino obstoječih študij. Rezultati kažejo, da obstaja ločen vzročni tok od gospodarske rasti do porabe električne energije: tako kratko- kot dolgoročno. Ugotovitev podpira hipotezo o porabi električne energije zaradi gospodarske rasti, kot je utemeljeno v literaturi. Članek poziva oblikovalce politike v Gani, da se zatekajo k alternativnim virom električne energije, da bi zmanjšali morebitne prihodnje pritiske na trenutne vire električne energije. Potrebno je urediti tudi primerne denarno politiko, da bi ublažili morebitni inflacijski porast cen, ki bi izhajal iz pretirane potrebe po električni energiji v bližnji prihodnosti.

Ključne besede: poraba električne energije, gospodarska rast, inflacija, sointegracija, vzročnost, Gana

Klasifikacija JEL: Q43, C32

Managing Global Transitions 11 (4): 141–160

Model institucionalne reforme Evropske unije in preference manjših držav članic

Viljar Veebel

Uspeh predlagane institucionalne reforme EU je zlasti pomemben v bližnji prihodnosti, saj lahko neuspeh reform končno pripelje do izgube verodostojnosti EU kot celote na mednarodnem področju. Vendar pa odločitev, ali naj se obstoječi »model skupnosti« prenovi ali naj bo dana prednost zveznemu ali deležniškemu modelu, je precej zapletena, saj se vizije in interesi držav članic EU močno razlikujejo. Članek proučuje, kateri od teh modelov bodo najbolj dosegljivi in najbolj koristni z vidika majhne države članice EU. Raziskava je pokazala, da je prenova

obstoječega modela skupnosti najbolj smiselna izbira tako v smislu merljivih kvantitativnih kot kvalitativnih vidikov iz perspektive majhne države članice EU. Obnova obstoječega »modela skupnosti« je tudi najbolj smiselna izbira z vidika uporabnosti.

Ključne besede: Evropska unija, federalizacija, deležniški model, institucionalna reforma

Klasifikacija JEL: F50, F55

Managing Global Transitions 11 (4): 161–177

Moderni evropski industrijski politiki naproti

Matjaž Nahtigal

Namen prispevka je pokazati, da je sedanji pravni okvir Evropske unije (EU) nepotrebno omejevalen in pretirano omejuje ekonomske in razvojne pobude v mnogih evropskih regijah, ki stagnirajo. Potrebno bi bilo izvajati bolj inovativne oblike industrijskih politik ter uporabljati instrumente in ukrepe širom EU na kar najbolj decentraliziran način. Med pristopoma »laissez-faire« ali »dirigiste« obstaja obsežen vmesni manevrski prostor za bolj proaktivne industrijske in razvojne politike. Morali bi oblikovati in na novo osmisliti ter izvajati nove oblike industrijskih politik po EU – ne da bi izkrivljali konkurenco, temveč da bi jo dodatno krepili. Enotni trg in pravila konkurence je mogoče oblikovati na več različnih načinov. Moderna industrijska politika predpostavlja visoko kakovostne javne institucije in visoko usposobljeno javno upravo. Zahteva avtonomijo in odgovornost javne uprave, da se zoperstavi pritiskom različnih interesnih skupin. Predlog za oživitve in artikuliranje modernih oblik industrijskih politik po EU je predlog za obsežno ekonomsko in socialno prenavo. Naloga moderne industrijske politike je, da organizira in krepi sposobnost prestrukturiranja v smeri visoko produktivnih aktivnosti.

Ključne besede: evropska industrijska politika, »stara« in »nova« industrijska politika, evropske pravne omejitve, regionalni razvoj

Klasifikacija JEL: K20, L50, L52, O25, O43

Managing Global Transitions 11 (4): 179–194

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