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contents

Articles

Steady State Economy and Population
THEODORE P. LIANOS **7**

Testing the J-Curve Hypothesis for the USA:
Applications of the Nonlinear and Linear ARDL Models
SERDAR ONGAN, DILEK OZDEMIR, CEM ISIK **21**

Citizens' Participation in Local Economic Development and Administration:
An Exploratory Statistical Analysis
ODYSSEAS MOSCHIDIS, VASILEIOS ISMYRLIS **35**

Investigating Needs and Barriers to the Employment of People with Disabilities
PANAGIOTIS TSALIS, EMMANOUIL AIVAZELIS, JULIA TAPALI,
GEORGIA FYKA, PROKOPIS ORFANOS, ARISTOTELIS NANIOPOULOS **55**

Economic Policy Uncertainty in Greece:
Measuring Uncertainty for the Greek Macroeconomy
STILIANOS FOUNTAS, PANAGIOTA KARATASI, PARASKEVI TZIKA **79**

Book Reviews

Advanced Introduction to Behavioral Economics
by John F. Tomer
reviewed by EDWARD CARTWRIGHT **93**

Reformation or Deformation of the EU Public Procurement Rules
Edited by Grith Skovgaard Ølykke and Albert Sanchez-Graells
reviewed by IOANNIS ALEX. TZIONAS **101**

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STEADY STATE ECONOMY AND POPULATION

THEODORE P. LIANOS
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Abstract
The present paper briefly reviews the idea of steady state economy from ancient times to the present. It discusses some of the suggestions made by H. Daly in his model of a steady state economy and, in particular, the idea of stable population. The paper suggests that the population must be stable at a level that is compatible with ecological equilibrium, which is about three billion people and can be achieved if every family is allowed to have fewer than two children. To ensure population is controlled this paper proposes the creation of an international market for human reproduction rights.

JE**L Classification:** J13, E10, Q50
Keywords: Steady-State Economy, Population, Population Control, Ecological Balance

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1. Introduction

The idea of a steady state economy is very old. In the 4th century BC, Plato and Aristotle both elaborated on the idea of a steady state by specifying the land/population ratio necessary for a just and happy state.

Plato's treatment is very brief. In the Laws (book V) he says: "The sufficient size of population cannot be properly determined except in relation to the land… And the land should be of such a size that would be enough to feed so many wise men, and no more land is needed….. In other words, men and land form a common factor" (translated by the author).

Aristotle has devoted Book VII of his Politics to establishing the foundations of a state that would be self-sufficient and stable and within which citizens could lead a good life. He develops the idea of best life on the basis of which he constructs a complete model of a steady state economy. The best life, also referred to as life of happiness, "is the life conjoined with virtue furnished with sufficient means for taking part in virtuous action" (1323b40 - 1324a2). In Aristotle, this means a comfortable, but not luxurious and wasteful life style. This should be true for each individual, separately, and for the state, collectively. The elements of his model are private land (property), public land and population. These elements can be properly combined to produce enough wealth for all individuals that own land, and enough proceeds from public land to take care of the poor and cover the costs of administration.

Aristotle believes that there is no limit to the growth of population if it is left uncontrolled. Therefore, the optimum land-population ratio cannot be sustained unless population controls are introduced. In fact, he suggests various methods for keeping the population constant at the proper size (for a detailed analysis, see Lianos, 2016).

The reader can easily see in the texts of these ancient writers the concern expressed in contemporary literature on limited natural resources and steady state economy.

The structure of the paper is as follows: Section 2 gives a brief presentation of the steady state economy according to the classical view, the Marxian view and H. Daly's view. Section 3 discusses the steady state economy in connection with population size. In section 4 we discuss the role of the State in a steady state economy. Section 5 presents an idea for creating an international market for human reproduction rights for the purpose of controlling the world population. A few comments are given in the last section.

2. Steady State Economy

The Classical view

In the past, many writers examined, in brief or extended versions, the content and

the inevitability of the economic system tending to a steady state position. John Stuart Mill is one the first who confessed that a steady state "would be, on the whole, a very considerable improvement on our present condition" (Mill, 1970, p. 113). For Mill, a steady state is a stationary state of capital and wealth.

The view of steady state economy held by classical economists, including Mill, is epitomized by Baumol's (1951) "magnificent dynamics" presented in Figure 1. Line TP shows total product for each level of population (or labor force). This is the aggregate production function and displays diminishing returns to labor. Line S shows the amount of product that is necessary for the subsistence of the labor force. The real wage rate is shown by the slope of line S. At population level P1 the difference between TP and S represents profits which motivate investment, increase employment, allows for higher wages and for improvement of the condition of the labor force, thus, leading to an increase in population. This process will be terminated at point E when population increases to P_2. At point E the stationary state is reached at zero profits. Improvements in the production process that raise the total product curve to TP' will motivate investment once again and the new process will bring the economy to a new stationary state at point E'.

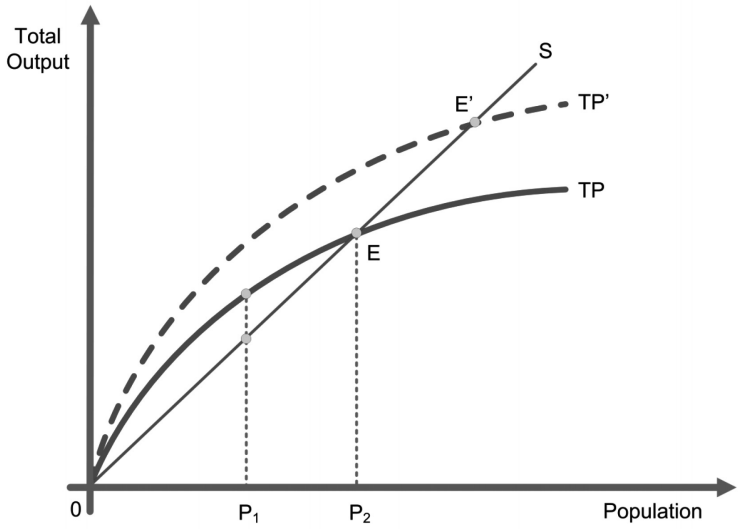

Figure 1. The magnificent dynamics

The question often raised by several writers, e.g. Blauwhof (2012), Binswanger (2009), Gordon and Rosenthal (2003), is if a capitalist economy can really remain at a steady state position at zero profits. The answer given by classical economists is affirmative.

The Marxian View

A steady state economy in the Marxian sense is supposed to be described by his simple reproduction scheme of chapter XXIII of volume One of *Capital*. The case of simple reproduction can be a steady state economy only if capitalists consume the surplus value acquired as revenue that year at any given period.

Usually, the reproduction scheme is presented in value terms. However it is easier to see what is involved if we present it in physical or money terms. Consider the following simple example of a two-sector economy which produces machines and corn using machines and labor. The technical coefficients are shown in Table 1.

Table 1. Technical coefficients of a simple economy

	M	C	L
M	0.5	0.05	0
C	0	0.02	2
L	2	0.01	0

In this economy the production of one machine requires half a unit of machines and two units of labor. One unit of corn requires 0.05 units of machines, 0.02 units of corn and 0.01 units of labor. The subsistence wage is 2 units of corn (which is required for one unit of labor). Assume that, in this economy, a surplus of 100 units of corn is produced for the consumption of capitalists and landowners. Equilibrium requires that demand and supply of machines, corn and labor should be equal. Thus,

$$M = 0.5M + 0.05C$$
$$C = 0.02C + 2L + 100$$
$$L = 2M + 0.01C$$

The equilibrium values for this system are M = 17.9, C = 178.5 and L=37.5. These quantities are reproduced year after year and this is an example of simple Marxian reproduction.

For some (e.g. Blauwhof, 2012) this is also a steady-state economy. However, this equilibrium position will not be sustained because in capitalism only a small part of the surplus is consumed and the rest is invested. Therefore, the economy always follows the expanded reproduction path.

The Marxian steady-state is not the simple reproduction scheme, but, rather, the higher phase of communist society, very briefly mentioned in the Critique of the Gotha Program. As is well known from Marx's brief description, at that higher phase, the economy will have greatly developed its productive powers, work will have become a necessity, not just a means to survive, and each member of society

would offer to production what they can and take what they need. According to Marx, human history ends at that phase of the truly communist society when the word 'scarcity' is removed from the dictionary.

Given the circumstances prevailing today, namely a world population of 7.5 billion and the huge ecological deficit, Marx's vision of a communist affluent society is purely utopian. Therefore, it is inaccurate to talk about steady-state in Marx's economics in the same sense it is in the classical tradition or in Daly's present-day context.

Daly's Steady-State Economy and De-growth

Daly's steady-state economy (SSE) is sometimes discussed together with economic de-growth (e.g. Kerschner, 2010). This is probably because of Georgescu-Roegen's rejection of the steady-state economy proposed by Daly and also because of Daly's (1997) criticism of Solow and Stiglitz on the basis of Geogescu-Roegen's arguments. However, Daly's steady-state economy and de-growth are two different concepts, at least for economic policy purposes.

In the words of Latouche (2009), "De-growth is a political slogan with theoretical implications… The slogan of de-growth is primarily designed to make it perfectly clear that we must abandon the goal of exponential growth, as that goal is promoted by nothing other than a quest for profits on the part of the owners of capital with disastrous implications for the environment, and, therefore, for humanity". Although Daly and Latouche share some common concerns, they should not be discussed together as they have very different political agendas.

Daly's steady-state economy and his policies for achieving a satisfactory state are of immediate practical importance. In his many writings, Daly defines the steady-state economy "as an economy with constant population and a constant stock of capital, maintained by a low rate of throughput within the regenerative and assimilative capacities of the ecosystem. This means low birth equal to low death rates, and low production equal to low depreciation rates…. Alternatively, and more operationally, we might define SSE in terms of a constant flow of throughput at a sustainable (low) rate, with population and capital stock free to adjust to whatever size can be maintained by the constant throughput that begins with depletion of low-entropy resources and ends with pollution by high-entropy waste (Daly, 2008). The long-run equilibrium position of Daly's steady-state economy can be presented in a diagram similar to that of the classical model. The equilibrium position of the classical model is based on the stability of the subsistence wage and on the Ricardian mechanism of the labor market. If the real money wage, which is determined in the labor market, exceeds the subsistence wage, the population will increase. In the opposite case, the population will decline. Thus, deviations from point E of figure 2 will be temporary. Now, suppose that the economy is at point E1 with the population

at P1. Since, by definition, the population is stable, point E cannot be reached. The equilibrium position will now be at point E', at higher wages, indicated by the higher slope of line S'. The gap of BE' will be closed not by a movement towards E but by an increase of the wage rate. The horizontal supply of the labor curve implied in the Ricardian model is now replaced by a vertical labor supply curve because of constant population.

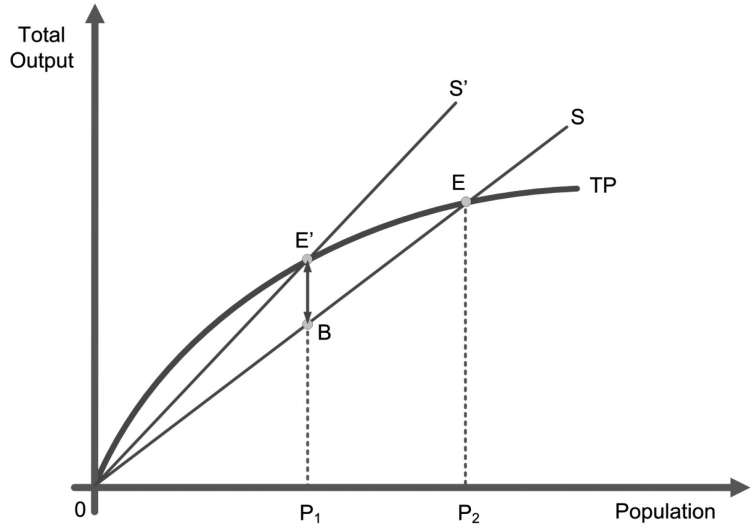

Figure 2. Equilibrium with stable population

In the same paper, Daly gives a ten point policy summary. Daly's definition and his suggested policies raise a number of issues, one of which is a vague reference to the stability of the population. Economic policy requires setting quantitative targets. It is not sufficient to say that the population should be stabilized by equating birth and death rates. This leaves the SSE undetermined. It is necessary to specify the size at which a population should be stabilized. This target should be, according to Daly and other writers, at the level where there is a sustainable constant flow of throughput. Since a given level of throughput corresponds to a given level of total output (assuming technology remains constant), the size of the population should be stabilized at a level dictated by the sustainable level of total product.

There are several studies that have estimated the size of world population that corresponds to a sustainable level of economic activity worldwide. Studies by Daily *et al.* (1994), Pimentel *et al.* (1994), Pimentel *et al.* (2010), Lianos (2013) and Lianos and Pseiridis (2015), based on different criteria and reasonable levels of *per capita* consumption, have all estimated that the world population should be stabilized at around three billion. Even if an error of 50% has occurred in these studies, the

desired level of population is approximately half of its present level. It seems that it is a safe conclusion to say that the world is heavily overpopulated.

Although the burden of overpopulation on the resources of the planet is obvious and recognized by the majority of researchers, it seems that no one is willing to raise the issue of population control. It is still a taboo.

Furthermore, Daly seems to believe that a SSE will necessarily suffer from unemployment. This follows from his question "If we must stop aggregate growth because it is uneconomic, then how do we deal with poverty in the SSE? (Daly, 2008, p. 4) His answer is redistribution by putting limits to minimum and maximum income. If the population is constant, there is no need for growth for the purpose of absorbing the increasing labor force. There is no economic argument on the basis of which a SSE will suffer from unemployment simply because it is a steady-state. However, unemployment may result from changes in technology or in consumers' tastes that change the structure of demand and require transfers of labor and resources from one industry to another. Besides, the type of redistribution suggested is questionable. A limit on maximum income would create problems of economic motivation and of bureaucracy. It would also keep the minimum limit low. Redistribution of income can take place through a system of taxes and subsidies and other means depending on the inventiveness of the government.

One major point in Daly's list in the ten point policy summary is that "the SSE could benefit from a move away from our fractional reserve banking system toward 100% reserve requirements", his slogan being "Nationalize money, not banks" (2017). This can be achieved through treating demand deposits differently from time deposits. For demand deposits, reserve requirements would be 100%. In this case, however, consumers and business would deposit money only for security and for their transactions. Also, the banks would have to charge a fee and this would be their only source of revenue, i.e., from accepting and handling demand deposits and this may discourage people from depositing. In the case of time deposits (savings accounts), according to Daly, there would be no reserves required and all savings could be loaned to potential borrowers. Banks would profit from the difference between the interest rate paid by borrowers and received by savers. Now, banks would bring together savers and borrowers but they could not change the money supply and the risk of financial crisis disappears. This suggestion is not without problems. There are two important cases in which Daly's suggestion appears to be too restrictive. One case has to do with the time structure of time deposits, which may not coincide with that of the demand from borrowers. In this case the banking system will leave borrowers unsatisfied while time deposits are resting within the banks. The other important case is the inability of the system to finance new enterprises. In a capitalist steady-state economy there will certainly be changes in consumers' tastes, new products will be introduced and new technologies will be

implemented for production. Therefore, new firms will be created and old ones will disappear. A banking system with 100% reserve requirements will make financing new firms difficult. The stability of the financial system can be protected by other means without sacrificing the advantages of fractional reserves.

Daly offers a few other policy suggestions that might improve the existing situation in many countries. However, these suggestions do not define a steady-state economy. The heart of the matter is the size of the population, which needs to be determined at a level that would be in harmony with ecological balance.

3. Population and Steady State Economy

As pointed out earlier, it is not enough to say that in a steady-state economy the population should be stabilized. What also needs to be known is the actual size of the population. For example, with the current population of 7.5 billion the economy cannot be sustained at its present level because of the ecological deficit we are experiencing. The choices we have are presented in Figure 3. Curve EC shows the combinations of Population (P) and *per capita* income (Y/P) that are compatible with ecological balance. Points to the right of EC imply ecological deficit. The present situation of the world population (7.5 billion) and total product ($75.2 trillion) with a per capita income of approximately $10 thousand is shown at point C and it is clearly unsustainable. It is estimated (Lianos 2013) that the world GDP corresponding to ecological balance is 34.6 trillion dollars. If we want to stabilize the population at its present size, ecological balance requires that per capita income be reduced to $4.7 thousand (point A). Alternatively, if we wish to keep *per capita* income at its present level, the population must be reduced to the size shown by point B. This means that there are many positions a steady-state economy can occupy along the EC curve. The decisive factor is the size of the population.

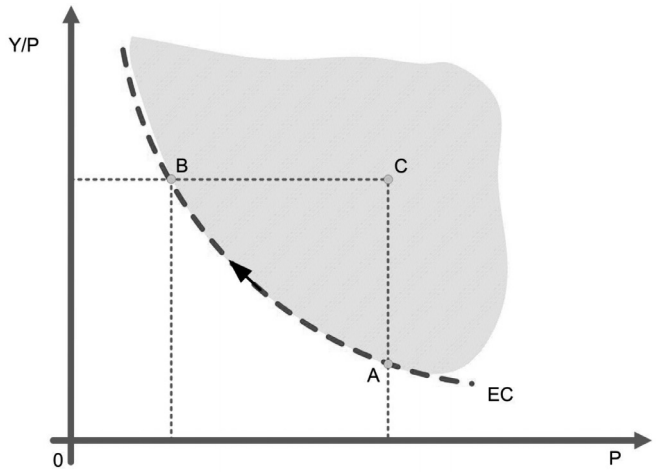

Figure 3. The ecological balance constraint

The sad truth is that, in the not very distant future, a steady-state economy with a much smaller population than the one we have today will become necessary. It will occur either by voluntary birth rate control (conscious procreation, moral restraint, family planning) or by imposed population controls (as, for example, in China) or the hard ways to which the present unsustainable situation leads, namely starvation, conflicts and wars.

At the theoretical level, a steady-state economy requires three fundamental elements. First, the population must be stable at a size that would be compatible with ecological equilibrium, or less. If technological advances make more efficient use of resources possible and total product can increase, population and/or consumption may also increase. Second, as has been repeatedly said by Daly and others, externalities must be internalized so that prices reflect real costs in terms of resources use. Third, the prices of products and of factor of production should be flexible so that changes in technology and/or in tastes would not result in permanent market deficits or surpluses.

Price flexibility is very important because of its implications. For example, such flexibility means that labor unions should not have the power to determine wages and, thus, give rise to the insiders-outsiders phenomenon that has resulted in higher unemployment in many European countries. However, labor unions would have a role in a steady-state economy. Furthermore, there should not be subsidized products (like bread, for instance). Problems of poverty should be solved by other means. Monopolies and other privileges should be abolished. Natural monopolies should be under the control of the community or of the government. Commodities and factors of production should be allowed to move freely.

There may be differences of opinion regarding the institutional arrangements in a steady-state economy, but it is undeniable that the size of the population should be determined by the scarcity of resources made imperative by the need for ecological balance. If the population is fixed at a certain level, everything else will be adjusted in relation to that level.

Economists and policy makers in modern economies have been unjustly accused of "growth-mania" since the end of World War II. Growth was necessary not only for improving the standard of living but also for accommodating the exploding population. The driving force for economic growth has been the explosion of the population. Stability of population is the cure for growth-mania.

4. The Role of the State in a Steady-State Economy

It should be emphasized that "a steady-state economy is not a failed growth economy" (Daly, 2008, p. 4); it is not an economy in stagnation. All the things that happen in a free economy would also happen in a steady-state economy. In the words of Mill (1970, p. 116) "There would be as much scope as ever for all kinds of mental culture,

and moral and social progress". However, such an economy would not be free of the problems that constantly appear in a free economy.

Scientific discoveries, new technological applications, changing consumer preferences, new products, and new methods of production and management would constantly change the structure of demand and, therefore, adjustments in production would be necessary. Unless prices are perfectly flexible and adjust automatically, which is rather unrealistic to expect, it would be necessary for the state to intervene. Also, public schools and public health systems would require the intervention of the state. Finally, natural disasters, such as earthquakes or floods, would make intervention necessary. Generally speaking, the frictions of the capitalist system and the myopia of many individuals in providing for the future would make it necessary for the state to play a corrective role.

It is certainly premature to discuss what the role of the state should be in a steady-state economy and what concrete measures it should have to take. What is urgent today is to discuss and think of ways to control the size of world population.

5. A Market for Human Reproduction Rights

Currently, the world population is close to 7.5 billion people and it is projected to increase in the next decades. Every day a new city of approximately 250 thousand people is born.

According to a recent study by the International Institute for Applied Systems Analysis (Lutz *et al*., 2014a, 2014b), the world population is likely to peak at 9.4 billion around 2070 and then decline to about 9 billion by the end of the century. According to a United Nations study (Gerland *et al*., 2014), the world population can be expected to grow to 9.6 billion in 2050 and to 10.9 billion in 2100. Despite their differences, both studies predict a thirty percent increase in world population in the next forty to fifty years.

The earth is overpopulated and the size of its population has to be reduced if the natural powers of the planet are to be preserved. The best possible way of doing this is by persuading families that it is in their long-run interest to keep their family size small. If this is an ecumenical effort, supported by governments and other institutions, and it is also accompanied by relevant institutional changes, as, for example, old age security systems, there is a good chance for the effort to succeed.

Another way is by monetizing the problem and creating a market for human reproduction rights. One model for implementing such a program could be defined as follows.

(i) Every couple is given three shares by the government, each share giving them the right to give birth to half a child. Each share represents the right of the couple to participate in the creation of the next generation and all couples have the same rights.

(ii) These rights are tradeable in the world market. Thus, a couple in Canada who wish to have two children can buy one share from a couple in China. Similarly, a couple who wish to have three children would have to buy three shares, and so on. If no couple wishes to sell shares and if all couples wish to have two children the one-and-a-half policy becomes in practice a one-child policy.

(iii) There are people who do not wish to, or cannot, have children, people who are happy with one child, and people who will be tempted to sell one or all their shares to make some money. It is certain that there will be people in all countries that would be able and willing to buy shares. Thus, the one-and-a-half child program will, at the same time, become a program of income transfers probably from relatively rich people to relatively poor ones, within each country and between countries.

(iv)This policy can be applied to each individual country that suffers from overpopulation, e.g. China, India, Indonesia, etc. However, since the population problem is universal, the full impact will emerge if the application is ecumenical. Thus, it is desirable that the scheme should have the support of all governments and also the support of various institutions, e.g. the Church and other social organizations. It is very likely that some governments that favor the large family model would prefer not to adopt the one-and-a-half children policy. However, if the international demand for shares is high and a substantial sum of money is received by those who sell one or more of their shares, then popular demand for adopting the plan would be strong in those countries.

(v) In addition to reducing world population, some other positive side effects are also possible. For example, the black markets for children adoption that exists in some (perhaps many) countries would disappear. Also, very substantial money flows would be directed from rich families and countries to poor ones. Of course, negative side effects are bound to appear as in the case of unintended pregnancies of married couples who have sold their shares.

Variations of the basic idea are possible. For example, some people may argue that the right to give birth to children should be given to individuals and not to couples, since there are many people who wish to have children but not get married. In other words, the right to give birth to a child is an individual right, distinct from the way couples decide to live. Furthermore, instead of each share corresponding to half-a-child, different values may be given, e.g. 0.6 or 0.4, depending on the desired rate of population decline.

To facilitate exchanges of reproduction rights an international stock exchange can be established where reproduction rights will easily and at a minimum cost be sold and bought. Thus, a couple in one geographical region could very easily buy (or sell) a reproduction share from (or to) another couple living in a very distant place. Needless to say, such a scheme of population control will often be violated, at least in

the beginning. Problems of non-compliance will certainly arise and there is no easy remedy available. However, fines and other measures of an administrative nature can be used so that compliance is encouraged and non-compliance discouraged. Information about the problem of overpopulation and moral suasion can contribute to the acceptance of the proposed solution by the public.

Of course, controlling family size in this way violates a basic human right. However, the offence of this violation should be weighed against the alternatives. It should also be pointed out that a policy or a rule, if generally applied, is not perceived as a coercive restriction by the public.

In the history of the world, social problems have been solved or limited to manageable proportions by command rules, by motivating economic forces, and by a combination of both. Of course, monetizing a problem does not necessarily lead to the best solution, but a second best solution is often better than letting things run their own course. Under present circumstances, if population growth is left unchecked, Parfit's repugnant conclusion will certainly be reached. Our suggestion for the one-and-a-half child policy is a combination of command and economics that also allows some choice.

Reduction in population worldwide will be followed by a general drop in demand for goods and services and a period of deflation and unemployment at least at the first stages. It is unlikely that price flexibility would be a substantial remedy for the waves of demand reduction and, therefore, very active government policies of demand and of income redistribution will be necessary. At the same time, income previously spent on the needs of children will now be spent on other items and, therefore, the decline of total demand need not be so high.

If such a plan were generally adopted, the world population would be reduced to half within three to four generations, i.e. in about one century.

6. Comments

It was pointed out that a steady-state economy is not a stationary economy in the sense of "a failed growth economy". It should also be said that it is not necessarily an affluent economy. If the population has been stabilized at a level at which the ecological deficit is maintained, society will, in the long run, suffer from problems of insufficient resources to support that population size and, therefore, to poverty. Thus, it is important that the steady-state economy be defined as one with a population at a level compatible with ecological equilibrium as well as comfortable lifestyles.

Additionally, the steady-state economy will have the problems that capitalist societies have, i.e., problems related to changing tastes, new technologies, risks, natural disaster, etc. Therefore, state policies that facilitate economic and social adjustments would be necessary.

Finally, we have emphasized the need for birth control even if that means some violation of human reproduction rights. The justification for such an approach is that it is less onerous than poverty, starvation, social unrest and wars that result from overpopulation.

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TESTING THE J-CURVE HYPOTHESIS FOR THE USA: APPLICATIONS OF THE NONLINEAR AND LINEAR ARDL MODELS

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Abstract
This paper investigates the evidence of the J-curve hypothesis between the United States, a country which has the world's largest trade deficits and an anchor currency, and its main 12 trading partner countries over the period 1991M1–2015M2. To this aim, we apply both linear and nonlinear Autoregressive Distributed Lag (ARDL) cointegration approaches and error-correction model (ECM). The nonlinear ARDL approach, recently introduced by Shin *et al.* (2014), allows us to examine the separate effects of both the appreciations and depreciations of the USD on the trade balances of the country. The empirical results indicate that while the linear approach supports the evidence of the J-curve for the USA with only 4 trading partners, the nonlinear approach supports such evidence with 8 trading partners. This implies that the nonlinear approach provides more evidence of the hypothesis than the linear approach. Therefore, this study reveals that existing but concealed potential evidence for the J-curve effect may be discovered with the nonlinear approach, which allows for nonlinearity in the adjustment process. Another empirical finding of this study is that depreciations in the USD seem to have more distinct long-run effects on the US trade balances than appreciations.

JEL Classification: F10, F14, F31
Keywords: J-curve, Linear and Nonlinear ARDL Cointegration, ECM, Asymmetry, the USA.

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1. Introduction

The United States has had the world's largest trade deficits for more than two decades. The country's trade deficits have grown from just $100 billion in 1989 to $745 billion in 2015 (Census, 2016). This huge and persistent deterioration trend in the trade balances, also known as the "global external imbalance" (Hunt and Rebucci, 2005; Narayan, 2006), might have been damaging the US economy by disrupting other balances in the economy. There are many protentional causes for the US having deficits in its trade balances, including various economic variables that are beyond the scope of this paper. However, one of the most important reasons may be the appreciations of the USD *against* other currencies (Ongan *et al*., 2017). Consequently, should the USD depreciate against other currencies, it is expected that US trade deficits may reduce. However, this expectation can be realized if the Marshall–Lerner (ML) condition developed by Marshall (1923) and Lerner (1944) is met.

The J-curve hypothesis introduced by Magee (1973) was established on this expectation of the ML condition. This hypothesis assumes that after the depreciation of the USD, the US's export products should become cheaper for consumers abroad. Likewise, foreign products should become more expensive for US consumers to import. Therefore, under this hypothesis, the US should export more and import less with a depreciated USD in the long-run.

Nevertheless, the empirical findings of J-curve hypothesis studies for the USA are ambiguous and vary depending on the trading partner countries, data samples, different empirical methodologies used and time horizon studied in the different studies. It should be noted that the USA is one of the most used sample countries in such studies since the USA has the best reported country data (Bahmani-Oskooee *et al.* 2015). For instance, Rose and Yellen (1989) used the error correction model (ECM) and found no evidence of the J-curve hypothesis for the USA with her 6 G-7 trading partners. Wassink and Carbaugh (1989) found evidence of incomplete pass-through leading to a delayed J-Curve for the USA with Japan. Mahdavi and Sohrabian (1993) used the Granger causality test and found a delayed J-curve for the USA. Demirden and Pastine (1995) used the Vector autoregressive (VAR) approach and found evidence of the J-curve for the US trade balance. Marwah and Klein (1996) used the OLS method and found evidence of the J-curve for the USA with its five largest trading partners. *Shirvani* and *Wilbratte (1997)* used a VECM approach and found no evidence for the US with her trading partners. Bahmani-Oskooee and Brooks (1999) used ARDL and cointegration to ECM and found no evidence for the USA with its six trading partners. Bahmani-Oskooee and Ratha (2004) used the same methodology and found a J-curve for the USA with its seven trading partners. Bahmani-Oskooee and Wang (2007) used bounds testing approach to cointegration and error-correction modelling and found evidence of a J-curve between the USA

and Australia for 35 industries out of 64. Bahmani-Oskooee *et al.* (2017a) used bound testing between USA and Pakistan and found that almost 50 % of the industries were affected by changes in the exchange rate in the short-run. Additionally, Bahmani-Oskoee and Ratha (2004) and Bahmani-Oskooee and Hegerty (2010) reviewed the literature of empirical studies on the J-curve hypothesis and could not find a clear answer verifying the validity of the J-curve hypothesis.

Furthermore, prior studies investigating the evidence of the J-curve hypothesis act under the assumption that there are linear relationships between the variables in the empirical models. In other words, these studies assume that trade balance responds to appreciations and depreciations symmetrically (if depreciations improve the trade balance, appreciations worsen it). However, relationships between variables might be nonlinear. Trade balance may respond to appreciations and depreciations asymmetrically.

Consequently, the assumption of a linear relationship (symmetric) could also be a reason for the failures in testing the J-curve hypothesis by scholars. Therefore, Nusair, (2012, 2017), Bahmani-Oskooee and Fariditivana, (2015 and 2016), as well as Bahmani-Oskooee *et al.* (2017) applied, *for the first time,* the nonlinear ARDL cointegration introduced by *Shin (2014). The nonlinear approach allows asymmetries in the adjustment process of the relationships between exchange rates and trade balances.*

This study applies both the linear and nonlinear cointegration approaches to investigate the evidence of the J-curve hypothesis between the USA and its main trading partner countries, namely, Germany, Canada, Mexico, Japan, Korea, the UK, France, the Netherlands, Italy, Ireland, Chile and Israel, bilaterally. China, as the largest trading partner of the USA, was *unwillingly* excluded from the study because of *lack of* related *data.*

The rest of the paper is organised as follows: Section 2 provides a short empirical methodology. Section 3 explains the empirical model and data set. Section 4 and 5 provide the empirical results and the conclusion of this study, respectively.

2. Empirical Methodology

In the empirical model of the study, both linear and nonlinear ARDL cointegration methods are applied. Linear models assume that there are linear relationships between variables. However, these relationships may be nonlinear. The nonlinear method does not only introduce the nonlinear adjustment process between exchange rate and trade balance; it also enables us to determine whether currency depreciations and appreciations have symmetric or asymmetric effects on trade balances, as mentioned above. In other words, the nonlinear ARDL approach by Shin *et al.* (2014) allows us to examine the separate effects of both appreciations and depreciations of the USD on bilateral trade balances of the USA with its trading

partner countries. If appreciations of the USD affect trade balances of the country differently than depreciations do, this will imply asymmetric effects. Therefore, the nonlinear ARDL approach may provide more evidence than the linear approach in testing the hypothesis. The nonlinear ARDL approach also nests and extends the linear ARDL approach of Pesaran at al. (2001), as explained below.

3. Empirical Model and Data Set

Following previous studies (e.g. Bahmani-Oskooee and Fariditivana (2016), we adopt the following trade balance model:

$$InTB_i = \beta_0 + \beta_1 lnY_{USA} + \beta_2 lnY_i + \beta_3 lnREX_i + \varepsilon_t \quad (1)$$

Here, in the logarithmic form of the equation, it is assumed that the trade balance (*TB*) of the US is a function of the *incomes* of the US and the US's trading partner country *i* and the bilateral *real exchange rate* between the USD and the trading partner country i's currency. In Eq. (1), $lnTB_i$ is defined as the rate of US's import from trading partner i divided by its export to trading partner *i*. TB data were obtained from the IMF's Direction of Trade Statistics. The lnY_{USA} and lnY_i are the US's and trading partner country i's Industrial Production Indices (as proxy of income). Data for this index were obtained from the database of the Federal Reserve Bank of St. Louis (FED). $lnREX_i$ is the bilateral real exchange rate between the USD and trading partner country i's currency. $lnREX_i$ is defined as $lnREX_i$ = (CPI_{USA}.NEX_i/CPI_i). NEX_i is the nominal exchange rate defined as the number of units of trading partner i's currency per USD. CPI_{USA} and CPI_i are the Consumer Price Indices of the US and trading partner country i. The data of NEX_i and CPI's were obtained from the database of the Federal Reserve Bank of St. Louis (FED). The data used are monthly figures covering the period of 1991M1–2015M2. In Eqn.1, it is assumed that the sign of β_3 is to be positive in order to support the validity of the J-curve hypothesis between the US and its trading partner country. In other words, a decline in REX reflects real depreciation of the USD, increasing the US's exports and improving the trade balance of the US (hence, the validity of the J-curve hypothesis). The sign of β_1 is assumed to be positive if an increase in income of the US leads to an increase in imports of the country. If an increase in income of the country is due to an increase in the production of substitute goods imported before, this may lead to less imports for the US yielding a negative sign for β_1.Similarly, the sign of β_2 is also assumed to be positive or negative in the same way.

Having defined the variables in Eqn. 1, we apply the linear ARDL cointegration approach of Pesaran *et al.* (2001), which considers both the short-run and long-run effects of the variables on a dependent variable. Therefore, we transform the model of Rose and Yellen (1989) in Eqn.1 to the linear ARDL approach of Pesaran *et al.* (2001) in Eqn.2.

$$\Delta lnTB_t = \alpha + \sum_{j=1}^{n} \beta_j \Delta lnTB_{t-j} + \sum_{j=0}^{n} \gamma_j \Delta lnY_{t-j}^{USA} + \sum_{j=0}^{n} \delta_j \Delta lnY_{t-j}^{i} + \sum_{j=0}^{n} \mu_j \Delta lnREX_{t-j} + \theta_1 lnTB_{t-1} + \theta_2 lnY_{t-1}^{USA} + \theta_3 lnY_{t-1}^{i} + \theta_4 lnREX_{t-1} + \varepsilon_t \quad (2)$$

In the linear model in Eqn.2, if short-run deterioration combines with long-run improvement on the trade balance (as the estimates of μ_j are negative or insignificant in the short-run and the estimate of normalized θ_4 is positive and significant in the long-run) this will signify evidence of a J-curve according to the definition of Rose and Yellen (1989) (Bahmani-Oskooee and Fariditivana, 2016).

In order to analyse the separate effects of depreciations and appreciations of the USD on the trade balances of the country, we apply the nonlinear approach introduced by Shin *et al.* (2014) and adapted by Bahmani-Oskooee and Fariditivana (2015 and 2016), as shown in the following model.

$$\Delta lnTB_t = = \alpha + \sum_{j=1}^{n} \beta_j \Delta lnTB_{t-j} + \sum_{j=0}^{n} \gamma_j \Delta lnY_{t-j}^{USA} + \sum_{j=0}^{n} \delta_j \Delta lnY_{t-j}^{i} + \sum_{j=0}^{n} \mu_j^{+} \Delta POS_{t-j} + \sum_{j=0}^{n} \mu_j^{-} \Delta NEG_{t-j} + \theta_1 lnTB_{t-1} + \theta_2 lnY_{t-1}^{USA} + \theta_3 lnY_{t-1}^{i} + \theta_4^{+} POS_{t-1} + \theta_4^{-} NEG_{t-1} + \varepsilon_t \quad (3)$$

As seen in the equation above, appreciations (designated as *POS*) and depreciations (designated as *NEG*) of the USD are added, as additional variables, to Eqn.2. Thus Eqn.3 was derived from Eqn.2.The partial sums of *POS* and *NEG* changes in the USD are defined in the following form.

$$POS_t = \sum_{j=1}^{t} \Delta lnREX_j^{+} = \sum_{j=1}^{t} \max(\Delta lnRE_j, 0)$$
$$NEG_t = \sum_{j=1}^{t} \Delta lnREX_j^{-} = \sum_{j=1}^{t} \min(\Delta lnREX_j, 0) \quad (4)$$

In the nonlinear model in Eqn.3, if the estimates of normalised long-run appreciation (θ_4^{+}) or depreciation (θ_4^{-}) are significantly positive this will signify evidence *of the J-curve hypothesis according to the definition of* Bahmani-Oskooee and Fariditivana (2015 and 2016).

4. Empirical Results

In this section of the study, we first present the empirical results of the linear ARDL cointegration approach of Pesaran *et al.* (2001). However, before this, we present the unit root test results of the Augmented Dickey-Fuller (ADF) for the stationary. ADF test results are reported in Table 1.

Table 1. Augmented Dickey–Fuller Unit Root Test Results

	Level Variables							
	lnTB		lnY_i		lnY_{USA}		lnREX	
Partner i	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend
Germany	-2.14	-1.90	-0.99	-3.55[b]	-1.88	-2.19	-2.39	-2.42
Canada	-1.15	-1.13	-2.24	-1.84	-1.88	-2.19	-1.92	-2.12
Mexico	-2.27	-2.20	-1.25	-2.13	-1.88	-2.19	-3.40[b]	-3.38[c]
Japan	-3.18[b]	-3.16[c]	-3.51[a]	-3.51[b]	-1.88	-2.19	-1.41	-2.54
Korea	-3.06[b]	-3.40[c]	-1.31	-2.05	-1.88	-2.19	-2.44	-2.42
The UK	-1.79	-1.43	-1.16	-1.53	-1.88	-2.19	-3.66[a]	-3.77[b]
France	-3.86[a]	-2.99	-1.58	-1.52	-1.88	-2.19	-2.45	-2.45
The Netherlands	-5.83[a]	-6.52[a]	-1.62	-2.78	-1.88	-2.19	-2.59	-2.60
Italy	-3.61[b]	-3.16[c]	-1.39	-1.83	-1.88	-2.19	-2.30	-2.33
Ireland	-1.74	-5.15[a]	-2.22	-1.19	-1.88	-2.19	-2.26	-2.41
Israel	-1.71	-4.00[a]	-2.24	-3.51[b]	-1.88	-2.19	-2.31	-2.27
Chile	-1.62	-1.90	-2.10	-3.63[b]	-1.88	-2.19	-2.12	-2.08
	First Differenced Variables							
Germany	-5.07[a]	-5.17[a]	-7.22*	-7.22[a]	-4.41[a]	-4.50[a]	-12.39[a]	-12.37[a]
Canada	-6.65[a]	-6.95[a]	-6.98*	-7.13[a]	-4.41[a]	-4.50[a]	-12.92[a]	-12.91[a]
Mexico	-26.21[a]	-26.21[a]	-19.14*	-19.14[a]	-4.41[a]	-4.50[a]	-13.68[a]	-13.67[a]
Japan	-22.22[a]	-22.21[a]	-15.27*	-15.25[a]	-4.41[a]	-4.50[a]	-12.26[a]	-12.28[a]
Korea	-18.81[a]	-18.78[a]	-17.39*	-17.43[a]	-4.41[a]	-4.50[a]	-12.24[a]	-12.23[a]
The UK	-7.44[a]	-7.53[a]	-20.97*	-21.16[a]	-4.41[a]	-4.50[a]	-12.71[a]	-12.70[a]
France	-12.82[a]	-13.19[a]	-22.84*	-22.85[a]	-4.41[a]	-4.50[a]	-12.46[a]	-12.44[a]
The Netherlands	-10.86[a]	-10.95[a]	-18.52*	-18.52[a]	-4.41[a]	-4.50[a]	-12.21[a]	-12.20[a]
Italy	-5.83[a]	-6.02[a]	-7.09*	-7.25[a]	-4.41[a]	-4.50[a]	-11.33[a]	-11.32[a]
Ireland	-11.22[a]	11.37[a]	-13.94*	-14.13[a]	-4.41[a]	-4.50[a]	-12.47[a]	-12.45[a]
Israel	-6.87[a]	-6.90[a]	-21.89*	-21.98[a]	-4.41[a]	-4.50[a]	-12.82[a]	-12.81[a]
Chile	-22.79[a]	-22.77[a]	-16.46*	16.52[a]	-4.41[a]	-4.50[a]	-12.00[a]	-11.99[a]

Test results show that some variables are stationary at their levels I (0) and some at their first differences I (1). But all are stationary at their first differences. Hence, we can apply the cointegration analysis for long-run relationships. To this aim, we apply the ARDL bounds testing, developed by Pasaran *et al.* (2001), using $F - stat$ The critical values, tabulated by Pasaran *et al.* (2001) for a linear model of three exogenous variables with an unrestricted intercept and no trend, are 3.77 and 4.35 for the upper bounds and 2.72 and 3.23 for the lower bounds at the 10% and 5% significance levels, respectively. Hence, the empirical results of the linear models indicate that there are long-run relationships for all countries except Canada and Chile (neither is reported in Table 2), since their $F - stats$ exceed the *upper critical* bounds value. Nevertheless, there is evidence of the J-curve hypothesis for the US with only Italy, the Netherlands, Mexico and France, since the estimates of (μ_j) are negative or insignificant in the short-run and estimates of normalised (θ_4) are positive and significant in the long-run. In other words, the J-curve hypothesis is supported since the depreciations in the USD deteriorate the US trade balance in the short-run and improve it in the long-run. The empirical results of the linear ARDL cointegration approach are reported in Table 2.

On the other hand, the critical values tabulated by Pesaran *et al.* (2001) for a nonlinear model of four exogenous variables with an unrestricted intercept and no trend, are 3.52 and 4.01 for the upper bounds and 2.45 and 2.86 for the lower bounds at the 10% and 5% significance levels, respectively. Hence, the empirical results of the nonlinear models, reported in Table 3, indicate that there are long-run relationships for all countries since their $F - stats$ *exceed* the *upper critical* bounds value. However, the evidence of the J-curve hypothesis for the USA is found with only Italy, Ireland, the Netherlands, Korea, Mexico, Japan, Israel and France, because the estimates of normalised long-run appreciation (θ_4^+) or depreciation (θ_4^-) are significantly positive only for these countries. The empirical results of the nonlinear ARDL cointegration approach are reported in Table 3.

Furthermore, the *estimated ECM (error correction model)* coefficients of both linear and nonlinear models are negative and significant for all countries except Germany. The *speed* of adjustment of the ECM in the nonlinear approach is higher than that of the ECM in the linear approach. To estimate the long-run asymmetric effects of appreciations and depreciations on the US trade balance, we apply the Wald test. The null hypothesis of long-run symmetry $(\theta_4^+ = \theta_4^-)$ is rejected implying that appreciations and depreciations have asymmetrical effects on the US trade balance with Canada, Ireland, Korea, Chile and Japan, since their long-run Wald statistics (W_{LR}) are significant. Additional diagnostic tests are reported on relevant tables for the linear and nonlinear models.

Table 2. Estimates of the Linear ARDL Model

	Estimate of the Linear ARDL Model														
	USA-Germany			USA-Italy			USA-Ireland			USA- Netherlands			USA-Korea		
	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t stat.
Long-run Estimates	Constant	-3.92	-0.47	Constant	-0.52	-0.20	Constant	9.48	2.26[b]	Constant	-5.14	-3.89[a]	Constant	-15.58	-3.16
	lnY_{USA}	-3.78	-0.60	lnY_{USA}	0.30	1.03	lnY_{USA}	-3.99	-3.25[a]	lnY_{USA}	-0.69	-1.48	lnY_{USA}	0.94	1.16[c]
	lnY_{GER}	3.33	0.67	lnY_{ITA}	-0.19	-0.51	lnY_{IRE}	2.32	6.49[a]	lnY_{FRA}	1.71	2.57[a]	lnY_{KOR}	-0.17	-0.72
	$lnREX$	3.51	0.91	$lnREX$	0.45	2.41[b]	$lnREX$	0.47	1.22	$lnREX$	0.45	2.02[b]	$lnREX$	1.76	2.58[b]
Short- run Estimates	$\Delta lnTB_{t-1}$	-0.66	-7.49[a]	$\Delta lnTB_{t-1}$	-0.35	-3.48[a]	$\Delta lnTB_{t-1}$	-0.56	-6.31[a]	$\Delta lnTB_{t-1}$	-0.34	-5.02[a]	$\Delta lnTB_{t-1}$	-0.57	-7.96[a]
	$\Delta lnTB_{t-2}$	-0.66	-7.80[a]	$\Delta lnTB_{t-2}$	-0.35	-3.16[a]	$\Delta lnTB_{t-2}$	-0.49	-5.24[a]	$\Delta lnTB_{t-2}$	-0.16	-2.76[a]	$\Delta lnTB_{t-2}$	-0.42	-5.70[a]
	$\Delta lnTB_{t-3}$	-0.51	-5.08[a]	$\Delta lnTB_{t-3}$	-0.24	-2.39[a]	$\Delta lnTB_{t-3}$	-0.43	-4.56[a]	$\Delta lnTB_{t-5}$	-0.17	-3.20[a]	$\Delta lnTB_{t-3}$	-0.20	-2.85[a]
	$\Delta lnTB_{t-4}$	-0.52	-4.63[a]	$\Delta lnTB_{t-4}$	-0.27	-2.80[a]	$\Delta lnTB_{t-4}$	-0.43	-4.68[a]	$\Delta lnTB_{t-8}$	-0.17	-2.94[a]	$\Delta lnTB_{t-4}$	-0.14	-2.06[b]
	$\Delta lnTB_{t-5}$	-0.41	-3.34[a]	$\Delta lnTB_{t-5}$	-0.21	-2.29[b]	$\Delta lnTB_{t-5}$	-0.42	-4.81[a]	$\Delta lnTB_{t-7}$	-0.30	-5.14[a]	$\Delta lnTB_{t-5}$	-0.21	-3.11[a]
	$\Delta lnTB_{t-6}$	-0.49	-4.42[a]	$\Delta lnTB_{t-6}$	-0.23	-2.63[a]	$\Delta lnTB_{t-6}$	-0.40	-4.73[a]	$\Delta lnTB_{t-9}$	-0.33	-5.58[a]	$\Delta lnTB_{t-6}$	-0.14	-2.07[b]
	$\Delta lnTB_{t-7}$	-0.41	-3.48[a]	$\Delta lnTB_{t-7}$	-0.26	-3.16[a]	$\Delta lnTB_{t-7}$	-0.51	-6.24[a]	$\Delta lnTB_{t-9}$	-0.17	-2.85[a]	$\Delta lnTB_{t-7}$	-0.34	-4.90[a]
	$\Delta lnTB_{t-8}$	-0.33	-3.12[a]	$\Delta lnTB_{t-8}$	-0.24	-2.63[a]	$\Delta lnTB_{t-8}$	-0.55	-6.79[a]	$\Delta lnTB_{t-10}$	-0.10	1.95[b]	$\Delta lnTB_{t-8}$	-0.22	-3.11[a]
	$\Delta lnTB_{t-9}$	-0.34	-3.36[a]	$\Delta lnTB_{t-9}$	-0.24	-2.96[a]	$\Delta lnTB_{t-9}$	-0.47	-6.03[a]	$\Delta lnY_{USA_{t-7}}$	3.48	2.60[a]	$\Delta lnTB_{t-9}$	-0.20	-2.98[a]
	$\Delta lnTB_{t-10}$	-0.40	-4.86[a]	$\Delta lnTB_{t-10}$	-0.37	-4.37	$\Delta lnTB_{t-10}$	-0.40	-5.57[a]	$\Delta lnY_{USA_{t-10}}$	-3.09	-2.34[b]	$\Delta lnTB_{t-10}$	-0.20	-3.22[a]
	$\Delta lnTB_{t-11}$	-0.28	-4.13[a]	$\Delta lnTB_{t-11}$	-0.28	-3.72[a]	$\Delta lnTB_{t-11}$	-0.24	-4.25[a]	$\Delta lnY_{NET\ t-8}$	-0.87	-2.44[b]	$\Delta lnTB_{t-11}$	-0.25	-4.52[a]
	$\Delta lnY_{GER_{t-7}}$	-0.90	-3.03[b]	$\Delta lnTB_{t-12}$	0.27	4.01[a]	$\Delta lnY_{USA_{t-9}}$	5.74	2.67[a]	$\Delta lnY_{NET\ t-10}$	-0.77	-2.19[b]	$\Delta lnY_{KOR_{t-1}}$	-0.81	2.77[a]
	$\Delta lnY_{USA_{t-1}}$	2.20	2.37[b]	$\Delta lnY_{USA_{t-11}}$	-2.68	-2.76[a]	$\Delta lnREX_{t-8}$	1.06	2.01[b]				$\Delta lnY_{USA_{t-7}}$	2.29	1.99[b]
	$\Delta lnY_{USA_{t-2}}$	2.31	3.11[a]	$\Delta lnY_{USA_{t-12}}$	3.35	4.10[a]							$\Delta lnREX_{t-1}$	0.84	3.74[a]
	$\Delta lnY_{USA_{t-8}}$	1.56	1.76[c]										$\Delta lnREX_{t-8}$	0.62	2.76[a]
	$\Delta lnREX_{t-11}$	-0.50	-1.95[c]												
	Diagnostic statistic														
	F= 3.93* R^2= 0.48 Adj. R^2 = 0.44 ECM_{t-1}= -0.05(0.89) χ^2_{SC} = 2.29 [0.00] χ^2_{HET}=0.23[0.63] CUSM=S $CUSM^2$=S			F= 4.20 * R^2= 0.61 Adj. R^2 = 0.59 ECM_{t-1}= -0.24(2.79) χ^2_{SC} = 33.37 [0.00] χ^2_{HET} = 211.6[0.124] CUSM=UNS $CUSM^2$=S			F = 7.21** R^2= 0.49 Adj. R^2 = 0.46 ECM_{t-1}= -0.32(4.06) χ^2_{SC} = 17.11[0. 14] χ^2_{HET} =158.01[0.73] CUSM=S $CUSM^2$=S			F=7.36** R^2= 0.40 Adj. R^2 = 0.37 ECM_{t-1}= -0.32(5.15) χ^2_{SC} = 15.84 [0.20] χ^2_{HET} = 176.27[0.08] CUSM=UNS $CUSM^2$=S			F = 4.21 * R^2= 0.48 Adj. R^2 = 0.44 ECM_{t-1}= -0.13(2.51) χ^2_{SC} =12.32[0.42] χ^2_{HET} =213[0.39] CUSM=S $CUSM^2$=S		

Pesaran, Shin and Smith (2001) tabulate the 5% critical values for k=3 as follows: Fcrit= 4.35, 10% critical values for k=3 as follows Fcrit 3.77. **: 5%, *: 10%. χ2SC, χ2HET, denote LM tests for serial correlation, Heteroscedasticity (White). Figures in parentheses are the associated t-statistics. Figures in square parentheses are the associated t-statistics p-values. CUSUM (denoted by CUSM) and CUSUMSQ (denoted by CUSM2). In each case we denote stable coefficients by "S" and unstable ones by "UNS". The Newey-West correction is applied for Germany and Italy. The Huber White correction is applied for the Netherlands. The Newey-West correction is applied to Germany and Italy to eliminate the observed effects of autocorrelation for these countries. The Huber White correction is applied to for the Netherlands to eliminate the changing variance for this country. Canada is not included to the table since we could not find a cointegrated relationship and, therefore, could not estimate the coefficients in the long and short-runs. The short-run estimates of for Italy and the Netherlands are not reported, since we used the General-to-specific (Gets) modelling approach developed by Hendry 1995, eliminating variables with coefficients that are not statistically significant.

Table 2. Estimates of the Linear ARDL Model (continued)

	Estimate of the Linear ARDL Model														
	USA-UK			USA-Mexico			USA-Japan			USA-Israel			USA-France		
	Variables	Coef.	t statis.	Variables	Coef	t stat.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.
Long- run Estimates	Constant	-5.70	-2.87[a]	Constant	-2.87	-2.90	Constant	-0.31	-0.14	Constant	-4.67	-6.39[a]	Constant	-0.43	0.44
	lnY_{USA}	0.46	2.72[a]	lnY_{USA}	1.31	2.72[a]	lnY_{USA}	-0.34	-1.08	lnY_{USA}	0.58	1.65[c]	lnY_{USA}	0.11	0.58
	lnY_{UK}	0.75	1.70[b]	lnY_{MEX}	-0.84	-1.77[c]	lnY_{JAP}	0.11	0.21	lnY_{ISR}	0.34	1.65[c]	lnY_{FRA}	0.003	0.92
	$lnREX$	-0.21	-0.68	$lnREX$	0.39	1.78[c]	$lnREX$	0.48	1.59	$lnREX$	0.69	2.64[a]	$lnREX$	0.41	1.91[c]
Short- run Estimates	$\Delta lnTB_{t-1}$	-0.31	-4.76[a]	$\Delta lnTB_{t-1}$	-0.35	-6.70[a]	$\Delta lnTB_{t-1}$	-0.51	-8.75[a]	$\Delta lnTB_{t-1}$	-0.32	-6.24[a]	$\Delta lnTB_{t-1}$	-0.47	-4.52[a]
	$\Delta lnTB_{t-2}$	-0.16	-2.89[b]	$\Delta lnTB_{t-12}$	0.26	5.25[a]	$\Delta lnTB_{t-2}$	-0.43	-8.06[a]	$\Delta lnTB_{t-12}$	0.27	6.48[a]	$\Delta lnTB_{t-2}$	-0.44	-4.35[a]
	$\Delta lnTB_{t-8}$	-0.10	-2.23[b]	ΔlnY_{MEX}	-0.51	-2.23[b]	$\Delta lnY_{JAP\ t-2}$	1.04	4.51[a]	ΔlnY_{ISR}	1.25	2.71[a]	$\Delta lnTB_{t-2}$	-0.35	-3.50[a]
	$\Delta lnY_{UK\ t-8}$	-1.42	1.88[c]	$\Delta lnY_{USA\ t-8}$	-0.93	-2.23[b]	$\Delta lnY_{JAP\ t-3}$	0.61	2.54[b]	$\Delta lnY_{ISR_{t-9}}$	-1.30	-2.88[a]	$\Delta lnTB_{t-4}$	-0.33	-3.45[a]
	$\Delta lnREX$	-1.06	-3.44[a]	$\Delta lnREX$	0.18	2.32[b]	$\Delta lnY_{JAP\ t-5}$	-0.46	-1.94[c]	$\Delta lnY_{USA_{t-4}}$	-4.28	-2.93[a]	$\Delta lnTB_{t-5}$	-0.35	-3.94[a]
				$\Delta lnREX_{t-8}$	0.21	2.50[b]	$\Delta lnREX_{t-1}$	-0.38	-2.23[b]	$\Delta lnREX_{t-8}$	1.14	2.11[b]	$\Delta lnTB_{t-8}$	-0.39	-4.63[a]
				$\Delta lnREX_{t-7}$	-0.17	-2.07[b]							$\Delta lnTB_{t-7}$	-0.49	-6.25[a]
													$\Delta lnTB_{t-8}$	-0.44	-5.70[a]
													$\Delta lnTB_{t-9}$	-0.42	-5.66[a]
													$\Delta lnTB_{t-10}$	-0.45	-6.97[a]
													$\Delta lnTB_{t-11}$	-0.35	-6.46[a]
													$\Delta lnY_{USA_{t-5}}$	2.01	1.97[c]
													$\Delta lnREX_{t-7}$	-0.73	-2.63[a]
	Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic		
	F= 6.40** R^2= 0.32 Adj. R^2= 0.30 ECM_{t-1}= -0.29 (5.04) χ^2_{SC}= 13.08 [0.22] χ^2_{HET}=53.64[0.48] CUSM=S $CUSM^2$=S			F=4.66** R^2= 0.35 Adj. R^2= 0.32 ECM_{t-1}= -0.12(3.90) χ^2_{SC}= 11.54 [0.48] χ^2_{HET}=89.11 [0.16] CUSM=UNS $CUSM^2$=S			F= 3.98 * R^2= 0.42 Adj. R^2= 0.39 ECM_{t-1}= -0.16(3.58) χ^2_{SC}= 4.30[0.93] χ^2_{HET}=74.22[0.20] CUSM=S $CUSM^2$=S			F= 12.90** R^2= 0.62 Adj. R^2= 0.61 ECM_{t-1}= -0.47(7.06) χ^2_{SC}= 15.83[0. 20] χ^2_{HET}=57.04[0.74] CUSM=S $CUSM^2$=S			F= 5.34** R^2= 0.52 Adj. R^2= 0.48 ECM_{t-1}= -0.34(3.25) χ^2_{SC}= 16.15 [0.13] χ^2_{HET}=176.72[0.35] CUSM=S $CUSM^2$=S		

Pesaran, Shin and Smith (2001) tabulate the 5% critical values for k=3 as follows: Fcrit= 4.35, 10% critical values for k=3 as follows Fcrit 3.77. ** : 5%, *:10%. χ2SC, χ2HET denote LM tests for serial correlation, Heteroscedasticity (White). Figures in parentheses are the associated t-statistics. Figures in square parentheses are the associated p-values. CUSUM (denoted by CUSM) and CUSUMSQ (denoted by CUSM2). In each case we denote stable coefficients by "S" and unstable ones by "UNS".

Table 3. Estimates of the Nonlinear ARDL Model

	USA-Canada			USA-Germany			USA-Italy			USA-Ireland			USA-Netherlands			USA-Korea		
	Variables	Coef.	t stat.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef	t stat.
Long-run Estimates	Constant	-4.03	-14.8[a]	Constant	-31.2	-0.77	Constant	-0.67	-0.26	Constant	6.18	2.57[b]	Constant	-8.34	-3.00[a]	Constant	-2.23	-1.04
	lnY_{USA}	-0.93	-4.52[a]	lnY_{USA}	-5.29	-0.68	lnY_{USA}	1.64	2.22[b]	lnY_{USA}	-2.78	-3.82[a]	lnY_{USA}	-0.54	-1.12	lnY_{USA}	1.74	2.54[b]
	lnY_{CAN}	1.89	8.91[a]	lnY_{GER}	-1.83	-0.63	lnY_{ITA}	-1.19	-1.68[c]	lnY_{IRE}	1.66	6.29[a]	lnY_{NET}	2.27	2.79[a]	lnY_{KOR}	-1.57	-2.52[b]
	POS	-0.36	-5.73[a]	POS	4.24	0.93	POS	0.13	0.59	POS	0.55	2.21[b]	POS	0.30	1.13	POS	1.8	3.49[a]
	NEG	-0.21	-3.84[a]	NEG	3.14	0.90	NEG	0.41	2.09[b]	NEG	0.31	1.37	NEG	0.40	1.67[c]	NEG	1.03	2.02[b]
Short- run Estimates	$\Delta lnTB_{t-1}$	-0.18	-3.74[a]	$\Delta lnTB_{t-1}$	-0.66	-8.04[a]	$\Delta lnTB_{t-1}$	-0.37	-3.72[a]	$\Delta lnTB_{t-1}$	-0.38	-3.19[a]	$\Delta lnTB_{t-1}$	-0.34	-4.95[a]	$\Delta lnTB_{t-1}$	-0.55	-8.23[a]
	$\Delta lnTB_{t-2}$	-0.16	-3.73[a]	$\Delta lnTB_{t-2}$	-0.64	-7.59[a]	$\Delta lnTB_{t-2}$	-0.36	-3.37[a]	$\Delta lnTB_{t-2}$	-0.33	-2.79[a]	$\Delta lnTB_{t-2}$	-0.16	-2.74[a]	$\Delta lnTB_{t-2}$	-0.42	-5.96[a]
	$\Delta lnTB_{t-4}$	-0.11	-3.07[a]	$\Delta lnTB_{t-3}$	-0.52	-5.61[a]	$\Delta lnTB_{t-3}$	-0.26	-2.55[b]	$\Delta lnTB_{t-3}$	-0.29	-2.50[b]	$\Delta lnTB_{t-5}$	-0.17	-3.23[a]	$\Delta lnTB_{t-3}$	-0.27	-3.81[a]
	$\Delta lnTB_{t-8}$	-0.12	-2.79[a]	$\Delta lnTB_{t-4}$	-0.53	-4.93[a]	$\Delta lnTB_{t-4}$	-0.29	-3.03[a]	$\Delta lnTB_{t-4}$	-0.30	-2.80[a]	$\Delta lnTB_{t-8}$	-0.17	-2.99[a]	$\Delta lnTB_{t-4}$	-0.22	-3.12[a]
	$\Delta lnTB_{t-9}$	-0.20	-4.43[a]	$\Delta lnTB_{t-5}$	-0.41	-3.76[a]	$\Delta lnTB_{t-5}$	-0.22	-2.50[b]	$\Delta lnTB_{t-5}$	-0.29	-2.93[a]	$\Delta lnTB_{t-7}$	3.35	2.49[b]	$\Delta lnTB_{t-5}$	-0.31	-4.40[a]
	$\Delta lnTB_{t-10}$	-0.37	-8.56[a]	$\Delta lnTB_{t-6}$	-0.51	-5.12[a]	$\Delta lnTB_{t-8}$	-0.25	-2.90[a]	$\Delta lnTB_{t-6}$	-0.31	-3.25[a]	$\Delta lnTB_{t-8}$	-0.33	-5.62[a]	$\Delta lnTB_{t-6}$	-0.20	-2.90[a]
	$\Delta lnTB_{t-11}$	-0.32	-5.77[a]	$\Delta lnTB_{t-7}$	-0.41	-3.94[a]	$\Delta lnTB_{t-7}$	-0.28	-3.40[a]	$\Delta lnTB_{t-7}$	-0.43	-4.85[a]	$\Delta lnTB_{t-9}$	-0.17	-2.89[a]	$\Delta lnTB_{t-7}$	-0.42	-6.13[a]
	ΔlnY_{USA}	-0.58	-1.63	$\Delta lnTB_{t-8}$	-0.31	-3.52[a]	$\Delta lnTB_{t-8}$	-0.26	-2.88[a]	$\Delta lnTB_{t-8}$	-0.49	-5.74[a]	$\Delta lnTB_{t-10}$	-0.10	-1.99[b]	$\Delta lnTB_{t-8}$	-0.31	-4.49[a]
	$\Delta lnY_{USA_{t-4}}$	-1.13	-3.20[a]	$\Delta lnTB_{t-9}$	-0.33	-3.69[a]	$\Delta lnTB_{t-9}$	-0.26	-3.23[a]	$\Delta lnTB_{t-9}$	-0.42	-5.17[a]	$\Delta lnY_{USA_{t-7}}$	3.35	2.49[b]	$\Delta lnTB_{t-9}$	-0.30	-4.46[a]
	$\Delta lnY_{USA_{t-5}}$	-0.91	-2.55[a]	$\Delta lnTB_{t-10}$	-0.42	-5.24[a]	$\Delta lnTB_{t-10}$	-0.38	-4.58[a]	$\Delta lnTB_{t-10}$	-0.37	-5.09[a]	$\Delta lnY_{USA_{t-10}}$	-3.22	-2.44[b]	$\Delta lnTB_{t-10}$	-0.29	-4.61[a]
	$\Delta lnY_{USA_{t-6}}$	1.10	2.79[a]	$\Delta lnTB_{t-11}$	-0.26	-3.99[a]	$\Delta lnTB_{t-11}$	-0.29	-3.94[a]	$\Delta lnTB_{t-11}$	-0.21	-3.74[a]	$\Delta lnY_{NET_{t-5}}$	-0.90	-2.52[b]	$\Delta lnTB_{t-11}$	-0.30	-5.45[a]
	ΔlnY_{CAN}	0.92	3.90[a]	$\Delta lnY_{USA_{t-5}}$	2.64	2.98[a]	$\Delta lnTB_{t-12}$	0.26	3.88[a]	$\Delta lnY_{USA_{t-9}}$	6.05	2.84[a]	$\Delta lnY_{NET_{t-10}}$	-0.82	-2.32[b]	$\Delta lnY_{USA_{t-10}}$	3.15	2.82[a]
	$\Delta lnY_{CAN_{t-8}}$	-0.62	-2.65[a]	$\Delta lnY_{USA_{t-8}}$	2.43	2.54[b]	$\Delta lnY_{USA_{t-11}}$	-2.98	-3.22[a]	$\Delta lnY_{IRE_{t-8}}$	-0.43	-1.77[c]				ΔPOS_{t-1}	0.78	2.84[a]
	$\Delta lnY_{CAN_{t-10}}$	-1.01	-4.45[a]	$\Delta lnY_{GER_{t-7}}$	-0.78	-2.29[b]	$\Delta lnY_{USA_{t-12}}$	3.09	3.71[a]	$\Delta lnY_{IRE_{t-12}}$	-0.48	-1.86[c]				ΔNEG_{t-8}	2.46	5.07[a]
	ΔNEG_{t-8}	-0.68	-3.37[a]	ΔPOS_{t-1}	-0.81	-2.13[b]				ΔPOS_{t-8}	1.70	1.89[c]				ΔNEG_{t-10}	1.63	3.27[a]
	Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic		
	F=28.22** R^2= 0.51Adj. R^2= 0.47 ECM $_{t-1}$=-0.50 (8.20) χ^2_{SC}= 28.27 [000] χ^2_{HET}=238.032[0.30] CUSM=UNS $CUSM^2$=S W_{LR}=51.12 [0.00]			F=4.44** R^2= 0.48 Adj. R^2= 0.44 ECM $_{t-1}$=-0.06 (0.88) χ^2_{SC}= 29.84 [0.00] χ^2_{HET}=244.46[0.24] CUSM=S $CUSM^2$=S W_{LR}=0.718[0.39]			F=4.00 * R^2= 0.62 Adj. R^2= 0.59 ECM $_{t-1}$= -0.23 (2.78) χ^2_{SC}=32.90[0.00] χ^2_{HET}=230.30[0.15] CUSM=UNS $CUSM^2$=S W_{LR}=2.18[0.14]			F= 6.97** R^2= 0.52 Adj. R^2= 0.48 ECM $_{t-1}$= -0.52 (4.38) χ^2_{SC}=18.21[0.10] χ^2_{HET}= 237.50[0.35] CUSM=S $CUSM^2$=S W_{LR}=7.136[0.00]			F=6.19** R^2= 0.40 Adj. R^2= 0.37 ECM $_{t-1}$= -0.33(5.26) χ^2_{SC}=16.14[0.18] χ^2_{HET}=192.96[0.11] CUSM=US $CUSM^2$=S W_{LR}=1.48[0.22]			F= 7.21 ** R^2= 0.52 Adj. R^2= 0.48 ECM $_{t-1}$= -0.18 (3.34) χ^2_{SC}=7.80[0.80] χ^2_{HET}=201.24[0.91] CUSM=S $CUSM^2$=S W_{LR}=6.05[0.01]		

Pesaran, Shin and Smith (2001) tabulate the 5% critical values for k=4 as follows: Fcrit= 4.01, 10% critical values for k=4 as follows Fcrit 3.52. **: 5%, *: 10%. χ2SC, χ2HET, denote LM tests for serial correlation, Heteroscedasticity (White). Figures in parentheses are the associated t-statistics. Figures in square parentheses are the associated p-values. CUSUM (denoted by CUSM) and CUSUMSQ (denoted by CUSM2). In each case, we denote stable coefficients by "S" and unstable ones by "UNS" WLR refers to the Wald test of long-run symmetry. The Newey-West correction is applied for Canada, Germany and Italy. The short-run estimates of and/or for Canada, Germany, Italy, Ireland, the Netherlands, the UK, Mexico and Israel are not reported, since we used the General-to-specific (Gets) modelling approach developed by Hendry 1995, eliminating variables with coefficients that are not statistically significant.

Table 3. Estimates of the Nonlinear ARDL Model (continued)

	USA-UK			USA-Mexico			USA-Japan			USA-Israel			USA-Chile			USA-France		
	Variables	Coef.	t statis.	Variables	Coef	t stat.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.	Variables	Coef.	t statis.
Long-run Estimates	Constant	-3.94	-1.37	Constant	-7.02	-2.27	Constant	0.46	0.23	Constant	-3.71	-2.88[a]	Constant	1.26	2.45[b]	Constant	-3.05	-1.96[c]
	lnY_{USA}	0.90	1.10	lnY_{USA}	0.68	1.22	lnY_{USA}	0.52	1.42	lnY_{USA}	0.57	1.50	lnY_{USA}	-0.33	-2.98[a]	lnY_{USA}	0.83	1.80[c]
	lnY_{UK}	0.01	0.01	lnY_{UK}	1.01	0.98	lnY_{JAP}	-0.40	-0.92	lnY_{ISR}	0.31	0.69	lnY_{CHI}	-0.04	-0.28	lnY_{FRA}	-0.00	-0.50
	POS	-0.09	-0.27	POS	0.66	2.26[b]	POS	0.45	2.07[b]	POS	0.76	2.97[a]	POS	-0.28	-4.39[a]	POS	0.29	1.64
	NEG	0.01	0.04	NEG	0.91	2.27[b]	NEG	0.61	2.63[a]	NEG	0.76	2.64[a]	NEG	-0.46	-7.19[a]	NEG	0.40	2.32[b]
Short- run Estimates	$\Delta lnTB_{t-1}$	-0.32	-4.86[a]	$\Delta lnTB_{t-1}$	-0.35	-6.66[a]	$\Delta lnTB_{t-1}$	-0.47	-7.99[a]	$\Delta lnTB_{t-1}$	-0.32	-6.24[a]	$\Delta lnTB_{t-1}$	-0.21	-3.91[a]	$\Delta lnTB_{t-1}$	-0.40	-3.80[a]
	$\Delta lnTB_{t-2}$	-0.16	2.88[a]	$\Delta lnTB_{t-12}$	0.26	5.31[a]	$\Delta lnTB_{t-2}$	-0.40	-7.66[a]	$\Delta lnTB_{t-12}$	0.27	6.47[a]	$\Delta lnTB_{t-2}$	0.16	3.18[a]	$\Delta lnTB_{t-2}$	-0.38	-3.79[a]
	$\Delta lnTB_{t-7}$	-0.09	-1.72[c]	$\Delta lnY_{MEX_{t-2}}$	-0.56	-2.53[b]	$\Delta lnY_{JAP_{t-2}}$	1.11	4.87[a]	ΔlnY_{ISR}	1.32	2.78[a]	$\Delta lnTB_{t-8}$	0.18	3.36[a]	$\Delta lnTB_{t-3}$	-0.28	-2.91[a]
	$\Delta lnTB_{t-8}$	-0.15	-2.86[a]				$\Delta lnY_{JAP_{t-3}}$	0.76	3.16[a]	$\Delta lnY_{ISR_{t-9}}$	-1.31	-2.87[a]	$\Delta lnTB_{t-9}$	0.14	2.50[b]	$\Delta lnTB_{t-4}$	-0.26	-2.84[a]
	ΔPOS	-1.26	-2.65[a]				$\Delta lnY_{JAP_{t-5}}$	-0.41	-1.77[c]	$\Delta lnY_{USA_{t-4}}$	-4.17	-2.83[a]	$\Delta lnTB_{t-10}$	0.12	2.23[b]	$\Delta lnTB_{t-5}$	-0.30	-3.41[a]
							ΔPOS_{t-4}	-0.80	-2.56[b]				$\Delta lnTB_{t-12}$	-0.11	-2.11[b]	$\Delta lnTB_{t-6}$	-0.33	-3.98[a]
							ΔNEG_{t-1}	-0.65	-2.38[b]				$\Delta lnY_{CHI_{t-7}}$	0.11	3.00[a]	$\Delta lnTB_{t-7}$	-0.46	-5.76[a]
													ΔlnY_{USA}	-0.57	-3.17[a]	$\Delta lnTB_{t-8}$	-0.43	-5.61[a]
													$\Delta lnY_{USA_{t-12}}$	-0.37	-2.12[b]	$\Delta lnTB_{t-9}$	-0.39	-5.42[a]
													ΔPOS_{t-2}	0.23	2.95[a]	$\Delta lnTB_{t-10}$	-0.44	-6.81[a]
													ΔPOS_{t-8}	0.25	3.37[a]	ΔPOS_{t-4}	-1.01	-2.04[b]
													ΔPOS_{t-9}	-0.15	-2.01[b]	ΔPOS_{t-11}	-0.96	2.08[b]
													ΔNEG_{t-1}	-0.18	-2.16[b]	ΔNEG_{t-7}	-1.86	-3.96[a]
	Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic			Diagnostic statistic		
	F= 4.51** R^2= 0.31 Adj. R^2= 0.28 ECM_{t-1}= -0.27 (4.60) χ^2_{SC}= 13.64 [0.19] χ^2_{HET}=83.07[0.05] CUSM=S $CUSM^2$=S W_{LR}=0.32[0.57]			F= 3.89* R^2= 0.32 Adj. R^2= 0.30 ECM_{t-1}= -0.11(3.62) χ^2_{SC}= 15.40 [0.22] χ^2_{HET}=83.07[0.06] CUSM=UNS $CUSM^2$=S W_{LR}=2.68[0.10]			F= 4.84** R^2= 0.43 Adj. R^2= 0.41 ECM_{t-1}= -0.21(4.46) χ^2_{SC}= 5.47 [0.85] χ^2_{HET}=102.95[0.16] CUSM=S $CUSM^2$=S W_{LR}=6.72[0.01]			F= 10.24** R^2= 0.61 Adj. R^2= 0.60 ECM_{t-1}= -0.48 (7.07) χ^2_{SC}= 16.83 [0.15] χ^2_{HET}=63.30[0.54] CUSM=S $CUSM^2$=S W_{LR}=0.001[0.97]			F= 5.60** R^2= 0.32 Adj. R^2= 0.28 ECM_{t-1}= -0.16 (5.10) χ^2_{SC}= 11.01[0.53] χ^2_{HET}=204.8[0.20] CUSM=UNS $CUSM^2$=UNS W_{LR}=33.74[0.00]			F= 6.24** R^2= 0.54 Adj. R^2= 0.51 ECM_{t-1}= -0.41(3.97) χ^2_{SC}= 12.14[0.35] χ^2_{HET}=216.06[0.35] CUSM=S $CUSM^2$=S W_{LR}=2.16[0.14]		

Pesaran, Shin and Smith (2001) tabulate the 5% critical values for k=4 as follows: Fcrit= 4.01, 10% critical values for k=4 as follows Fcrit 3.52. **: 5%, *: 10%. χ2SC, χ2HET denote LM tests for serial correlation, Heteroscedasticity (White). Figures in parentheses are the associated t-statistics. Figures in square parentheses are the associated p-values. CUSUM (denoted by CUSM) and CUSUMSQ (denoted by CUSM2). In each case, we denote stable coefficients by "S" and unstable ones by "UNS". WLR refers to the Wald test of long-run symmetry. The short-run estimates of and/or for Canada, Germany, Italy, Ireland, the Netherlands, the UK, Mexico and Israel are not reported, since we used the General-to-specific (Gets) modelling approach developed by Hendry 1995, eliminating variables with coefficients that are not statistically significant.

The comparative empirical results of both linear and nonlinear ARDL cointegration approaches, in terms of validity of the J-curve hypothesis, are shown in Table 4.

Table 4 clearly shows that while the nonlinear ARDL approach supports the evidence of the J-curve hypothesis for 8 countries, the linear approach supports this for only 4 countries. In other words, the nonlinear approach provides more evidence of the hypothesis than the linear approach. It should be noted that Bahmani-Oskooee and Fariditivana, in their recent study (2016), also found more evidence of the J-curve hypothesis with the nonlinear ARDL cointegration approach as compared to the linear approach. Canada, France, Germany, Italy, Japan and the UK are the countries our study has in common with the sample countries Bahmani-Oskooee

and Fariditivana (2016)'s study. When we compared the results of two studies in terms of these countries, we got some similar and some different findings. For instance, Italy and France are the countries supporting the evidence of the J-curve for the USA in both studies by both the linear and the nonlinear approaches. On the contrary, we found the evidence of a J-curve for the USA with Japan, whereas they could not find any such evidence for the same country. On the other hand, while we could not find any evidence of a J-curve for the USA with Germany, Canada and the UK, they found one for the same countries. Presumably, different findings for the same sample countries might result from the different time horizons and time frames used in both studies. While we used monthly data from 1991M1–2015M2, they used quarterly data from 1971Q1-2013Q3. Another reason for these differences might also arise from the different independent variables used in the two studies. While they used the GDP, we used the Industrial Production Index as the proxy of GDP, which allows researchers to make analyses using monthly data.

Table 4. The Validity of the J-curve Hypothesis by the Linear and Nonlinear Approaches

Countries	Linear ARDL	Nonlinear ARDL
Canada	x	-
Germany	-	-
Italy	+	+
Ireland	-	+
The Netherlands	+	+
Korea	-	+
The UK	-	-
Mexico	+	+
Japan	-	+
Israel	-	+
Chile	x	-
France	+	+

(+) denotes the validity of the J-curve hypothesis.
(–) denotes the non-validity of thecurve hypothesis.
(x) denotes no cointegration and, thereby, no estimated *coefficients*.

5. Conclusion

In conclusion, the US and its trading partner countries' economic policy makers should take into consideration the validity or non-validity of the J-curve hypothesis and all these separate effects of both depreciations and appreciations of the USD in order to manage their countries' sustainable trade balances, bilaterally. In addition, after the recent US election, the economic benefits of the North American Free Trade Agreement (NAFTA) have been scrutinised by the new presidential administration. Canada and Mexico, being members of the NAFTA, may experience some economic consequences depending on the USA's actions with the agreement This is particularly true about Mexico, the country we found evidence for the J-curve hypothesis with the US from both linear and nonlinear ARDL approaches. Furthermore, apart from the evidence of the J-curve hypothesis, depreciations in the USD against to the Canadian Dollar deteriorate the US trade balance with this country both in the short- and the long-run. However, the same changes in the USD against the Korean Won improve the US trade balance with Korea in both the short- and the long-run. The empirical results of this study should also be considered on the basis of the Transatlantic Trade and Investment Partnership (TTIP) which is under ongoing negotiations between the US and the EU. The depreciations in the USD against to the Euro have significant positive effects on the USD trade balances with Italy, the Netherlands and France in the long-run. On the other hand, the depreciations and appreciations against to the British Pound do not have significantly negative or positive effects on the US trade balance with the UK, which is one of the largest trading partners of the USA in the EU and a country that is intending to leave the EU.

This study also reveals the need for further empirical studies focused on the effects of depreciations and appreciations of the USD on the US and its trading partner countries' bilateral trade balances. The results of these additional studies may be important for policymakers since the new US government has signaled a desire for changes in its bilateral international trade policy with its recent withdrawal from the proposed Trans-Pacific Partnership (TTP) trade deal between the US and Pacific Rim countries.

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CITIZENS' PARTICIPATION IN LOCAL ECONOMIC DEVELOPMENT AND ADMINISTRATION: AN EXPLORATORY STATISTICAL ANALYSIS

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Abstract
This paper evaluates the characteristics of local economic development from a citizen's perspective. Its principal goal is to help the authorities of the Greek local government to measure their performance in economic development actions, while encouraging citizens' participation. Data were collected with the assistance of a specific questionnaire and analysed with Multiple Correspondence Analysis, a multidimensional statistical methodology. With this methodology, the most intense characteristics have emerged, producing an immediate extraction and presentation of the SWOT analysis' elements.

JEL Classification: C18, O10, O40
Keywords: Local Economic Development, Citizens' Participation, Local authority, Multiple Correspondence Analysis, SWOT Analysis

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1. Introduction

One of the most important challenges for local authorities' organizations includes actions and planning appropriate for economic development. Local authorities are involved in economic development for many reasons, namely, their responsibilities, as democratically elected bodies; the social and economic well-being of the whole of their community; their relevant powers and resources; and their knowledge of local needs and opportunities (Law No 3852/10- *Callicrates* Programme). In order to promote economic development, they can enforce many measures and actions, depending on the regulations they must comply with.

Local authority citizens could be reached by administrators, to be provided with information concerning the evaluation of economic policy, on the basis of which government, considering other factors, can make decisions. As Michels and de Graaf (2010) argued, participatory policy-making leaves vertical government decision-making intact, while at the same time it leaves a wider margin for suggestions and ideas put forward by citizens. The "New Public Management" theory has set new challenges for service design and provision by the public administration, for citizens who have become active participants in this process (Kelly, 2005), and for the very efficiency of administration (Scharitzer and Korunka, 2000). Such efficiency can be ensured through focusing on performance evaluation (Meier and O'Toole Jr, 2007; Sanderson, 2001). To this effect, the introduction of models and techniques to measure citizens' satisfaction, the ultimate goal being to improve the quality of citizens' lives, could prove very important (Ho Ha and Lee, 2010). Therefore, regional public management administrators have begun to place more emphasis on evaluating and ensuring the quality of their services so as to satisfy their customers. However, many problems are encountered in this process and public management is less oriented towards citizens' involvement (Cassia and Magno, 2011), which means this evolution is still in progress (Dalehite, 2008).

This study examines the case of Greek local authorities (regions and municipalities). While many other southern Europe countries (like Italy, Spain, Portugal and France) have undertaken significant processes of political and administrative changes over the last decades (Ongaro, 2008), Greece is currently struggling with the implications of an economic crisis; current and former governments of the country have introduced a number of countermeasures to reverse the effects of this crisis. One such measure is the reform of local public administration (Law No 3852/10- *Callicrates* Programme), starting in 2011, which led to the merge of the Greek municipalities. Its basic scope was to generate productivity gains and fiscal savings, firstly by focusing mainly on restructuring and strengthening decentralised administration, and, secondly, through adjustment of the Greek administrative structure to European standards.

A similar research study that allows Greek citizens to express their opinion about the economic development of their municipality, and, therefore, that enables direct participation in economic development planning, has not been realised yet. The principle goal of the present study is to help local government authorities evaluate their performance in promoting economic development. In their effort to plan and promote development, one of the most important actions is to register and recognise citizens' expectations. Another important purpose in this direction is to evaluate local administrational services (Miller and Miller, 2000). In order to collect relevant information from services provided, surveys should be undertaken to discover customers' experiences (Dahlgaard and Dahlgaard-Park, 2002).

The research presented here is based on data obtained through a questionnaire survey. The questionnaire contained a section about demographics and another section about citizens' perception of the existence of actions promoting economic development. The main goal is to provide an important tool that administrators of local authorities could use to make decisions regarding actions for economic development enhancement. Certainly, the ultimate aim is to improve the quality of local administrational services, in order to keep citizens satisfied, since local authorities operate as agents of a specific locality.

For data analysis, a multidimensional statistical methodology, namely Correspondence Analysis, is mainly used, as most suitable for discovering correspondence (Benzecri, 1992) between citizens' answers and their characteristics.

2. Theoretical background

The term local government (or else: local authority, local public sector, local administration) in this paper refers to the smallest public administration municipal unit, such as a city or a town. It is a public administrative institution bestowed by legislature from the central government, with specific functional and fiscal responsibilities and rights (Luger, 2007). Another author (Fanariotis, 1999) defines local authority units, as socioeconomic entities, within which individuals should experience socioeconomic integration. The local public sector interacts with residents, civic society and the private sector in a localised manner; it is where residents and businesses receive services from the public sector and where residents interact with government officials. Therefore, the role of local government is crucial; it is supposed to be better than anyone at recognising what the population (citizens and entrepreneurs) needs, as it is the institution closest to local citizens. In addition, there are certain services that only local government can provide efficiently. Moreover, any local administration can play a role in national or regional development policies and foster local development through its own incentives. It is also evident that public management research has attracted attention in recent years, particularly concerning its role in the provision of public services (Brandsen and Pestoff, 2006).

As noted by Luger, (2007), a local government's role includes the following activities: planning, financing, delivering services, regulating, managing.

Another author (Kuklinksi, 1972) implies that local authorities should focus on the following fields:

- The economic development sector
- The social development sector
- Environmental conservation and residents' quality of life.

All these actions-activities of local authorities can be considered part of the services provided to their local community. More specifically, the term 'public services', as used here, refers to services created through the public policy process and regulated by (central or local) government, but which can be provided by a range of 'public service organisations' (PSOs) in the public, third, and private sectors. Local authorities are organisations engaged in delivering public services to local people and communities (Osborne and Strokosch, 2013).

Crisis

The recent economic crisis has regrettably affected all sectors of the economy (trade, industry and services) around the world. Many governments have responded to this recession through a range of strategies intended to reduce public spending and generate growth (Osborne *et al.*, 2014). In this crisis situation, local authorities can prove to be important political actors in building resilience; they can be viable interlocutors and also address the complexities of sustainable development and fight poverty (European Commission, 2016). Besides the fiscal crisis, other societal challenges, such as demographic changes and social inequity are challenging local governments, which have to cope by tackling such problems in new ways (Pyka and Hanusch 2013). These issues and many others (food security, resource depletion, public safety and violence, environmental issues, rapid urbanisation) are pressing authorities to respond immediately and efficiently.

Moreover, public organisations, and municipalities, in particular, remain under severe pressure to produce more value for public money, as they are the first to receive complaints from citizens. Therefore, actions must be taken to reverse this downside of the economy. The mainspring is enhancing growth and development.

(Local) Economic development

In this paper emphasis is placed on actions taken by local governments, which can support economic development at the local municipality level. When using the term 'local (or regional) economic development' Luger (2007) refers to efforts to enhance employment, income, wealth, and/or opportunity within a defined geographic area. These efforts can include efforts of intervention in the industrial, workforce, infrastructure, and other types of development sectors. Economic development

can provide better quality-of-life for citizens through a more vibrant social and cultural milieu, financial security, physical health and well-being, and a sustainable environment (Luger, 2007).

The efforts of local governments in the direction of economic growth are also referred to as Local economic development (LED). As implied by Young and Kaczmarek (2000), in addition to the provision of public services, local governments are also envisaged as playing an important role in LED through regulating a wide range of factors that underpin local economy growth and development. In addition, the same authors consider local government as an important agent in the complex processes of building institutional thickness to ensure the development of local economies and the enhancement of the inhabitants' quality of life.

3. Methodology

A. Sample-questionnaire

The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU for the purposes of collection, development and harmonisation of European regional statistics and socio-economic analyses of regions. The NUTS 2 class refers to basic regions for the application of regional policies.

Eurostat has also set up a system of Local Administrative Units (LAUs) compatible with NUTS (http://ec.europa.eu/eurostat/web/nuts/local-administrative-units). The lower LAU level (LAU level 2, formerly NUTS level 5) consists of municipalities or equivalent units in the 28 EU Member States.

In our case (Greece), there are a total of thirteen regions (Nuts II). However, only nine regions of continental Greece have been selected, since insular Greece has special economic and social characteristics. Stratified sampling was utilised, in order to include citizens from the nine regions, according to their percentage in the total population. From these regions, the twenty-seven largest municipalities were selected, as they have appropriate funding in all economic sectors. Finally, a sample of 400 residents from 18 municipal districts of continental Greece was selected.

Questionnaire

The fifty-five questions of the questionnaire derived from relevant bibliography (Cox and Andrew 1988; McQuaid, 1993; Young and Kaczmarek, 2000; Piek *et al.*, 2008; Morgan, 2009) concerning topics of competitiveness, innovation and other aspects of entrepreneurship and economic development potentially pursued in a local level. Nevertheless, some of the questions are more service oriented. Before undertaking the interviews, some necessary clarifications were given to respondents on certain economic terms, such as productivity, innovation, digital marketing and so on.

- More specifically, fifty-five questions (E1-E55) could be grouped in the following categories (some examples are provided in brackets):
- Economic factors (ease of securing credit, economic climate, and strength of investors' protection, effects of taxation, funding from an ESPA programme, support of new jobs, tourism expansion).
- Marketing factors (consumer satisfaction/monitoring of trends, export potential, local demand, intensity of local competition)
- Quality of products and processes (quality of local suppliers, certification of quality standards as ISO 9001, or 14001)
- Human capital-Training-Skills (education, extent/range of staff training, skills acquisition)
- Infrastructure Logistics-Transports: (quality of roads, connection with big urban centres)
- Internet access and usage: (ICT Access, ICT Use)
- Information and knowledge dissemination-technology: (knowledge dissemination)
- Environment and Energy (ecologic sustainability, photovoltaic parks, natural resource conservation, protection of biodiversity)
- Innovation in production and marketing: capacity for innovation, use of digital marketing, number of new products, patents.

There were also four demographic questions: age, level of education, profession, gender and region of the citizen responding.

This study covers the results from a research survey launched in the beginning of 2016 and completed in April of the same year throughout the Regional Units of Continental Greece. The questionnaire was distributed to a broad sample of adult citizens (over eighteen years old) in twenty-seven municipalities and included all professional and educational levels. The question addressed to the citizens was: "To what extent do you think the following characteristics exist in your local economy-municipality?", and the possible answers were, 1: "not at all", 2: "little", 3: "somewhat", 4: "much", 5: "a great deal". Consequently, higher scores along this scale indicate that this is a prevalent feature.

B. Questions researched

The main subject to be researched is: "Which are the most and least featured characteristics of economic development in the municipalities examined?"

C. M.C.A.

M.C.A. is an exploratory technique of the data analysis field, which does not assume any theoretical distribution of data and puts forward intensively differentiated

trends exhibited by the data, as reflected in graphs, as well (Moschidis *et al.*, 2009). The main research field concerns the data rather than the population, and, therefore, there are no research hypotheses to be answered. This methodology defines the main tendencies and presents them along axes. Therefore, the main elements needed for the S.W.O.T. analysis presentation can be easily extracted.

D. SWOT analysis

S.W.O.T. analysis is a methodology from the field of Management Science, which is utilised to evaluate Strengths, Weaknesses/Limitations, Opportunities and Threats a business project may entail. It involves the specification of the objective of the business venture or project and identifies internal and external factors that are favourable or unfavourable to the achievement of that objective. The final stage of the method is the presentation of a matrix, which includes all Strength, Weakness/Limitation, Opportunity and Threat factors of the current project.

In the case of local public administration economy, S.W.O.T. analysis is a means of reviewing and evaluating local economy performance and potential. When implementing this process of identifying the economic performance of a local unit, S.W.O.T. analysis can be a valuable tool for a Municipality's Management to evaluate their performance and comprehend the economic climate.

4. Application, Results

Descriptive Statistics

Firstly, Table 1 containing demographics of the citizens follows.

Table 1. Demographics of respondents

Gender	**%**	**Age**	**%**	**Educational level**	**%**
Male	49.2	18-39	34.73	Not attended	8.23
Female	50.8	40-59	33.82	Primary	28.48
		>60	31.45	Secondary	45.09
				Tertiary	15.61
				Post-graduate	2.59

The following Table 2 displays the number of citizens per Region.

Table 2. Citizens per Region

	Regions	**Number**
1	Attica	160
2	Eastern Macedonia/Thrace	26
3	Central Macedonia	76
4	Western Macedonia	12
5	Epirus	14
6	Thessaly	32
7	Western Greece	32
8	Sterea Ellada	24
9	Peloponnese	24
	Total	**400**

Table 3 presents the percentages of citizens' answers to the fifty-five questions, per value. For example, the percentage of citizens who replied 'somewhat' was 32.66%.

Table 3. Percentages of total responses on the 5-grade scale

Response-grade	**Percentage-%**
1: not at all	18.11
2: little	27.09
3: somewhat	32.66
4: much	16.88
5: a great deal	5.26

Application of the Methodology Proposed

Multivariate analysis

The results after the implementation of MCA are the following:

Firstly, the table of eigenvalues is presented, where total inertia is 0.25167 (Table 4).

Table 4. Eigenvalues-Inertia for the table of evaluation

TOTAL INERTIA 0.25167							
AXIS	INERTIA	%EXPLAN	SUM	| SCREE PLOT			
1	0.1826216	72.83	72.83	|**********			
2	0.0487188	19.43	92.26	|**********			
3	0.0114249	4.56	96.82	|***			
4	0.0079732	3.18	100.00	|**			

- The first factorial axis (first main tendency) interprets the issue researched to a percentage of 72.83.
- The second factorial axis (second main tendency) comes to an interpretation level of 19.43 percent.

The first factorial space (1st and 2nd axis) interprets data at a percentage of 92.26, which is a very good and adequate percentage for further analysis.

For the explanation of M.C.A. results, we will mainly use the most important interpretation indicator of a point (characteristic) towards axis, which is Contribution (CTR), as it expresses the contribution percentage in axis construction. The points with large CTR towards the axis construct many times highlight its physical importance. Therefore, we can consider those with CTR values above average as points of high contribution in axis construction (Greenacre, 2007). We note that the average CTR is 1000:55= 18.18, where 55 is the number of points-questions. Moreover, by using the indicator 'coordinate', we define the side of the axis on which the point (characteristic) is represented. Therefore, points with a positive coordinate value are situated on the right side of the axis, while points with a negative coordinate value lie on the left side. Another indicator presented here is Projections-Correlations (COR) and contains the quality for each point by dimension. This value may also be interpreted as the 'correlation' of the respective point with the respective dimension.

Taking into account the explanations above and based on the visualisation of axes (see Fig. 1, 2, 3), we conclude the following:

The first axis (Fig. 1) at a 72.83 percentage of interpretation, presents on one side characteristics that have proved to exist to a great extent in the local economy, since they are close to points e4, e5; namely, 'Productivity' (E29)-CTR:167, 'Connection with big urban centres' (E32) -CTR:36, 'Unemployment' (E33) -CTR:193, 'Export Potential' (E37) -CTR:79, 'Tourist sector development prospects' (E41) -CTR:33, 'Secondary production sector 'prospects' (E42) -CTR:70, 'Green development' (E17) -CTR:23, 'Connection between economic sectors' (E26) -CTR:34. On the other side of the axis and close to points-grades e1 and e2, there are negligible characteristics, such as: 'External Investments' (E15) -CTR: 26, 'Innovative companies' (E47) -CTR: 31, 'Digital marketing' (E14) -CTR: 21 and 'Economic climate' (E18) -CTR: 22.

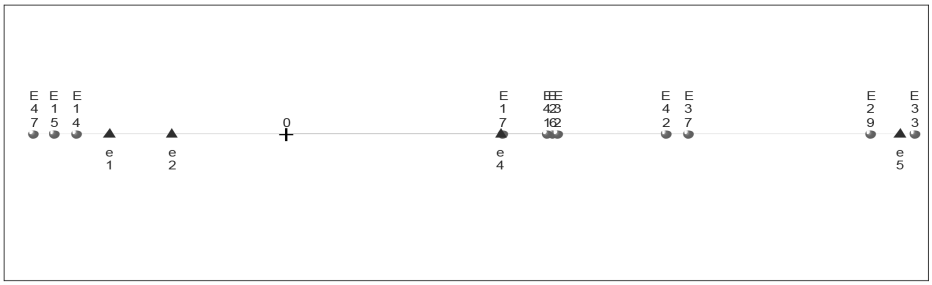

Figure 1. First factorial axis

The points differentiated in this axis are also presented in Table 5 below.

Table 5. 1st axis points

Variable	**Coordinate Values**	**Contribution(CTR)**
E14-Digital marketing	-467	21
E15*-External Investments	-517	26
E17-Green development	483	23
E18*-Economic climate	-449	22
E26-Connection between sectors	593	34
E29-Productivity	1302	167
E32-Connection with big urban centres	605	36
E33-Unemployment	1400	193
E37-Export Potential	896	79
E41-Tour.sector prospects	582	33
E42-Secondary production sector prospects	846	70
E47-Innovative companies	-562	31
e5-Grade 5	478	204
e4- Grade 4	1367	532

** These points have higher values for the Correlation indicator (COR) and, therefore, they are mainly examined in the 2nd axis.*

The second axis (Fig. 2) opposes factors that were ranked with 1 or 5, such as: the 'External Investments' (E15) -CTR:69, 'Photovoltaic parks' (E18) -CTR:47, 'Unemployment' (E33) -CTR:134, 'Knowledge dissemination' (E38) -CTR:91, 'Innovative companies' (E47) -CTR:75, with factors that presented median values (3,4), such as '*Concern for biodiversity' (E1)* -CTR:29, 'Internet Access' (E10) -CTR:30, 'Quality certification' (E55) -CTR:29 and 'Sports infrastructure' (E5)-CTR:167.

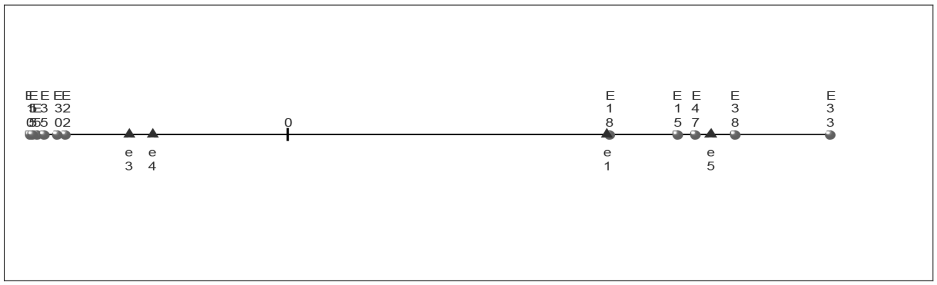

Figure 2. Second factorial axis

Hidden: E55
Visible: E1

The differentiated 2nd axis points are also presented in Table 6 below.

From the preceding analysis as well as Figure 3, we can conclude (Greenacre, 2007) that there are many factors that seem to strongly differentiate. Firstly, the positive ones (with a positive contribution to the economic environment and entrepreneurship) are: 'Productivity' (E29), 'Connection with big urban centres' (E32), 'Tourist sector development prospects' (E41) 'Secondary production prospects' (E42), 'Green development' (E17), 'Connection with other sectors' (E26). On the other hand, the points-factors of lower values (1 and 2) are also presented: 'External Investments' (E15), 'Innovative companies (E47), 'Digital marketing' (E14), 'Knowledge dissemination' (E38), 'Export Potential' (E37), 'Unemployment' (E33), 'Favourable Economic climate' (E18). These factors-points that differentiated intensively are utilised to complete the SWOT analysis matrices, which can be seen in Tables 7 & 8 and concern the local economy of municipalities-regions. The analysis is presented in two different tables, as derived from the two main tendencies (1st and 2nd axes).

Table 6. 2nd axis points

Variable	Coordinate Values	Contribution(CTR)
E5-Sports infrastructure	-278	28
E10-Internet Access	-286	30
E15-External Investment	432	69
E18-Economic climate	357	47
E30-Tourist attraction	-255	24
E33-Unemployment	602	134
E35-Playgrounds, Parks	-270	26
E38-Knowledge dissemination	496	91
E47-Innovation	452	75
E55-Quality certification	-283	29
e5-Grade 5	469	234
e3- Grade 3	-136	205
e1-Grade 1	354	474

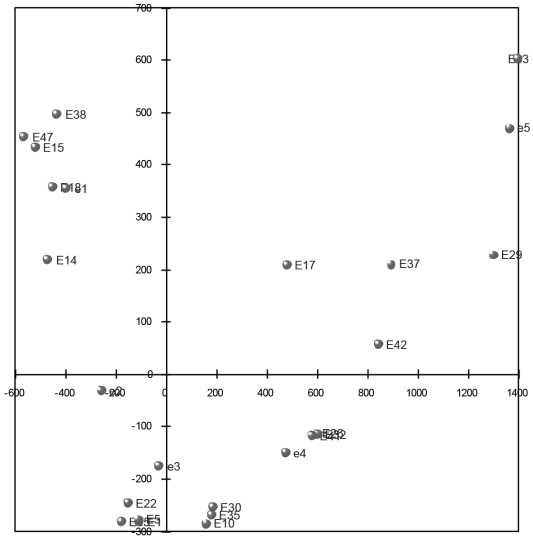

Figure 3. First factorial space

Table 7. SWOT analysis matrix - the main tendency of economic development actions

Strengths	Weaknesses	Opportunities	Threats
Green development	Digital marketing	Secondary production perspectives	
Productivity	Unemployment	Tourism sector development prospects	
		Connection with big urban centres	
		Export Potential	
		Connection with other sectors	

Table 8. SWOT analysis matrix – the second tendency for economic development actions

Strengths	Weaknesses	Opportunities	Threats
	Innovative companies		External Investments
	Knowledge dissemination		Economic climate

Consequently, it is obvious that from the citizens' perspective, unemployment is a very serious threat in the regions examined and certainly throughout Greece. On the other hand, there is an opportunity for secondary production as well the tourist sector to further expand. Both previous factors are considered very important for the economic prosperity of any region. The economies of the municipalities-regions examined seem to experience some other serious problems, as well, such as lack of innovation, knowledge dissemination and digital marketing, all of which are entrepreneurship friendly. The general state of the economy is not satisfactory and there were few external investments in the local area. However, some other factors, such as green development, productivity and connection with big urban centres, seem to be sufficiently featured in the municipalities examined.

Examination of Demographic Characteristics

Besides the analysis presented above, the effect of all demographic variables on the fifty-five factors (questions) was also examined. Findings revealed that citizens' opinions do not change with different demographic characteristics.

As an example, the existence of possible differentiations between the fifty-five questions and the level of education was also analysed, after the implementation of MCA, as presented in Table 9. The symbolisation 'Sec' indicates citizens who have not gone on to post-secondary education (secondary or primary school or no education), while 'Univ' indicates citizens with a Bachelor's Degree or even post-graduate education. Certainly, 'Sec1' is the first grade of the category 'Sec', Sec2 is the second grade of the category and so on.

The results derived concluded that there is no difference between the opinions of citizens with different levels of education. This is also obvious with the visualisation of results, which are displayed in the first factorial space (Figure 4). Citizens with different levels of education 1:Sec, and 2:Univ, have given similar responses, which can be justified by the closeness of the points. For example, this can be seen from points 15 and 25 (in the circle), where 15 is the fifth grade of education level 1 and 25 is the fifth grade of education level 2.

Table 9. Table of citizens per grade and educational level

Ind	Sec1	Sec2	Sec3	Sec4	Sec5	Univ1	Univ2	Univ3	Univ4	Univ5
E1	10	25	44	10	2	10	26	34	19	0
E2	15	30	33	12	1	13	36	22	16	2
E3	9	26	40	13	3	11	24	36	15	3
E4	8	30	36	14	3	10	19	39	19	2
E5	15	23	38	14	1	4	35	33	15	2
E6	32	28	24	7	0	25	25	27	12	0
E7	23	21	40	6	1	21	29	29	10	0
E8	30	30	25	5	1	21	35	25	8	0
E9	21	24	37	8	1	15	22	37	11	4
E10	9	18	37	25	2	9	19	30	26	5
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
E50	13	28	32	13	5	9	19	30	26	5
E51	14	27	43	7	0	13	25	34	17	0
E52	18	27	36	10	0	7	29	35	15	3
E53	17	31	32	11	0	12	22	39	14	2
E54	11	30	25	18	7	5	16	29	30	9
E55	15	31	34	11	0	7	25	42	15	0

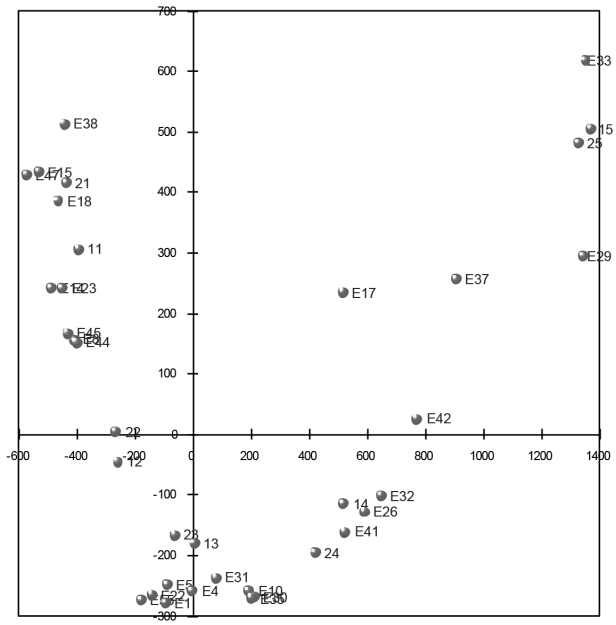

Figure 4. First factorial space of the matrix of comparative evaluation

The impact of regions

As mentioned previously, this research was conducted in Municipalities in nine different Greek regions. It was evident from the data extracted from Hellenic Statistical Authority (ELSTAT, 2015), that differences existed between these regions, concerning the size of Gross Domestic Product (GDP), unemployment percentages and other economic indices. The analysis conducted in this study, revealed that differences indeed existed between the variable of ''Region" and most of the fifty-five questions and here an example is presented.

M.C.A. was applied to a specific question (E18-Appropriate economic climate) and the variable of ''regions" and the results are presented in Table 10 and Figure 5.

Table 10. Eigenvalues-Inertia for region analysis

TOTAL INERTIA 0.117							
AXIS	INERTIA	%EXPLAN	SUM	| SCREE PLOT			
1	0.064	54.8	54.8	|**********			
2	0.028	24.4	79.1	|**********			
3	0.017	14.5	93.6	|********			
4	0.007	6.4	100.00	|*****			

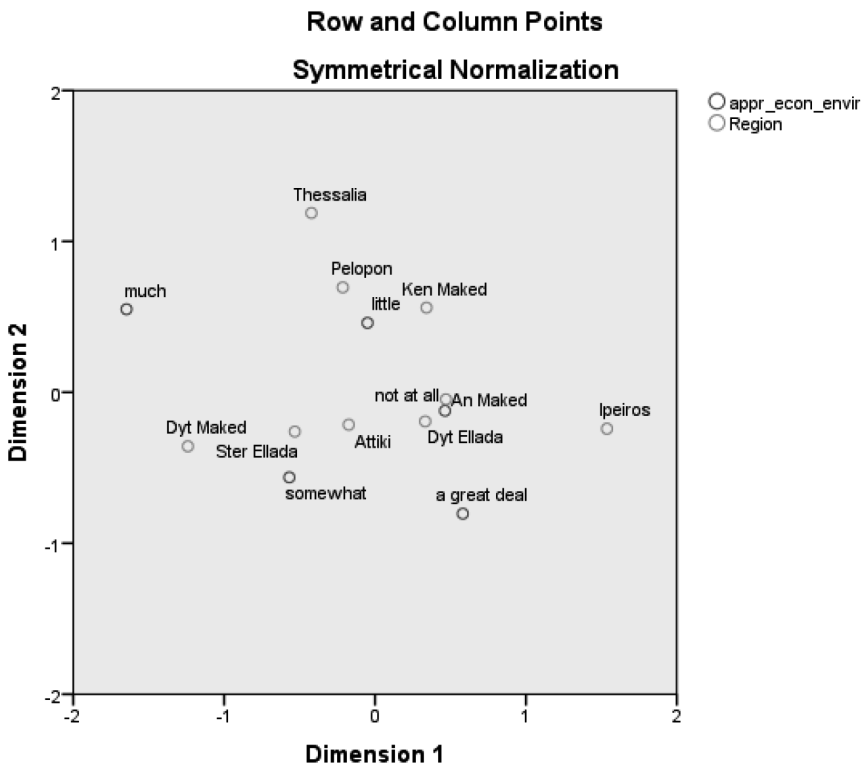

Figure 5. First factorial space of region analysis

From the results presented above it becomes obvious that the regions of Attica, Western Macedonia and Sterea Ellada have displayed a more favourable economic climate, as they approximate point 4-'somewhat'. The regions of the Peloponnese, Central Macedonia and Thessaly formed a different group approximating point 2-'little". Lastly, the regions of Epirus, Eastern Macedonia and Western Greece seemed to be the worst in creating a favourable economic climate.

5. Conclusions

The M.C.A. statistical methodology presented and applied in this research paper can easily extract differentiations present in big data without making *a priori* hypotheses. Therefore, the ultimate choice of crucial factors was precise and direct. In this case, with no previous indications, the methodology highlighted the most important factors for local development as dominant tendencies from the citizens' perspective. These factors were also utilised to perform a S.W.O.T. analysis for Greek economic development, enabling the creation and organisation of a business plan for the Greek economy.

Consequently, many assumptions may be formulated for the country of Greece and its current socio-economic status based on these analyses. Applying SWOT analysis to the data researchers can discover the strengths and weaknesses of local economic performance and the potential for further improvement. First of all, it is obvious that Greece still remains in a very difficult phase of its economic crisis, which started in 2008 and still persists. It is also certain that many more reforming actions should be taken so as to restore the country to a stable economic status. Nevertheless, Greece seems to have many opportunities for growth, since it is a productive country, it has export potential (many neighbouring countries), tourism and secondary sectors have wide prospects, the connection between sectors is expanding and the connection with big centres is adequate. On the other hand, the Greek economy seems to lag behind in innovation, digital marketing, knowledge dissemination, economic climate and investments. All these factors can provide many more opportunities for further economic development.

The present analysis also offered Greek citizens a chance to express their opinion on their local economy. This action can be regarded as a form of participation in the management of the local administration unit. Local governments should take their citizens' views seriously, since they are the first to be impacted by local authority management policies. However, it has become evident that Greek local governments did not apply similar methods when collecting information from their citizens and, to the best of the authors' knowledge, no study similar to this has been previously undertaken. The process described above may also be presented as a valuable tool with a scope to evaluating LA's performance when providing services to their citizens.

As many studies have shown, public officials significantly influence economic growth (Jones and Olken, 2005, Li and Zhou, 2005; Xu, Wang and Shu, 2007; Zhang and Gao, 2007; Yao and Zhang, 2014; Hodler and Raschky, 2014; Xi, Yao and Zhang, 2015) and local governments play an important role in LED through regulating the wide range of factors that underpin growth and development of local economies (Young & Kaczmarek, 2000). The action of involving stakeholders and (groups of) citizens at an early stage of the policy process, rather than consulting them immediately before the implementation phase, can create broader support for policy decisions and, therefore, make government policy more effective and legitimate (de Graaf, 2007). However, other arguments are also expressed. Engaging citizens in policy making allows governments to tap into wider sources of information, broader perspectives and potential solutions, and improves the quality of the decisions reached (Michels & De Graaf, 2010).

This research can also be expanded to all Municipalities of Greece, to cover those not included in the present paper and, of course, to insular Greece, with questions appropriately modified. This way, the conclusions could be more detailed

and cover the whole country. The process may also be presented as a valuable tool. Moreover, applying SWOT analysis to the data can offer researchers a chance to discover the strengths and weaknesses of local economic performance and the potential for further improvement. Therefore, this methodology can be utilised by other countries and, having formulated appropriate questions (suitable for any local economy), deductions can be made about the local economic environment and its potential.

The data collected in this study can be utilised to analyse the performance of the regions or municipalities in various economic aspects. It is certain that some regions displayed better performance in relation to some of the measures. These differences among findings could be further examined and processed by the Central Government (Ministry of the Interior), which supervises the operation of administrative units and provides funding on an annual basis.

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INVESTIGATING NEEDS AND BARRIERS TO THE EMPLOYMENT OF PEOPLE WITH DISABILITIES

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Abstract
The principal aim of the WorkAbility project was to apply a holistic approach concerning underemployment and unemployment in the case of people with disabilities in Greece. A questionnaire survey was undertaken in the framework of WorkAbility to investigate the employment status of people with disabilities in the Region of Central Macedonia. A total of 306 persons with disabilities participated in the survey, of which 101 persons were deaf or hard-of-hearing, 100 persons vision-impaired and 105 persons were hemiplegics, paraplegics or tetraplegics. A statistical analysis of data collected was performed and interesting results have been drawn for the total sample as a whole and for each disability group separately. A set of different variables has been examined and the statistical significance between them has been also determined. Survey results are available online and can be exploited towards the establishment of accessible employment and entrepreneurship in Greece.

JEL Classification: J71
Keywords: Employment, Disabled Persons, Survey, WorkAbility, Greece

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Introduction

People with disabilities, in both developed and low-income countries, have routinely experienced underemployment and unemployment rates significantly higher than the rest of the population, even before the onset of the financial crisis. According to Eurostat (1995), a person between 16 and 64 years old has 66% probability to find employment or create his/her own enterprise. This percentage is reduced to 47%, if the same person has a moderate disability, and further reduced to 25%, if the same person has severe disability (European Commission, 2001).

In Greek society, unemployment and underemployment, as results of the global financial crisis, constitute major burdens. According to seasonally adjusted figures released by the EU statistics office Eurostat (2017), Greece tops the "black list" of European unemployment, with unemployment rate reaching 23.2% in February 2017. The situation is even worse when it comes to youth unemployment in Greece, as it reached 47.9% in February 2017.

Despite the well-documented relation between disability and unemployment, there are no data available concerning the effect the financial crisis has had in the employment of persons with disability in Greece, in general, and the Region of Central Macedonia, in particular (unemployment percentage in Central Macedonia is slightly higher than that observed in the rest of the country, reaching 24.2 % in the second quarter of 2016, according to the European Job Mobility Portal).

This lack of data has been recognised by the Greek Statistics Authority itself in an announcement made in December 2014 (Greek Statistics Authority, 2014). According to Eurostat, the employment rate in 2011 in Greece, for persons between 15 and 64 years of age, was 35.5% for persons with disability and 58.5% for persons with no disability (Eurostat, 2014).

The data above indicate the necessity to analyse the issue of unemployment and underemployment of people with disability in Greece to greater depth. The WorkAbility project, which was financed by the countries of the European Economic Area – EEA (Iceland, Liechtenstein and Norway), in the frame of the Programme "Diversity, Inequalities and Social Inclusion", and by the Greek National Program of Public Investments, has undertaken this challenge, towards promoting accessible employment and entrepreneurship. The key aim of the WorkAbility project was to address the rising social and income inequalities in Greece, in general, and the effect of the economic crisis to the vulnerable societal group of persons with disabilities, in particular, from a research/scientific perspective.

Two partners participated in the project: the Transport Systems Research Group of Aristotle University of Thessaloniki (TSRG/AUTh), which was also the project coordinator, and the Professionals' Chamber of Thessaloniki (PCTh). Project collaborators included: the Panhellenic Association of the Blind - District Union of Central Macedonia, the Panhellenic Association of Paraplegics - District Union of Macedonia and Thrace and the Association of the Deaf of Northern Greece.

WorkAbility applied a holistic approach, following two major axes of work. The first axis aspired to provide an in-depth view of the existing situation and to initiate actions that would lead to a change of practices implemented. This included examination of legislation, policies and practices through relevant literature and contacts with stakeholders as well as identification of obstacles that citizens with disabilities and employers of disabled persons have to overcome in the employment market. In order to provide a realistic view of the current situation, a survey was conducted investigating the employment status of persons with disability. This survey is the main focus of the present paper. Finally, in Axis 1 accessibility assessment of major employers' infrastructure was carried out.

The second axis of the project aspired to develop a spirit of entrepreneurship among persons with disability, to promote the concept of "social entrepreneurship" and to create a powerful guidance and support tool. Thematic seminars and workshops took place, with the active participation of persons with disability and other stakeholders. These, combined with lessons learned and the knowledge acquired during the implementation of the project, formed the basis of the project's "Toolbox for Employment", containing recommendations and guidelines on how to foster accessible employment and entrepreneurship.

International reports on the employment status of disabled persons

Various surveys have examined disabled employees' working conditions and their implications for working environments.

In 2011 the Ad-Hoc Module of the EU Labour Force Survey (LFS-AHM) examined population members aged between 15 and 64 years, from the European Union (EU) and its individual member states, with data for Iceland, Switzerland and Turkey also available. The survey results were based on two disability definitions:

- Definition 1: People having a basic activity difficulty (such as sight, hearing, walking, and communicating).
- Definition 2: People limited in work because of a Longstanding Health Problem or an Activity Difficulty (LHPAD).

Based on the first definition of disability, the average unemployment rate for disabled people in the 28 member states was 12.1%, a difference of 2.5% from that of people without disabilities. The highest unemployment rates in the member states among people with disabilities were found in Latvia and Spain. Furthermore, the largest difference between people with and without disabilities by country was encountered in Hungary and the Czech Republic.

Based on the second definition, the average unemployment rate in the 28 member states was 17.4% for people with limited activity, with a 9.4% difference from the rest of the population. The highest percentages were once again presented in Latvia and Spain, while the largest differences between those with and those

without disability were observed in Hungary and the Czech Republic, Germany, and Estonia. Furthermore, illness or disability was stated as the main reason why the majority of disabled unemployed persons had left work (30% in total) (Eurostat, 2014).

The Fair Treatment at Work Survey, carried out in the UK in 2008 with a sample of 502 disabled people, showed the following key-findings:

- Disabled people were much more likely than non-disabled people to say they had experienced some form of unfair treatment, discrimination, bullying or harassment at work in the previous two years (27 per cent compared with 17 per cent).
- Specifically, 19 per cent of the disabled people said they had experienced unfair treatment, 12 per cent discrimination, two per cent sex-based harassment and 14 per cent other types of bullying or harassment.
- Disabled people were also more likely to say that they had experienced other incidents in the previous two years 'in a negative way' involving work colleagues, clients or customers.
- More than a third (37 per cent) said that they had been treated in a disrespectful or rude manner as compared to 25 per cent of people without disability, while 23 per cent mentioned that they had been insulted or had received offensive remarks made about them as compared to 17 per cent of people without disability. 14 per cent of people with disability had been humiliated or ridiculed in connection with their work, and 9 per cent had experienced actual physical violence at work as compared to 8 per cent and 5 per cent of people without disability, respectively.
- 19 per cent of people with disability, compared to 13 per cent of people without disability, reported unfair treatment, 12 per cent of people with disability, compared to 7 per cent of people without disability, reported discrimination, while 14 per cent, compared to 6 per cent, reported other forms of bullying or harassment.
- The experience of some kind of unfair treatment, discrimination, bullying or harassment at work is considerably higher among people with disability (27 per cent) than among people without disability (17 per cent). (Coleman, Sykes & Groom, 2013)

Furthermore, research carried out by OPM & Ipsos (2014) with the assistance of disability organisations, documented that discrimination is also profound against people with disability who would like to be able to work, but face problems when applying for employment.

Many participants believed that stigma is the reason why employers are not willing to employ people with a disability. This is in conjunction with myths about disability and employment, such as that people with disability are less productive, they take more days off, are less effective and unreliable. Thus, they are perceived as a risky investment.

Other participants supported that employers believe that disability and illness are the same, so they presume that disabled people will need more days off, while some participants believe that employers have little commitment to employing people with disability in accordance with equality legislation.

Another important factor was insufficient support or help from job centres. Some participants reported that they did not receive help from the staff at job centres due to the former's lack of experience or limited experience in paid work or because they were searching for a part-time position. The key finding is that people with disability were unable to find personalised support.

Quite a few people, especially those with mental disabilities, expressed personal fears and worries, which lead to their reluctance in seeking employment. They were concerned about the process and believed that stress would have a negative impact on their wellbeing, while some reported that potential rejection would have an impact on their self-esteem.

What has been described so far is not only a European phenomenon. The Australian Bureau of Statistics notes that 20% of Australians have a disability, but only 53% of those who are of an employable age are in the workforce, compared to 81% of people without disability in the paid workforce. This figure is far worse for people with certain types of disabilities (e.g. vision impairment and high-level spinal cord injury) and/or higher support needs. Moreover, people with disability in employment are more likely to work part-time (37%), forced into work for the unemployment benefits or unpaid internship/work experience, thus, curtailing their career opportunities and access to economic resources (Darcy, Taylor, and Green, 2016).

Furthermore, according to the U.S. Bureau of Labor Statistics, in 2016, the unemployment rate for persons with a disability, at 10.5 percent, had changed little compared to the previous year, while the rate for those without a disability had declined to 4.6 percent. The employment-population ratio for groups of persons with and without a disability increased from 2015 to 2016 (by 0.4 percentage point for persons with a disability and by 0.3 percentage point for persons with no disability).

Highlights from the 2016 data included the following:

- Nearly half of all persons with a disability were age 65 and over, a number about three times higher than the share of those with no disability.
- For all age groups, the employment-population ratio was much lower for persons with a disability than for those with no disability.
- For all educational attainment groups, jobless rates for persons with a disability were higher than those for persons without a disability.
- In 2016, 34 percent of workers with a disability were employed part-time, compared to 18 percent of those with no disability.
- Employed persons with a disability were more likely to be self-employed than those with no disability. (Bureau of Labor Statistics, 2017).

Concerning the Greek context, in a research study carried out by the National Confederation of Persons with Disability (NCPD - E.S.AmeA) among the general population in 2013, 59.1% of participants responded that access to employment for disabled persons had got worse during the previous 3 years and 66.2% responded that cases of social stereotypes and prejudices towards disabled persons had either

increased or remained stable; 51.7% of respondents considered prejudice as the main behavioural aspect of the general population towards disabled persons (NCPD, 2013). Another survey was carried out in 2006 by the Greek Ministry of Internal Affairs (Logaras, 2013). In this survey, lack of accessibility to the working environment was identified as the most prominent cause for problems regarding employees with disability.

Survey on Employment of People with Disabilities

Survey Identity and Methodology

The present study focuses on the questionnaire survey undertaken in the framework of WorkAbility project, with the assistance of local associations of major disability groups, concerning the employment rate of persons with disability, their employment status and the impact the financial crisis had had on their employment status and income. The sample of the survey consisted of 306 people with disabilities (hearing, vision and mobility impairment) living in the Region of Central Macedonia.

The aim of the WorkAbility survey was to record the experiences and points of view of the people interviewed concerning employment of persons with disabilities in Central Macedonia, in order to highlight and improve the current state of employment through improvements of accessibility infrastructure and related services.

The questionnaire was created by the members of the Transport Systems Research Group of Aristotle University of Thessaloniki (TSRG/AUTh) in cooperation with social scientists and the Panhellenic Association of the Blind - District Union of Central Macedonia, the Panhellenic Association of Paraplegics - District Union of Macedonia & Thrace and the Association of the Deaf of Northern Greece. Prior to the design of the questionnaire, extensive literature research had been carried out in order to identify previous studies and surveys on the employment of people with disabilities at national and EU levels.

It should be noted that the survey was conducted among members of the aforementioned associations of persons with disability by the associations themselves, who were acting as project subcontractors. Thus, the project itself promoted entrepreneurship among people with disabilities.

A similar questionnaire survey on the employment status for people with disabilities in Greece was carried out in 2003, within the framework of Community Initiative Programme (CIP) EQUAL 1 and 'Proklisi' Project (Magoulios & Trichopoulou, 2012). In that case, the study sample consisted of 1386 people with disabilities, living in urban areas of 10 Regions and 14 prefectures in Greece. The sample included people with physical disabilities, but also people with emotional and mental disorders, intellectual retardation and thalassaemia.

Although the two aforementioned surveys have different characteristics in terms of sample size, the geographical area covered and the types of disabilities included, they depict the employment status of Greek people with disabilities in two specific time periods: the 'Proklisi' survey describes the situation in 2003, before the onset of the financial crisis, while the 'WorkAbilty" survey provides a review of the current situation (year 2016).

Through examining the results of the two surveys in parallel, useful conclusions can be drawn on whether the employment status of people with disabilities has changed over the last years and in what way.

The survey's first phase started in March 2016 and was completed in April 2016. In this phase, personal, as well as phone interviews were conducted. After the completion of the interviews, the second phase of the survey started. In this phase, the questionnaires were codified into meaningful data through data manipulation, in order to be ready for the statistical analysis that ensued. The data were codified into Excel and analysed with SPSS. The statistical processes performed in order to yield results were mainly crosstabs with chi-square tests and McNemar's tests for statistical significance.

The questionnaire used during the interviews consisted of two distinct parts. The first part included demographic and general questions such as type of disability, level of education, allowance and income, while the second part consisted of more targeted questions on issues such as how disability affects performance in the working environment, the need for assistive technology, adjustments or personal assistance, relationship with employers, colleagues and customers, factors affecting employment, etc.

The questionnaire was completed by 306 persons with disabilities, of which 101 were deaf and hard-of-hearing (34.4%), 105 hemiplegics, paraplegics and tetraplegics (33%), and 100 vision-impaired (32.6%).

The participants of the survey were divided into three specific categories, based on their employment status:

- People who were employed
- People who had worked in the past but were unemployed or retired at the moment of the survey
- People who had never been employed

Descriptive statistics

Among the 306 completed questionnaires, 3 were missing vital information and were excluded from the study. Out of the final 303 persons, 20 people had been employed before their disability and retired after the disability. These people were analysed separately from the rest.

Disability

As far as respondents' disability is concerned, 30.14% of the sample population consisted of deaf persons, 4.26% of hard-of-hearing persons, 32.62% of persons with visual impairment, 4.61% of hemiplegic, 18.79% of paraplegic and 9.57% of tetraplegic persons. The total number of participants for the group of the deaf and hard-of-hearing was N=97 persons, of which 87.6% were deaf and 12.4% hard-of-hearing. For the vision impairment group, the total number was N=92 persons. For the physical disabilities group, the total number was N=93 persons, of which 14% hemiplegics, 57% paraplegics and 29% tetraplegics.

Age

The age range of the sample was between 18 and 83 years of age. More specifically, the 1st group consisted of 17 people aged 18-25, which was 6% of the total population sampled, the 2nd group consisted of 66 people aged 26-35, which was 23.3% of the total sample, and so on (Table 1).

Table 1. Age groups of population

Age groups	Frequency	Percent	Valid Percent	Cumulative Percent
18-25	17	6	6.0	6.0
26-35	66	23.3	23.3	29.3
36-45	80	28.3	28.3	57.6
46-55	69	24.4	24.4	82.0
56-65	26	9.2	9.2	91.2
66-75	19	6.7	6.7	97.9
76-88	6	2.1	2.1	100.0
Total	283	100.0	100.0	

Gender

Concerning the gender of participants, 59% were men and 41% women. For the group of the deaf and hard-of-hearing, 58.8% were men and 41.2% women. For the vision impairment group, 63% were men and 37% women. For the group of persons with physical disabilities, 54.8% were men and 45.2% women.

Educational level

As far as educational level is concerned, 13.78% of the population sampled were elementary school graduates, 8.83% junior high school graduates, 31.80% high school graduates, 34.63% University graduates and 3.53% graduates holding Master's and Doctor's Degrees.

In the survey conducted within the framework of EQUAL in 2003, the educational status of people with disabilities reported was quite different, since only 13% of interviewees stated that they held a University degree and 1.1% a Master's degree or a PhD title.

Thus, it seems that there has been an increase over the last decade in the percentages of people with disabilities who have received education at University level and of those who continued their studies to a Master's or a PhD level.

Concerning the educational level of the deaf and the hard-of-hearing group, 29.9% were elementary school graduates, 5.2% junior high-school graduates, 24.7% high-school graduates, 8.2% post-secondary school graduates, 29.9% University graduates and 2.1% Master's or Doctor's Degree holders.

For the group of visually impaired participants, 3.3% were elementary school graduates, 4.3% junior high-school graduates, 30.4% high-school graduates, 12% post secondary-school graduates, 47.8% University graduates and 2.2% Master's or Doctor's Degree holders.

Concerning the physical disabilities group, 6.5% were elementary school graduates, 17.2% junior high-school graduates, 40.9% high-school graduates, 2.2%, post secondary-school graduates, 26.9% University graduates and 6.5% Master's or Doctor's Degree holders.

Working status

Concerning the working status of the population, 34.98% were employed, 14.13% unemployed, 27.21% retired and 23.67% had never worked before. It is worth noting that in the 2003 EQUAL survey (Magoulios & Trichopoulou, 2012) the percentage of persons employed was 35.9%, almost the same as the equivalent percentage reported in the WorkAbility survey (34.98%).

As far as the relation between the type of disability and working status is concerned, 50.6% of the deaf and 66.7% of the hard-of-hearing were employed. 12.9% of the deaf persons of the sample were retired, while 15.3% of the deaf and 25% of the hard-of-hearing had never worked. For the visually impaired group, 28.3% were employed and 9.8% unemployed, 43.5% retired and 18.5% had never worked. As far as the physical disabilities group is concerned, 30.8% of the hemiplegics, 28.3% of the paraplegics, and 11.1% of the tetraplegics of the sample were employed. Unemployment rates were about 15% for hemiplegics and paraplegics, and 3.7% for tetraplegics, 25% of hemiplegics and paraplegics were retired and 30% of them had never worked, while 33.3% of tetraplegics were retired and 51.9% had never worked.

Vocational rehabilitation seminars

Across all disability groups 45.2% of participants had attended vocational rehabilitation seminars and, specifically, 44.3% of the deaf and hard-of-hearing group, 42.4% of the vision impairment group and 48.4% of the physical disabilities group.

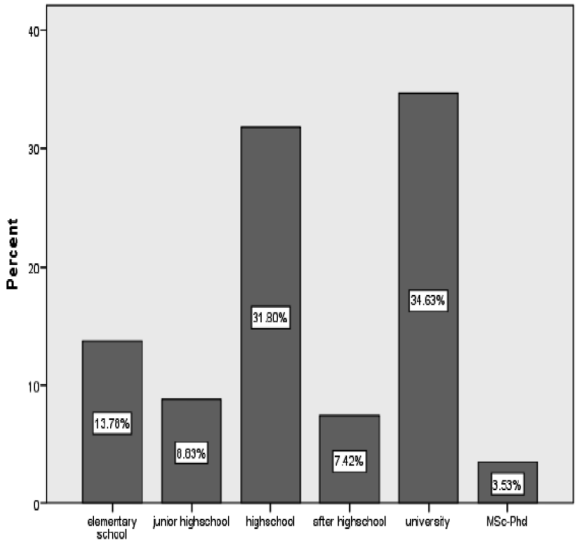

Figure 1. Level of education of population

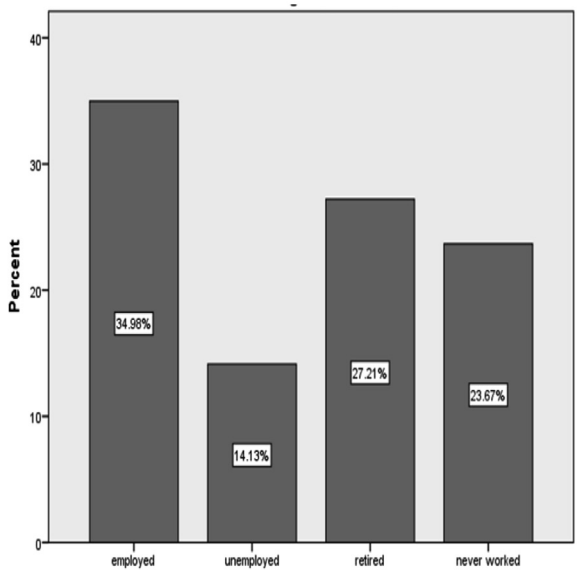

Figure 2. Working status of population

Special school

59.8% of the hearing disability group, 20.7% of the vision impairment group and 32.3% of the paraplegics and tetraplegics groups attended a special school.

Employment sectors (self-employment, full-time permanent staff, part-time permanent staff, full-time contract, part-time contract)

For the deaf and hard-of-hearing, 5.6% (4 persons) and 12.5% (1 person), respectively, were self-employed, 57.7% (41 persons) and 62.5% (5 persons) were working as full-time permanent staff, 1.4% (1 person) worked as part-time permanent staff, while 25.4% of the deaf worked on a full-time contract (18 persons) and 9.9% (7 persons) of the deaf and 25% (2 persons) of the hard-of-hearing worked on a part-time contract.

Concerning the visually impaired group, 9.5% (7 persons) were self-employed, 66.2% (49 persons) were working as full time permanent staff, and 4.1% (3 persons) worked as part-time permanent staff, while 16.2% (12 persons) worked on full-time contract work and 4.1% (1 person) worked on a part-time contract.

For the group with physical impairments, 44.4% of hemiplegics, 18.9% of paraplegics and 7.7% of tetraplegics were self-employed. The percentages of hemiplegics, paraplegics and tetraplegics working as full-time permanent staff were 33.3%, 70.3% and 76.9%, respectively. In addition, 2.7% of the paraplegics had a permanent part-time job, while 5.4% of the paraplegics and 15.4% of the tetraplegics worked on full-time contracts. Finally, 22.2% of the hemiplegics and 2.7% of the paraplegics worked on a part-time contract.

Number of working hours

To the question "Do you consider your disability as restricting the number of hours you can work?", 80% of the deaf and 91.7% of the hard-of-hearing answered "no". The same answer was received by 75.8%, of the visually impaired, 84.6% of the hemiplegics, 71.2% of the paraplegics and 33.3% of the tetraplegics.

Performance at work and disability

To the question, "Do you consider your disability as affecting the performance of your work tasks?", 70.2% of the deaf and all of the hard-of-hearing answered "no". Furthermore, 68.1% of the visually impaired, 84.6%, of the hemiplegics, 83% of the paraplegics and 66.7% of the tetraplegics also responded with a negative answer.

Table 2. Percentages of employment sectors across disabilities

			Disability						Total
			Deaf	Hard of hearing	Visual disability	Hemiplegics	Paraplegics	Tetraplegics	
Regime	Self-employed	Count	4	1	7	4	7	1	24
		%within Disability	5.6%	12.5%	9.5%	44.4%	18.9%	7.7%	11.3%
	Permanent Full-time	Count	41	5	49	3	26	10	134
		%within Disability	57.7%	62.5%	66.2%	33.3%	70.3%	76.9%	63.2%
	Permanent part-time	Count	1	0	3	0	1	0	5
		%within Disability	1.4%	0.0%	4.1%	0.0%	2.7%	0.0%	2.4%
	Contract full-time	Count	18	0	12	0	2	2	34
		%within Disability	25.4%	0.0%	16.2%	0.0%	5.4%	15.4%	16.0%
	Contract part-time	Count	7	2	3	2	1	0	15
		%within Disability	9.9%	25.0%	4.1%	22.2%	2.7%	0.0%	7.1%
Total		Count	71	8	74	9	37	13	212
		%within Disability	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 3. Percentages of answers to the question "Do you consider your disability as affecting the performance of your work tasks?" across all disability groups

			Disability						
			Deaf	Hard of hearing	Visual disability	Hemiplegics	Paraplegics	Tetraplegics	Total
Duty Due to Disability	yes	Count	25	0	29	2	9	9	74
		%within Disability	29.8%	0.0%	31.9%	15.4%	17.0%	33.3%	26.4%
	no	Count	59	12	62	11	44	18	206
		%within Disability	70.2%	100.0%	68.1%	84.6%	83.0%	66.7%	73.6%
Total		Count	84	12	91	13	53	27	280
		%within Disability	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Commuting from and to the working place

To the question, "Do you consider your disability as preventing you from moving from and towards your working place?", 94.1% of the deaf and 100% of the hard-of-hearing answered "no". Furthermore, 49.5% of the visually impaired, 76.9% of hemiplegics, 70.6% of paraplegics and 37% of tetraplegics gave negative answers.

Personal help

Concerning the need for personal help, the survey results indicate that persons from the deaf and hard-of-hearing group need more personal help than any other group. In particular, after comparing employed, unemployed and retired participants, it was found that 56.6% of the deaf, 45.5% of the hard-of-hearing and 16.5% of the visually impaired are in need of personal help. None of the hemiplegics is in need of personal help, while 86% and 55.6% of the paraplegics and tetraplegics, respectively, stated that they do not need personal help.

Special equipment

Comparing employed, unemployed and retired persons, 34.9% of the deaf and 34.6% of the hard-of-hearing are in need of special equipment. Furthermore, 38.5% of the visually impaired and 15.4% of hemiplegics, 64% of paraplegics and 77.8% of tetraplegics are in need of special equipment.

Table 4. Percentages of working status and need for personal help for the hearing impaired and the hard-of-hearing

Disability				Working Status				Total
				Employed	Unemployed	Retired	Never worked	
Deaf	Personal Help	yes	Count	25	10	5	7	47
			%within Disability	59.5%	55.6%	45.5%	58.3%	56.6%
		no	Count	17	8	6	5	36
			%within Disability	40.5%	44.4%	54.5%	41.7%	43.4%
Total		Count %within Disability		42	18	11	12	83
				100.0%	100.0%	100.0%	100.0%	100.0%
Hard-of-hearing	Personal Help	yes	Count	1	1		3	5
			%within Disability	14.3%	100.0%		100.0%	45.5%
		no	Count	6	0		0	6
			%within Disability	85.7%	100.0%		100.0%	54.5%
Total		Count %within Disability		7	1		3	11
				100.0%	100.0%		100.0%	100.0%

Table 5. Percentages of working status and need for personal help for the visually impaired

Disability				Working status				Total
				employed	unemployed	retired	never worked	
Visual impairment	Personal Help	yes	Count	4	1	7	3	15
			%within Working Status	15.4%	12.5%	17.5%	17.6%	16.5%
		no	Count	22	7	33	14	76
			%within Working Status	84.6%	87.5%	82.5%	82.4%	83.5%
Total			Count	26	8	40	17	91
			%within Working Status	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6. Percentages of working status and need for personal help for the hemiplegics, paraplegics and tetraplegics

Disability				Working status				Total
				Employed	Unemployed	Retired	Never worked	
hemiplegics	Personal help	no	Count	4	2	3	4	13
			% within Working status	100%	100%	100%	100%	100%
	Total		Count	4	2	3	4	13
			% within Working status	100%	100%	100%	100%	100%
paraplegics	Personal help	yes	Count	2	1	0	4	7
			% within Working status	13,30%	12,50%	0%	25%	14%
		no	Count	13	7	11	12	43
			% within Working status	96,70%	97,50%	100%	75%	86%
	Total		Count	15	8	11	16	50
			% within Working status	100%	100%	100%	100%	100%
tetraplegics	Personal help	yes	Count	0	1	2	9	12
			% within Working status	0%	100%	22,20%	64,30%	44,40%
		no	Count	3	0	7	5	15
			% within Working status	100%	0%	77,80%	35,70%	56,60%
	Total		Count	3	1	9	14	27
			% within Working status	100%	100%	100%	100%	100%
Total	Personal help	yes	Count	32	14	14	26	86
			% within Working status	33%	36,80%	18,90%	39,40%	31,30%
		no	Count	65	24	60	40	189
			% within Working status	67,00%	63,20%	81,10%	60,60%	68,70%
	Total		Count	97	38	74	66	275
			% within Working status	100%	100%	100%	100%	100%

Special working conditions

Comparing employed, unemployed and retired participants, 50.6% of the deaf and 54.5% of the hard-of-hearing are in need of special working conditions. Furthermore 22% of the visually impaired, 30.8% of the hemiplegics, 22% of the paraplegics and 66.7% of the tetraplegics are also in need of special working conditions.

Multinomial logistic regression analysis method for the total sample

Model

A model to estimate the importance of each factor of the dataset against employment was needed. The full model was analysed in order for the statistically significant variables to be shown.

Employment was checked in terms of Gender, Disability, Educational Level, Special Training, Seminars, Working hours Due to Disability, Trip Due to Disability, Personal Help, Special Equipment, Special Work Status and Age Groups.

The 'Gender' variable represents whether someone is male or female, 'Disability' represents the disability group someone belongs to, 'Educational Level' represents the level of education of the interviewee, 'Special Training and Seminars' shows whether someone attended special instruction or vocational rehabilitation seminars, 'Working hours/Trip-Due to Disability' represents whether one's disability affects their commuting from and to their job and the hours they spend at work, 'Personal Help/Special Equipment/Special Work status' stands for whether the interviewee's disability makes them need personal help, special equipment or special working conditions, and 'Age Group' stands for the age group the survey participant belongs to.

When using multinomial logistic regression, as seen in the table below, the most important (i.e. statistically-significant) factors that influence employment in the sample, are the interviewee's Age, Educational level, and Disability (p-value<0.05%).

Further analysis of survey results and concluding remarks

In order for statistical significance across groups to be shown, especially after knowing which were the variables most significantly affecting the working status of a disabled person, and for further comparisons to be made, some variables got regrouped to enhance the behaviours shown.

The term 'statistical significance' is used to describe whether the spread of answers between groups presents significant discrepancies. In statistical hypothesis testing, statistical significance (or a statistically significant result) is attained when a p-value is lower than the significance level (as a matter of good scientific practice, a significance level is chosen before data collection, i.e., when the p-value is below 5%). The p-value is the probability of obtaining results at least as extreme when the null hypothesis is true, whereas the significance level is the probability of rejecting

the null hypothesis when it is true. Therefore, almost always, the null hypothesis is that the spread of the answers is equal across all groups; in other words, when there is statistical significance in these data, it means that the spread of the answers is not equal across groups.

The variables with more groupings were "Education" and "Disability", as the number of answers needed for the results to be considered valid, through this more detailed comparison, was not covered without those groupings. After moderations, there was a clearer view of trends followed by those groups. Findings are presented below.

Concerning the working sectors participants worked in, 41% of the deaf and hard-of-hearing worked in the private sector and 56% in the public sector. For the visually impaired group, percentages were 60% and 36%, respectively, while for the group of paraplegics, hemiplegics and tetraplegics percentages were 53.3% for the private sector and 54.9% for the public sector. The analysis showed that the results above were not statistically significant across disability groups.

There is statistical significance between working status and disability. The group of hearing impairment presents the highest percentages of employed (52.6%) and unemployed individuals (28.3%), compared to the equivalent percentages of the visually impaired group (28.3% and 9.8% respectively) and the paraplegics, hemiplegics and tetraplegics group (23.7% and 11.8%, respectively). Concerning retired persons, the visually impaired group presents the highest percentage (43.5%), followed by the percentage of paraplegics, hemiplegics and tetraplegics (28%) and the percentage of the deaf and hard-of-hearing (11.3%). The paraplegics, hemiplegics and tetraplegics group has the highest percentage of those who had never worked, closely followed by the visually impaired and the deaf and hard-of-hearing groups.

Table 7. Presentation of the main multinomial logistic regression results through Likelihood Ratio tests, where in column Sig. the three important factors are Disability, Educational Level, and Age Groups (p-value<0.05%)

Effect	Model fitting criteria	Likelihood Ratio Tests		
	Reduced model likelihood	Chi-square	df	Sig.
Intercept	428.749	0	0	.
Gender	431.181	2.432	3	0.488
Disability	486.371	57.622	15	0
Level of education	465.82	37.071	15	0.001
Special training	430.793	2.043	3	0.563
Seminars	430.113	1.364	3	0.714
Working hours due to disability	430.788	2.039	3	0.564
Duty due to disability	433.072	4.323	3	0.229
Trip due to disability	433.059	4.31	3	0.23
Personal help	429.353	0.604	3	0.895
Special equipment	434.771	6.022	3	0.111
Special working status	432.187	3.438	3	0.329
Age groups	555.026	126.277	18	0

There is also statistical significance between employment mode and disability. The group of paraplegics, hemiplegics and tetraplegics presents the highest percentage of self-employed individuals, two times higher than the percentage of the visually impaired group, with the group of the deaf and hard-of-hearing presenting the lowest percentage.

As far as full-time contracts are concerned, the highest percentage was that of the deaf and hard-of-hearing (22.8%), which is slightly higher than the mean percentage, followed by the percentage of the visually impaired group (16.2%), which is very close to the mean percentage, and by the percentage of the physical impairment group, which is very low (6.8%). Concerning part-time contracts, the hearing impairment group comes first with 11%, followed by the other two groups (4.1% for the visually impaired and 5.1% for the paraplegics, hemiplegics and tetraplegics).

To the question, "How important do you consider the factors below in finding employment", 10 factors were presented in order to be ranked by the employed, unemployed and retired persons of the three main groups of disabilities. The factors were: 1st "Skills required", 2nd "Education", 3rd "Employers' point of view", 4th "Employers previous experience with disabled people", 5th "Accessibility in the working environment", 6th "Subsidized Program", 7th "Professional experience", 8th "Gender", 9th "Age", and 10th "Marital status".

The top five affecting factors for the visual impairment group are skills required, education, employer's behaviour, accessibility and employers previous experience with disabled. For the group with physical impairments the top five is education, skills required, subsidized employment program, employers' behaviour, and accessibility, while for the hearing impairment group the top five are skills required, professional experience, gender, age and employers behaviour.

It can easily be noticed that there are wide differences throughout all three groups, when it comes to the ranking of the ten factors above. It should be noted that the ranking came out of a sum of scores from -2 to +2 ([-2,2]), where the interviewees were asked to mark a level of importance, (very positive=2, positive=1, neither=0, negative=-1 and very negative=-2).

As far as the need and use of personal help, special equipment and being in a special working status (such as flexible schedules, part-time work, job-sharing and teleworking) is concerned, most of the survey's results were statistically significant, showing that the distribution of whether the participants need and use the above or not is not equal amongst the three disability groups.

In particular, 55.3% of the persons from the hearing impairment group need personal help, with 46.8% actually having it. These percentages are reduced to 16.5% and 16.9% for the visually impaired group and to 21.1% and 8.2% for the group of persons with physical disabilities.

The percentages of those who need special equipment and those who use it, are 35.1% and 16.2% for the group with hearing impairments (NB: the difference between need and use of special equipment percentages within the hearing impairment

groups is statistically significant, p=0.007<<0.05, particularly for the employed and the unemployed), 38.5% and 33.3% for the group with visual impairments, and 61.1% and 49% for the group with physical disabilities, respectively.

As far as the need of special equipment is concerned, the physical impairment group presents the highest percentages, compared to other disability groups.

Percentages of those who need special working conditions and those who actually have it are 51.1% and 43.1% for the hearing impairment group, 22% and 20.6% for the visual impairment group, and 36.7% and 36.7%, respectively, for the physical disability groups.

The group of people from all disability groups that have never been employed presents the highest percentage among other working status groups (employed, retired, unemployed) concerning the need of special working conditions (p-value < 0.05).

Table 8. Factors considered as important for finding employment across disabilities

	Visual disability group	Physical disability group	Hearing disability group	Total
Skills required	114	35	79	228
Education	107	37	17	161
Employers' behaviour	73	28	48	149
Employers Previous experience with the disabled	54	23	41	118
Accessibility of working environment	55	27	30	112
Subsidised plan	16	31	2	49
Professional experience	39	20	54	113
Gender	17	13	53	83
Age	22	13	53	88
Marital status	22	11	43	76

Regarding the means of searching for jobs, persons in all working status and disability groups agreed that they most frequently used the services provided by the Manpower Employment Organization (OAED). Their next preference was "Call of job openings through disability associations" followed by the choice "Knowing the employer".

According to previous research data (Magoulios & Trichopoulou, 2012) the vast majority of people with disabilities (75%) agree that the most important role in job-seeking is played by skills and qualifications, followed by other positive factors, such as work experience, qualifications and studies, exploitation of subsidy plans, while what comes last is the employer's attitude. Concerning the means used in the

process of job-seeking, people with disabilities who participated in the 2003 EQUAL survey answered that they mostly preferred personal or family acquaintances as employers when looking for a job and, to a lesser extent, they exploited other means, such as OAED subsidy plans, job advertisements, personal efforts other than via acquaintances, employers recommended by OAED and their broader network, or schemes promoting employment.

There appears to be statistical significance concerning the distribution of choices between the educational level of participants and their willingness to work. The higher their educational qualifications, the higher the percentages of those who want to work in all disability groups.

To the question "evaluate the behaviour of your employer, your colleagues, your working environment, and the customer behaviour towards you", ratings were "Not satisfied at all", "Semi-satisfied", and "Very satisfied". In general, the hearing impairment group is the most dissatisfied of the three disability groups, concerning all four questions, especially the last one concerning customers' behaviour. However, the majority of respondents across all disabilities seem to be satisfied in terms of working environment attitude. The same conclusion emerged from the 2003 survey (Magoulios & Trichopoulou, 2012), which showed that behaviour patterns of colleagues, employers, customers and managers were quite satisfactory for most employed people with disabilities.

According to the tables below, there is statistical significance between disability and colleagues' behaviour, as well as between disability and customer behaviour.

Persons that have never worked from all disability groups

These persons constitute a separate group, as they have no working experience and interviewers were interested in determining whether they were actually willing to find a job. The percentage of interviewees who answered they did not want to work drops as their level of educational level rises. Specifically, it falls from 63.6% for those who graduated from elementary school to 7.1% for University graduates and holders of Master's and Doctor's Degrees. Those results are statistically significant (p-value<0.05).

Persons that were employed before their disability and retired after their disability

A small group within the sample (20 persons) had working experience only before their disability occurred. Thus, even though they had experience of the needs of a working environment, they had not been employed as disabled persons. Eight of the interviewees were visually impaired, two were hemiplegics, three were paraplegics, and seven were tetraplegics. Some descriptive statistics for their disability and education are provided at Tables 13 and 14.

Table 9. Levels of satisfaction across disabilities, regarding employers' behaviour towards disabled employees

			Disability			
			Visual disability group	Physical disability group	Hearing disability group	Total
Employers' behaviour	Not satisfied at all	Count	4	3	4	11
		% within disability	5.70%	6.80%	5.80%	6.00%
	Moderately satisfied	Count	14	13	25	52
		% within disability	20.00%	29.50%	36.20%	28.40%
	Very satisfied	Count	52	28	40	120
		% within disability	74.30%	63.60%	58.00%	65.60%
	Total	Count	70	44	69	183
		% within disability	100%	100%	100%	100%

Table 10. Levels of satisfaction across disabilities, regarding colleagues' behaviour towards disabled employees

			Disability			
			Visual disability group	Physical disability group	Hearing disability group	Total
Colleagues' behaviour	Not satisfied at all	Count	1	2	4	7
		% within disability	1.40%	4.50%	5.80%	3.80%
	Moderately satisfied	Count	16	7	26	49
		% within disability	22.90%	15.90%	37.70%	26.80%
	Very satisfied	Count	53	35	39	127
		% within disability	75.70%	79.50%	56.50%	69.40%
	Total	Count	70	44	69	183
		% within disability	100%	100%	100%	100%

Table 11. Levels of satisfaction across disabilities, regarding their working environment

			Disability			
			Visual disability group	Physical disability group	Hearing disability group	Total
Working Environment	Not satisfied at all	Count	4	2	4	10
		% within disability	5.70%	4.50%	5.80%	5.50%
	Moderately satisfied	Count	20	8	29	57
		% within disability	28.60%	18.20%	42.00%	31.10%
	Very satisfied	Count	46	34	36	116
		% within disability	65.70%	77.30%	52.20%	63.40%
	Total	Count	70	44	69	183
		% within disability	100%	100%	100%	100%

Table 12. Levels of satisfaction across disabilities, regarding customers' behaviour towards disabled employees

			Disability			Total
			Visual disability group	Physical disability group	Hearing disability group	
Customer Behaviour	Not satisfied at all	Count	3	1	10	14
		% within disability	4.30%	2.30%	14.50%	7.70%
	Moderately satisfied	Count	26	6	32	64
		% within disability	37.10%	13.60%	46.40%	35%
	Very satisfied	Count	41	37	27	105
		% within disability	58.60%	84.10%	39.10%	57.40%
Total		Count % within disability	70	44	69	183
			100%	100%	100%	100%

Table 13. Disabilities of the specific group of persons that were employed before their disability occurred and retired after their disability occurred

	Frequency	Percentage	Valid percent	Cumulative percentage
visual disability	8	40	40	40
hemiplegics	2	10	10	50
paraplegics	3	15	15	65
tetraplegics	7	35	35	100
Total	20	100	100	

Table 14. Educational level of the specific group of persons that were employed before their disability occurred and retired after their disability occurred

	Frequency	Percent	Valid percentage	Cumulative percentage
elementary school	1	5%	5%	5%
junior high school	3	15%	15%	20%
high school	9	45%	45%	65%
post-secondary school	1	5%	5%	70%
university	6	30%	30%	100%
Total	20	100%	100%	

Conclusions

Accessible employment has not been sufficiently developed in Greece yet and any actions towards this goal could have significant potential impacts for people with disabilities, employers and society as a whole.

People with disabilities face serious obstacles in employment, including prejudice and stereotypes, barriers to education, accessibility barriers, as well as inadequate policies and practices.

The WorkAbility project activities aimed to bring together all actors involved, to raise awareness of employers about disability and to provide people with disabilities with all appropriate incentives for successfully entering the labour force, either as employees or as entrepreneurs.

Elimination of discriminating attitudes and provision of reasonable accommodations at workplaces, in combination with adoption of new employment policies and practices, are important steps towards promoting employment and entrepreneurship among people with disabilities. In this context, WorkAbility has provided a set of powerful tools, information and knowledge to be utilised, paving the way for the establishment of accessible employment and the creation of an inclusive marketplace and society.

WorkAbility survey results provide an indication of the aforementioned obstacles and limitations, specifically depicting the situation in the Region of Central Macedonia. Results also indicate areas of intervention and initiatives that need to be taken in terms of accessible employment and entrepreneurship in Greece.

From the answers given by survey participants it is obvious that Greek people with disabilities have a high educational level nowadays, which allows them to build strong CVs, be competitive and successfully enter the labour market. Especially for visually impaired people, the percentage of University graduates and Master's and Doctor's Degree holders among the survey population reached 50%. In addition, the survey indicated that there is a strong correlation between educational level and willingness to work, meaning that, as the educational level rises, so does the percentage of those who want to work.

According to answers provided, 23.67% of interviewees had never worked before. For this group of participants, it is interesting to note that only 7.1% of graduates and Master's and Doctor's Degree holders stated they do not want to work. Thus, a lot of crucial questions emerge: Why do people with disabilities get discouraged from finding a job or starting up their own businesses, although they are willing to work? Do disability allowance policies discourage beneficiaries from job seeking? Are the incentives offered by family, friends, employers and society sufficient to promote employment for people with disabilities? Finding true answers to such questions is a rather demanding and multifaceted task, but also necessary in order to reverse the current situation.

It is worth mentioning that the majority of respondents across all three disability groups stated that their disability did not affect their performance at work. Tetraplegics seemed to have greater needs in terms of special equipment and special working conditions compared to individuals with other disabilities. They also felt that their disability was a hindering factor for commuting to and from their working place and also restricted the number of hours they were able to work. In addition, it appeared that the group of people with hearing problems had the highest percentage of individuals needing personal help.

Most participants stated that they were satisfied with the behaviour of colleagues, employers and customers. This is a positive finding indicating that attitudes towards employees with disabilities within contemporary working environments in Greece have been substantially improved and have become friendlier, compared to the past.

Furthermore, based on the results of the multinomial logistic regression analysis conducted, it was determined that the most significant factors affecting employment are age, educational level and type of disability.

The results of the survey have been included in WorkAbility Deliverable 3.1 entitled "Analysis of existing situation concerning employment of persons with disability in Central Macedonia" and are available at the project's website: www.workability.gr.

These results, in combination with the 'Toolbox for Employment' developed in the context of the WorkAbility project, can be appropriately exploited in order to overcome the barriers identified and to enhance employment opportunities for people with disabilities in Greece, thus, allowing their vocational rehabilitation.

Following the completion of the WorkAbility project, an interesting challenge is to conduct a new, extensive survey covering a broader geographical range and more types of disability. Of course, interdisciplinary cooperation of, for example, social workers, psychologists, engineers and key- stakeholders is of vital importance for the proper design and successful implementation of such a survey.

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ECONOMIC POLICY UNCERTAINTY IN GREECE: MEASURING UNCERTAINTY FOR THE GREEK MACROECONOMY

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Abstract
We constructed the monthly Economic Policy Uncertainty (EPU) index for Greece for the period 1998-2018 using the Baker *et al.* (2016) methodology. This index is of critical importance for macroeconomic research given the presumed heightened levels of uncertainty in the Greek economy in the context of recent economic and political events. The newly-constructed time series of the uncertainty index is discussed and related to the recent economic and financial crisis in Greece and the Eurozone. Simple statistical analysis highlights the high levels of correlation in economic policy uncertainty between Greece, European countries and the USA. It is also shown that the uncertainty correlation between Greece and Europe is time varying and has become much lower since the onset of the Greek crisis.

JEL Classification: D80, E20, E66, G18
Keywords: Economic Policy Uncertainty Index, Greek Economy, European Uncertainty

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"The only certainty is that nothing is certain",
Pliny the Elder, Book II, sec. 7, *Naturalis Historia*

1. Introduction

Uncertainty is a puzzling and multi-dimensional concept that has been at the forefront of theoretical and empirical economics. It may be pertinent for various types of decision makers (consumers, firm managers or policymakers). It may also relate to uncertainty regarding the magnitude of macroeconomic variables (e.g., GDP growth and inflation) or exogenous non-economic events (wars or natural disasters). Uncertainty is also varying across both time and space. Evidence suggests that uncertainty is anticyclical and more prevalent in developing as compared to developed countries (Bloom, 2014).

Recent macroeconomic developments in industrial countries have provided the stimulus for uncertainty to become a hotly- debated topic in the academic community. During the last decade, due to the global financial crisis and the Euro Area crisis, increased interest has been focused on the uncertainty related to the US economy, as well as, the economies of Eurozone countries. Following the US Great Recession and the Euro-area debt crisis, economic uncertainty seems to be on the rise at a global scale and measuring such uncertainty has become a much-needed task. Baker, Bloom and Davis (henceforth BBD, 2016) have proposed a measure of uncertainty known as the Economic Policy Uncertainty (EPU) index, which is based on newspaper coverage frequency. Following their seminal paper on the construction of the index for the US economy, the EPU index has also been constructed for several other industrial countries by the same authors or independent researchers.

The ongoing Greek crisis highlights the increasing importance of the concept of economic uncertainty and raises the issue of the causal determinants of this uncertainty, as well as the issue of estimating the effects of uncertainty on macroeconomy. It is generally believed that heightened uncertainty in the Greek economy keeps the cost of international borrowing at high levels and hampers the prospects of economic growth. It is, therefore, vital to create a measure of economic uncertainty for the Greek economy. Despite the critical significance of a measure of uncertainty for the Greek economy, to date, no such measure exists. Hence, in this paper, we attempt to create a monthly index of EPU for Greece for the period 1998-2018 following the BBD (2016) methodology. This time period includes the year that preceded the launch of the Euro, the years following the creation of the Eurozone, and the time since the start of the recent Greek crisis. In addition to measuring economic uncertainty, we are also interested in providing a narrative analysis relating the uncertainty measure to international and national economic and political events. The newly-constructed index of uncertainty for the Greek economy is also related to similar indices for European countries using

simple statistical analysis. Our major results are the following: First, the values of the index seem to reflect, quite satisfactorily, major events occurring during the sample period, such as, the global financial crisis, the Eurozone crisis, the Greek elections and referendum of 2015, and the introduction of capital controls. Second, the Greek uncertainty index is highly correlated with similar indices constructed using the same methodology, such as the European, US and global indices, as well as with the indices for other European countries, and, in particular, France and Germany. Third, there is evidence for time-varying volatility in the correlation coefficient between the Greek and European EPU indices as the relation between the two uncertainty indices has been much lower since the start of the Greek crisis.

The paper is organized as follows: section 2 summarizes the main relevant literature, and section 3 describes the methodology. Section 4 provides the results and discusses the uncertainty index in the context of major economic and political events, both national and international. In addition, some simple correlation analysis between the Greek EPU and various uncertainty indices for other countries or regions is also performed. Finally, section 5 presents the conclusions.

2. A review of relevant literature

Modern theoretical literature on uncertainty and its impact on economic activity are quite rich and diverse. A long string of this literature focuses on the impact of micro uncertainty on investment decisions. Craine (1989) shows that, under risk aversion and incomplete markets, the impact of uncertainty on investment is most likely negative. When risk neutrality or complete markets are present, the impact is ambiguous and may become positive (Hartman, 1972). Bernanke (1983) argues that, in the presence of irreversible investment, agents delay their decisions and uncertainty may affect investment negatively. This is the so called real-options argument (Bernanke, 1983; Bloom, 2009). However, uncertainty may also affect economic activity in a positive manner. According to the "growth options" argument, this happens if, in the presence of investment lags, there is a mean-preserving increase in demand uncertainty, which increases expected profit once the investment goes ahead (Bar-Ilan and Strange, 1996).

In international empirical literature, there are various ways of measuring uncertainty. Among the various measures, we have the volatility of a series (GDP or the stock market) proxied by the moving standard deviation of a time series, and the forecaster disagreement. Another proxy of uncertainty is derived from a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, according to which the conditional variance of a series is used as a measure of uncertainty concerning macroeconomic variables, such as inflation, output growth, oil prices, house prices and housing investment (Grier and Perry, 1998; Fountas, Karanasos and Kim, 2002, 2006; Bredin and Fountas, 2009; Bredin, Elder and

Fountas, 2011; Christidou and Fountas, 2018). In particular, the GARCH approach in measuring macroeconomic uncertainty has been one of the most widely accepted approaches in relevant literature as highlighted through applications by prominent macroeconomists (Hamilton, 2010). The objective of these studies is, firstly, to estimate a univariate or multivariate GARCH model of uncertainty and obtain a proxy of uncertainty captured by the conditional variance of the relevant macroeconomic series. At a second step, these studies estimate the impact of the uncertainty measure on variables expressing macroeconomic performance, such as inflation, output growth or housing investment.

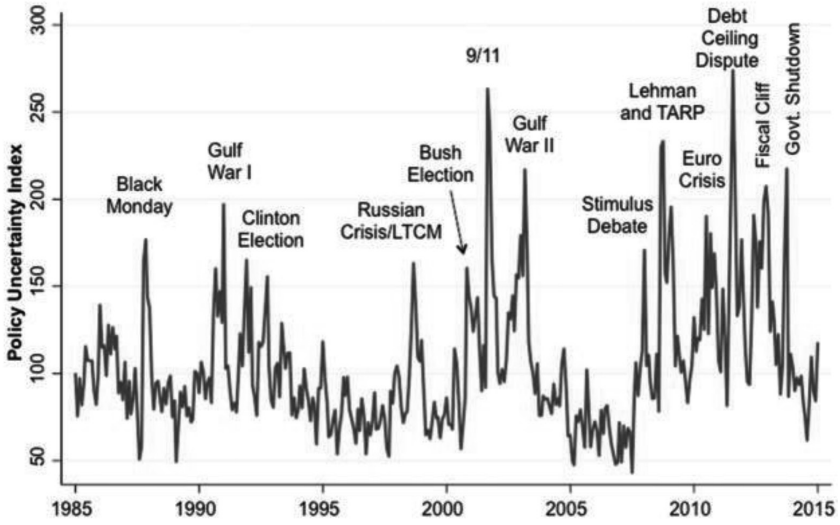
The EPU index proposed by BBD (2016) is a recent measure of a country's uncertainty that focuses on the uncertainty caused by economic policymaking. The EPU index depicts both short-run and long-run uncertainty arising from questions, such as, who will apply economic policy, what kind of economic policy will be followed, what regulations the policy makers will introduce and what will the effects of such regulations be on the economy. This index is quite volatile and its fluctuations may be attributed to macroeconomic variables (government spending and taxes) and political polarization (Baker *et al.*, 2014). The creation of the EPU index is based on newspaper coverage frequency of specific words, which will be discussed in the following section. The first EPU data series to be constructed by BBD was for the USA and covers the period from 1985 to the present. Subsequently, these authors developed the EPU series for other industrial countries, including large European countries, such as, France, Germany and the UK. In their Economic Policy Uncertainty site, BBD also report the European index using data from five European countries, and the Global index including data from nineteen countries.

BBD also proceeded with some tests of the credibility and validity of the EPU index for the US economy. Support of the credibility of the index is remarkable. Much research into the EPU index has been conducted, generating important results on the events depicted on an EPU graph, the causal effects between the EPU and macroeconomic or financial variables and the importance of uncertainty during economic crises. A study of relevant international literature indicates that the EPU index is affected by important economic and political events as made apparent by the US case. Figure 1, taken from BBD (2016), reports the values of the US EPU index and shows that the uncertainty index is highly volatile and can capture quite well important political and economic events corresponding to peaks at the level of uncertainty. According to several studies, a steep increase has been observed in each country's uncertainty index during or after the end of major events, such as national elections, oil crises and referenda (BBD, 2016; Davis, 2016; Cerda *et al.*, 2018).

Following the BBD's approach, other researchers have created the uncertainty series for several countries. In most cases, these papers employ Vector Autoregression (VARs) Analysis to examine the impact of uncertainty on domestic macroeconomic

variables. Arbatli *et al.* (2017) constructed several policy uncertainty indices for Japan and find that the indices captured domestic and international economic and political events in a satisfactory manner. Armelius *et al.* (2017) developed the EPU index for Sweden and found that policy uncertainty affects domestic GDP growth negatively. Another interesting finding is that European and US uncertainty affect Swedish output growth in the same way as domestic uncertainty. BBD (2016) provide evidence for negative responses from the sectors of investment, real GDP and employment to US EPU shocks. Cerda *et al.* (2018) constructed two EPU indices for Chile and found that these indices capture important national and international events. Luk *et al.* (2017) constructed an EPU index for Hong Kong and found evidence for spillover effects of uncertainty from industrial countries on Hong Kong economy. Sahinoz and Cosar (2018) developed the EPU index for Turkey and, using VAR analysis, found that policy uncertainty has affected economic growth, consumption and investment negatively. Tobback *et al.* (2018) argue that the EPU methodology is subject to measurement error and proposed a different methodology to measure uncertainty for Belgium, using text-mining techniques. Zalla (2017) constructed the EPU index for Ireland and performed VAR analysis to measure the impact of policy uncertainty on Irish macroeconomic variables. To date, an EPU index has been created for more than 22 countries[1].

Figure 1. The EPU index for the USA (monthly data). Source: Baker, Bloom, and Davis (2016)



1. Data for all countries are available at www.policyuncertainty.com

3. Methodology

During the last few years researchers have attempted to measure EPU in several countries. However, to date, there have been no data for the EPU index for Greece. Identifying this lack of data and realizing the importance of uncertainty for a country like Greece, especially during the last decade with the ongoing crisis, our objective is to create the EPU index for Greece for the period 1998.1-2018.1. Furthermore, the methodology used in creating this uncertainty index will be used to keep the index continuously updated. The data will be freely available to the academic community on the formal website of the index (www.policyuncertainty.com).

As mentioned previously, the EPU index introduced by BBD is an index created through conducting digital research into specific terms in the digital archives of newspapers. The research has to be conducted on the digital archives of leading general or business-oriented daily newspapers. More specifically, in order to create the Greek EPU index we searched through the Greek daily newspaper *Kathimerini* archives for the number of articles per month that included at least one term of the 3 categories: economic, policy and uncertainty. Table 1 includes all the words that are part of the query. Then, the number of articles that include the terms of the 3 categories above is scaled by the total number of articles published by the newspaper per month. Following the appropriate normalization, we get the final data for the EPU index for Greece.

Table 1. Table of words being sought for the creation of the EPU index

Uncertain **OR** Uncertainty **OR** Uncertainties	Αβεβαιότητα **Ή** Αβέβαιος, -η, -ο **Ή** Αβέβαια
AND	**ΚΑΙ**
Economic **OR** Economy	Οικονομία **Ή** Οικονομικά **Ή** Οικονομικός,-ή,-ό
AND	**ΚΑΙ**
Policy **OR** Congress **OR** Deficit **OR** Federal Reserve **OR** The Fed **OR** Legislation **OR** Regulation **OR** Regulatory **OR** The White House	Πολιτική **Ή** Πολιτικές **Ή** Κυβέρνηση **Ή** Έλλειμμα **Ή** Κεντρική Τράπεζα της Ελλάδος/Ελλάδας **Ή** Ευρωπαϊκή Κεντρική Τράπεζα **Ή** Νομοθεσία **Ή** Μεταρρύθμιση **Ή** Μεταρρυθμίσεις **Ή** Μεταρρυθμιστικός,-ή,-ό **Ή** Βουλή

4. Results and discussion

Figure 2 shows the monthly values of the EPU index for Greece for the period 1998.1-2018.1. The figure highlights the wide variability in policy uncertainty during the sample period. Uncertainty seems to be relatively low following the launch of the Euro (except for the first year) and for quite a long period till the collapse of Lehman Brothers. Perhaps not surprisingly, uncertainty has been on an upward trend since the onset of the global financial crisis around the time of the collapse of Lehman Brothers. The rise in uncertainty was exacerbated during the Greek government-debt crisis notching very high values of the uncertainty index during the first half of 2015, a period of political and economic uncertainty, which coincided with the elections that brought the Sy.ri.za party to power. It is noticeable that the index showed a rapid downward trend during 2017, as the economy entered a period of stabilization.

It is important to attempt to associate the peaks in the Greek uncertainty index with major economic and political events, both national and international, which may have an impact on the level of Greek uncertainty. To this end, Figure 3 reports the values of the index and events coinciding with peak values in the series of the index.

Figure 2. Greek Economic Policy Uncertainty Index (January 1998-January 2018)

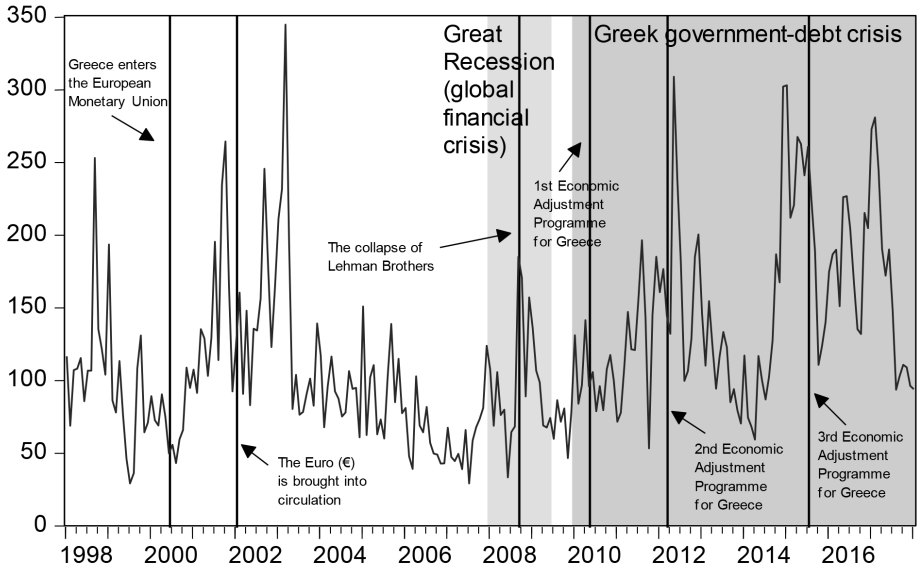
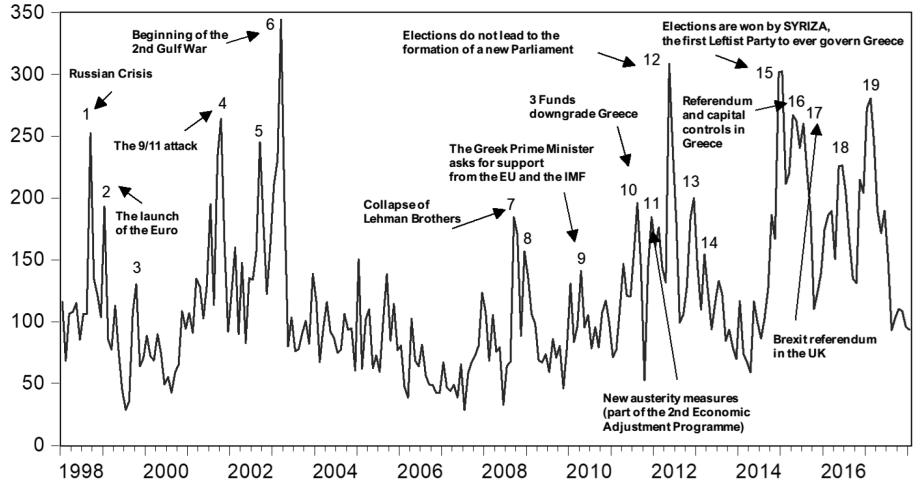


Figure 3. Important peaks of the Greek Economic Policy Uncertainty Index (January 1998 – January 2018)



The following list includes important peaks of the Greek EPU index (as shown in Figure 3) and political and/or economic events that took place at the time of the peak:

1) 9/1998: Russian Crisis.
2) 1/1999: The Euro was launched in accounting form.
3) 10/1999: The Greek Stock Exchange crashed in September 1999 & a big earthquake struck Athens in September 1999.
4) 10/2001: A month after the terrorist attack of 9/11 in New York.
5) 9/2002: Oil price rise & fall of banking stocks.
6) 3/2003: American Forces invaded Iraq.
7) 9/2008: The collapse of Lehman Brothers (the beginning of the global financial crisis).
8) 12/2008: Perhaps the worst riots since the fall of the dictatorship (1974) occurred in major cities of Greece, following the murder of a teenage student, Alexandros Grigoropoulos, by two policemen in Athens. Since then, every year on the 6th of December, there are demonstrations in the student's memory.
9) 4/2010: The Greek Prime Minister (G. Papandreou) asked for financial support from the IMF, the EU and the ECB. Fitch downgraded Greece.
10) 7/2011: 3 Funds downgraded Greece.
11) 2/2012: New austerity measures & anticipation of the agreement for the 2nd Economic Adjustment Programme, which was finally agreed and signed the following month.

12)5/2012: General elections resulted in a transitional government due to absence of a parliamentary majority. A coalition government was vital, at that time, in order to implement the measures agreed 2 months earlier as part of the 2nd Economic Adjustment Programme. The coalition government was achieved at the elections of June 2012.
13)12/2012: One month after the Greek Parliament had approved the 3rd memorandum.
14)3/2013: Cyprus' bail-in and introduction of capital controls.
15)1/2015: Early general elections due to the inability of the government to elect the President of the Republic. The elections were won by SY.RI.ZA., the first left party to ever govern Greece. A coalition government was formed by SY.RI.ZA. and AN.EL. Parties.
16)7/2015: Greek referendum (8th July) to approve the bailout conditions proposed by the EU, the ECB and the IMF. The result of the referendum was "No". Finally, a bailout package was agreed on the 13th of July. A month earlier (June 2015) capital controls had been introduced.
17)6/2016: Brexit Referendum in the United Kingdom & terrorist attack at the International Airport of Istanbul.
18)11/2016: Presidential elections in the USA (Trump elected).
19)1/2017: the U.K. triggers article 50 for Brexit & beginning of Trump's presidency & terrorist attack in Istanbul (New Year's Eve).

Given the availability of similar EPU indices for several other industrial countries, and assuming that uncertainty is likely transmitted from one country to another during periods of economic turmoil, it would be very interesting and useful to determine the extent to which the Greek EPU index is correlated with other indices. This exercise would be even more relevant for European countries and, in particular, member states of the European Union, given the close economic links that have been developed since the founding of the EU. We, therefore, performed a simple correlation analysis of the Greek EPU index with similar indices available for other major industrial European countries. Table 2 reports the estimated simple correlation coefficients, the t-statistics and their respective probability values. Results show that the correlation coefficient is always statistically significant. The scale of the correlation coefficient of the Greek EPU index is higher for large countries, such as France, Germany and the UK.

Table 3 reports the correlation coefficients of the Greek EPU index for three regions, namely, the US, Europe-5 and the world-19. The European index has also been constructed by BBD and is available on the economic policy uncertainty site. It includes 5 countries, namely, France, Germany, Italy, Spain and the UK. The world uncertainty index includes data from nineteen countries, namely, Australia, Brazil,

Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. Again, all simple correlation coefficients reported are statistically significant and, in most cases, are of a larger scale than the correlation coefficients between Greece and individual countries, as shown in Table 2. It is interesting to note that the Greek EPU index is more closely correlated with the European index (the scale of the correlation coefficient is 0.639) than with the US index (the scale of the correlation coefficient is 0.545), probably a result to be expected given the stronger economic ties between Greece and Europe as compared to the US.

It is possible that there is time-varying correlation between various uncertainty indices. This is rather anticipated, as the full sample includes relatively tranquil periods during the pre-global financial crisis and more volatile periods such as those associated with the global financial crisis and the European and Greek crises. Table 4 reports the time variation of EPU indices in Greece and Europe. We report the values of simple correlation coefficients and significance levels for three periods, i.e., the period prior to the launch of the Euro, the period from January 2002 to March 2010 and the period from April 2010 to January 2018. The second period ends just prior to the onset of the Greek crisis, which we consider to be in April 2010, when the then Prime Minister, George Papandreou, sought financial assistance from the EU, the ECB and the International Monetary Fund. The results of Table 4 indicate that the correlation between the European and the Greek uncertainty indices was much higher (about twofold in scale) prior to the start of the Greek crisis as compared to the values since the onset of the crisis. This conclusion is, perhaps, not surprising given that most of the variability of the Greek uncertainty index since 2010 has been associated with domestic rather than international events. Notably, the Greek uncertainty index was significantly affected by political events in 2015 (two general elections and one referendum) and the bank holiday of the summer 2015. Figure 4 plots the European and Greek uncertainty indices for the 1998-2018 period. It is obvious that the two indices are highly related over time and it seems that certain peaks coincide in the two indices. However, since 2010 the correlation between the two indices seems to have been dwindling.

Table 2. Analysis of EPU index correlation between Greece and European countries

Correlation Analysis: Ordinary Sample: 1998M01-2018M01 Number of observations: 241							
	France	Germany	Ireland	Italy	Russia	Sweden	UK
Correlation (Greece)	0.554	0.559	0.343	0.436	0.381	0.479	0.493
t-statistics	10.271	10.426	5.644	7.476	6.367	8.422	8.758
probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 3. Analysis of EPU index correlation between Greece, Europe, USA and the world

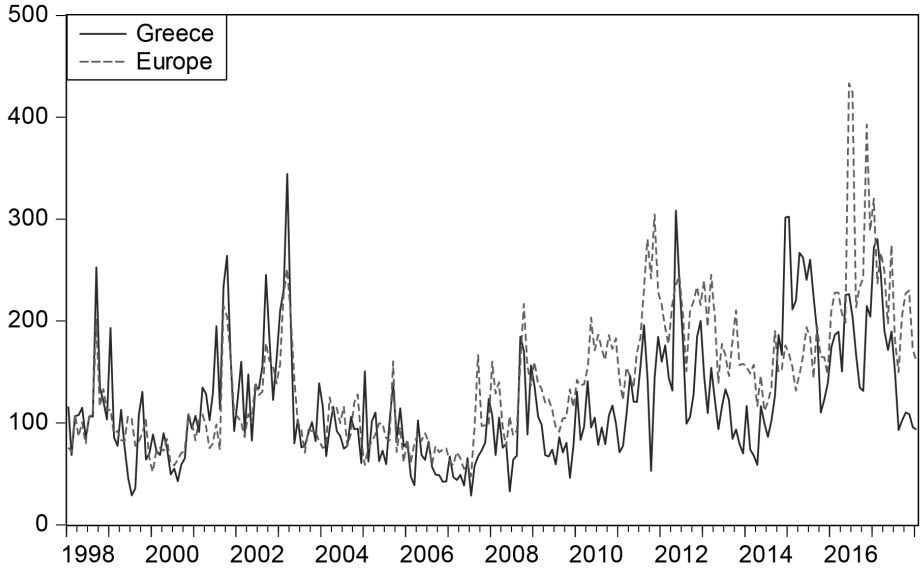
Correlation Analysis: Ordinary Sample: 1998M01-2018M01 Number of observations: 241			
	Europe-5	USA	World-19
Correlation (Greece)	0.639	0.545	0.672
t-statistics	12.876	10.063	14.046
probability	0.000	0.000	0.000

Note: The EPU index for Europe-5 includes five countries: France, Germany, Italy, Spain and the UK. The World EPU index includes nineteen countries: Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States.

Table 4. Correlations between Greece and Europe-5

	1/1998-12/2001	1/2002-3/2010	4/2010-1/2018
Correlation	0.792	0.736	0.387
t-statistics	8.800	10.738	3.998
probability	0.000	0.000	0.000

Figure 4. The Greek and European EPU indices



5. Conclusions

In this paper we have attempted to provide an initial measure of economic policy uncertainty for the Greek economy, following the framework suggested by BBD (2016), which is based on newspaper coverage frequency of specific words. Using the digital archives of a major daily newspaper, we constructed the monthly Greek EPU index for the period 1998.1-2018.1. Our major results are the following: First, a careful study of the values of the index shows that uncertainty has been quite volatile throughout the period of study and has been on the rise since the onset of the global financial crisis and, even more so, during the recent Greek government-debt crisis. Moreover, the values of the index seem to quite satisfactorily reflect major economic and political events occurring during the sample period, such as, the global financial crisis, the Eurozone crisis, the Greek general elections and referendum of 2015, and the introduction of capital controls. Second, the Greek uncertainty index is highly correlated with similar indices constructed using the policy uncertainty methodology, such as the European, US and global indices, as well as with the indices for other European countries, in particular France and Germany. Third, there is evidence for time-varying volatility in the correlation coefficient between the Greek and the European EPU indices as the relation between the two uncertainty indices has been much lower since the onset of the Greek crisis. This is due to the Greek index reflecting several national events since the onset of the Greek crisis associated

with general elections and prolonged negotiations between the Greek government and the EU authorities.

It would be rather interesting to consider some extensions of the present research. As shown by previous studies (BBD, 2016; Armelius *et al.*, 2017; Zalla, 2017), the EPU index is expected to impact macroeconomic variables of the national economy. In an accompanying paper (Fountas *et al.*, 2018), we have estimated VARs identified via Cholesky ordering and have used impulse response function analysis to examine the impact of domestic uncertainty on macroeconomic variables. Preliminary evidence seems to indicate that effects have the expected sign and are statistically significant. Further analysis using a structural VAR approach will shed further light on the robustness of these preliminary results.

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Book Review

Advanced Introduction to Behavioral Economics

by John F. Tomer
Emeritus Professor of Economics, Manhattan College, New York, US
published by Edward Elgar, 2017, pp. 192
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reviewed by Edward Cartwright*

The rapid growth of behavioural economics over the last few decades has been quite extraordinary. From somewhat humble beginnings, behavioural and experimental economics have grown into core areas of economic research. They have also become instrumental in the application of economics, as evidenced by the success of the Behavioural Insights Team in the UK and similar offshoots elsewhere (Halpern 2016). Richard Thaler's recent Nobel Prize is the latest recognition of how far behavioural economics has come. Textbooks and scholarly introductions to the field have been much slower to emerge. Indeed, the book by Nick Wilkinson (2007) is arguably the first textbook on the market dedicated to this subject. Recent years, however, have seen a host of new books launched in the market, ranging from beginner introductions (Baddeley 2017) to advanced level texts (Dhami 2016), and everything in-between (e.g. Angner 2016, Baddeley 2013, Cartwright 2014, Just 2013).

The book *Advanced Introduction to Behavioral Economics*, by John Tomer, is a new addition. It is part of the Elgar Advanced Introductions series, the aims of which are 'to pinpoint essential principles of a particular field, and to offer insights that stimulate critical thinking'. In the introductory chapter, Tomer (p.2) clarifies his intended aims and audience: 'This book is designed to explain carefully and simply the most important BE [behavioral economics] theories and perspectives. It is also designed to explain important BE trends and recent developments. … [T]his book should be particularly useful for advanced undergraduate students, graduate students, government policymakers, and other professionals who participate in discussions about economics-related matters.'

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The book is short, at 161 pages, but clearly aimed at a relatively informed audience. In this sense, the book distinguishes itself from others on the market, where book length seems to be highly correlated with presumed knowledge of the target audience! So, it lives up to the billing of an 'advanced introduction'. The book also covers a wide range of topics including neuroeconomics, nudging and behavioural macroeconomics, as well as more standard fare, such as heuristics and biases. One theme that particularly makes the book stand out is its focus on methods and applications, rather than just theory. To further elaborate on this point we need look no further than Chapter 2, which is worth discussing in some detail, as it sets out themes that run throughout the book.

Chapter 2 essentially provides an overview of the history and objectives of behavioural economics. Mainstream economics, under the umbrella of neo-classical economics, is depicted as too narrow in rejecting inter-disciplinary and non-quantitative insight in a push for mechanical, mathematical formalization. 'The problem with NE [neo-classical economics] is its very strong commitment to a particular form of positivism' (p. 10). Behavioural economics is seen as a way to potentially break the shackles and move towards a different kind of economics, one that is more outward looking and willing to embrace ideas from other social sciences.

Interestingly, though, the book breaks from the relatively common approach of portraying behavioural economics as a coherent body of work taking economics to a better place. Instead, behavioural economics is portrayed as a broad field with multiple strands and internal tensions. Particularly telling is the discussion of what Tomer calls psychological economics. This strand of behavioural economics encompasses the work of Daniel Kahneman, Amos Tversky and Richard Thaler and for many would be seen as behavioural economics. Tomer, however, highlights other strands of behavioural economics including the work pioneered by Herbert Simon on bounded rationality, that of Herbert Leibenstein on X-inefficiency, Goerge Akerlof on behavioural macroeconomics, Richard Nelson and Sidney Winter on evolutionary theory, as well as the work of George Kantona.

Psychological economics also comes in for some indirect criticism for being too much like mainstream economics. For instance, (p 19.) 'As part of this PE [psychological economics] process, the core NE assumptions of self-interest, rationality, and self-control are challenged. Nevertheless, PE's basic methods do not represent a radical departure from NE. … It follows that PE shares much of the positivism of NE.' In exploring the distinction between 'new' behavioural economics, which is essentially psychological economics, and old behavioural economics, which includes the work of Herbert Simon and others, Tomer (p. 21) writes: 'Whereas new BE has considerable ties to the economic mainstream and new BEs have a greater comfort level with mainstream economics, old BEs are more dissatisfied with NE and have a strong desire to develop an alternative to mainstream

economics. Furthermore, it is noteworthy that leading new BE researchers have not been particularly tolerant of old BEs and have typically had dismissive attitudes toward economists in the old BE camp.'

The picture that emerges in this chapter, reinforced throughout the remainder of the book, is one in which psychological economics is seen as too close to mainstream economics to be the kind of radical departure from the mainstream that Tomer considers necessary. For some readers this may come as a surprise, given the rhetoric that usually comes along with much of psychological economics. However, the views expressed by Tomer are shared by many (e.g. Berg and Gigerenzer 2010). And it is hard to deny that most of psychological economics, irrespective of its aims, ends up looking like mainstream economics plus an extra parameter to capture some psychological effect, such as loss aversion or inequity aversion. This approach also brings with it the potential for ad-hoc, unscientific reasoning (Binmore and Shaked 2010).

Is it a problem that new behavioural economics is so close to the mainstream? Tomer clearly thinks it is; I am not so sure. I do, though, welcome the portrayal of behavioural economics as a broad field. I also welcome the recognition that modern behavioural economics is not quite as radical as some suggest. One thing I would criticise about the chapter, however, is that it focuses too much on methods rather than outcomes. Whether or not the field of a subject is broad or narrow would seem somewhat irrelevant if it delivers the goods. And it is arguably on this front that the need for change is most pressing. The section on George Akerlof and behavioural macroeconomics speaks more to this by highlighting six important phenomena that neo-classical economics is not able to explain, such as involuntary unemployment, and under-saving for retirement. It is also worth noting that psychological economics really came to the fore when its relevance for policy became clearer.

After the rollercoaster of Chapter 2, we get some more routine chapters covering basic theory. Chapter 3 picks up the work of Herbert Simon on satisficing and Gerg Gigerenzer and colleagues on fast-and-frugal heuristics. Particular emphasis is put on the role of ecological rationality wherein heuristics are matched well to the environment and the task. It would have been nice if the work of Vernon Smith had also been acknowledged here (e.g. Smith 2007). On a related note, I would have also liked more discussion on the implications of ecological rationality. More specifically, reading through the chapter, I got the impression that people are very good at making decisions. They have good intuition and judgement, 'aha' moments (p. 28), and can make *more* accurate decisions than an optimising strategy (p. 30). If people are so clever, then they may well be modelled using the neo-classical assumption of 'as if' rationality? Clearly this is not the conclusion we are supposed to draw.

Chapter 4 provides a brief overview of key-ideas emerging from the work of Kahneman, Tversky and Thaler within the heuristics and biases framework. The

chapter covers biases due to availability, anchoring and representativeness before covering prospect theory and mental accounting. Again, what is emphasised is how the work of Kahneman and Tversky takes the neo-classical mainstream as its starting point but has become the core part of behavioural economics. Chapter 5 elaborates on the discussion by bringing in the role of emotions, social preferences and self-control, including the notion of time-inconsistency and quasi-hyperbolic discounting. Therefore, these two chapters cover much of the core material of modern behavioural economics.

This is why I found it concerning for an 'advanced introduction' that little insight is given as to how the research has developed over time. For instance, the section on prospect theory stops with Kahneman and Tversky's (1979) article. Arguably, it is the article published in 1992 that set out prospect theory as it is now practised (Tversky and Kahneman 1992). What is more crucial is that recent developments in reference dependent utility (Koszegi and Rabin 2006, 2007; Schmidt, Starmer and Sugden 2008), as well as probability weighting (Fehr-Duda and Epper 2012), will be critical going forward. A brief mention of these developments would have been welcome. Similarly, the section on social preferences in Chapter 5 hardly touches on the huge volume of literature that has emerged relating to the modelling of social preferences, whether that be around inequality aversion (e.g. Fehr and Schmidt 1999, Bolton and Ockenfels 2000) or psychological game theory (e.g. Dufwenberg and Kirchsteiger 2004), and so on. Again, some guidance to key-ideas would have been welcome.

Another concern is that these two chapters (and the book in general) often draw on secondary sources. For an advanced textbook I would like to see original references, particularly as these references were typically written in an accessible manner. For example, the text somewhat bizarrely (p. 40) draws on Heukelom (2014) to describe prospect theory, rather than using the original articles (Kahneman and Tversky 1979, Tversky and Kahneman 1992). Other examples from Chapter 4 include page 37, which picks up the famous anchoring experiment of Ariely, Loewenstein and Prelec (2003), page 43, which draws on results about golf professionals by Pope and Schweitzer (2011), and page 49, which picks up the disposition effect (the tendency to sell stocks that are up on their original price than stocks below original price) without presenting any references to the wealth of literature on this topic (e.g. Hens and Vcek 2011, Dacey and Zielonka 2008).

Chapters 6 to 9 turn to applications with a focus on behavioural finance, behavioural policy, law and behavioural macroeconomics. I think it is great that so much space is dedicated to applications and I particularly enjoyed reading this section. Chapter 6 primarily focusses on excess volatility in stock prices, Chapter 7 focuses on nudge, and Chapter 9 on efficiency wages. The explanations of key-ideas are well written and the role that behavioural economics can play is clearly brought

out. The only disappointment is Chapter 8, on law and economics, which focuses almost exclusively on methods. Indeed, only in the penultimate paragraph (p. 99) do we actually get any applications. This would seem a missed opportunity to discuss some of the interesting work being done on, say, social norms and how legal deterrence can have unintended consequences (e.g. Frey and Jegen 2001), or on a specific issue like tax evasion.

Chapters 10 to 14 cover various aspects of economic methods and indicate the future development of behavioural economics. Chapter 10 looks into lab experiments and explores the distinction between behavioural economics and experimental economics. The chapter follows the lead of Heukelom (2014) in claiming a strict separation between behavioural and experimental economics. However, I think this is a difficult viewpoint to justify given that behavioural and experimental economics have always been very closely inter-twined. On a relevant note, Chapter 12 covers neuroeconomics and, while the chapter gives a good overview of the subject, the relationship between behavioural economics and neuroeconomics is not particularly clear. If behavioural and experimental economics are distinct, then where does neuroeconomics fit into the mix?

Chapter 11 asks the question 'Are mainstream economists open-minded toward behavioural economics or do they resist it?' In addressing this question the chapter primarily focuses on some of the ways mainstream economics criticised a behavioural approach, and the way behavioural economists have reacted. The final conclusion seems to be that a long period of hostility has given way to general acceptance of behavioural economics. Personally, though, I think it is difficult to address these issues without distinguishing sub-fields within economics. In some fields, like public economics and development economics, behavioural and experimental methods of top level research are now expected. In other fields, however, particularly areas of macroeconomics, one can still find many researchers who are highly hostile to behavioural and experimental methods (and particularly hostile to the idea that these methods could contribute to their own research). Consequently, economics is still in something of a flux.

The three final chapters are more forward looking in presenting a picture of how behavioural economics may evolve in the future. Chapter 13, on a more humanistic behavioural economics, essentially suggests we need to encourage people's willingness to cooperate and discourage their tendency to be selfish. In making this point Tomer refers to the many instances when humans are selfish (e.g. p. 139-40). It may have been useful to balance that out with examples of cooperative behaviour being the norm. Another criticism would be that Tomer draws on work that he acknowledges as not widely recognised. Thatis no bad thing, in itself, but given the huge amount of work now going on in related topics, such as happiness, and on institutions that encourage cooperation, that it seems like a missed opportunity.

Chapter 14 looks at recent trends in behavioural economics, including the work of Raj Chetty on nudge and online experiments.

I would like to finish with some final overall reflections on the book. In Chapter 2 (p. 22) Tomer questions whether behavioural economics will 'become the superior paradigm with the potential to replace the NE paradigm?' While he leaves the answer to this question open, it seems fairly clear that Tomer believes a revolution is needed in economics but behavioural economics, as it currently stands (dominated by psychological economics), is not going to provide that revolution. This sense of frustration runs through the book and in many ways defines it, which, ultimately, determines what the reader is going to get from the book. I think the book, is wanting as a guide to current behavioural economics, for the simple reason that it does not sufficiently cover the main developments in modern behavioural economics (as it has evolved). However, as a book on the history and development of behavioural economics, it scores highly in the opinions it expresses and it is an entertaining and thought provoking read.

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Book Review

Reformation or Deformation of the EU Public Procurement Rules

Edited by Grith Skovgaard Ølykke and Albert Sanchez-Graells
Published by Edward Elgar Publishing, 2016, pp. 426+xii
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ISBN 978 1 78536 181 4 (ebook)

reviewed by Ioannis Alex. Tzionas*

I. The government procurement sector has always been at the focal point of concern for central and regional governments, contracting authorities, the EU, as well as a great number of economic operators. Hence, government procurement rules acquire utmost importance and continuous topicality for all actors involved in the relevant market.

In the aftermath of the economic crisis of 2008 two landmark initiatives took place at international and EU level. As far as the former is concerned, the 1994 WTO Government Procurement Agreement (GPA) was reformed twenty years after its initial adoption (the revised Agreement came into effect in April 2014). Regarding the latter, the EU enacted the so-called "2014 Public Procurement Package" consisting of three Directives (Directive 2014/23 on concession contracts, Directive 2014/24 on government procurement and Directive 2014/25 on utilities procurement).

The 2014 Public Procurement Package was intended to coordinate EU rules with international obligations that were part of the 2014 WTO's GPA, to overhaul existing rules and to consolidate general principles of EU public procurement law.

In this context, the book aptly examines whether the 2014 Public Procurement Package constitutes a reformation or a deformation of EU public procurement rules. The book is a collective work of 16 essays/chapters, divided into five parts, which cover a wide range of aspects of the subject matter. The body of the work is concluded with an excellent index.

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II. The introductory part presents the rationale of the book and is jointly authored by the editors, followed by the first chapter on the legislative process of the EU approached from a political science perspective and, written by Doreen Allerkamp.

III. The second part examines the reforms introduced by the Commission.
Chapter 2, titled *"The evolution of EU public procurement rules and its interface with WTO: SME promotion and policy space"*, by Kamala Dawar and Monika Skalova, assesses the legal interface between the 2014 Directive and the WTO GPA concerning policy space available to the EU so that it may pursue its objective of promoting SMEs participation in procurement markets.

Chapter 3, titled *"A deformed principle of competition? – the subjective drafting of Article 18(1) of Directive 2014/24"*, by Albert Sanchez-Graells, provides a thorough examination of the legislative historical background of Article 18(1) of Directive 2014/24 and the author argues that the incorporation of a subjective element regarding the contracting authority's 'intention' to artificially restrict competition may make the provision incompatible with CJEU case law.

In Chapter 4, titled *"E-procurement between EU objectives and the implementation procedures in the Member States-Article 22(1) of the 2014 Directive"*, Petra Ferk, after a presentation of the legislative evolution, takes the view that, by introducing Article 22 into the 2014 Directive, the Commission achieved its original purpose of establishing 'fully' mandatory e-procurement with the qualifications of transposition deadline set for 18 October 2018.

In Chapter 5, titled *"Division into lots and demand aggregation – extremes looking for the correct balance?"*, its author, Ignacio Herrera Anchustegui, discusses the incorporation of a provision in the 2014 Directive allowing contracting authorities to award contracts in separate lots and to strengthen demand aggregation techniques.

Chapter 6, titled *"The provision on abnormally low tenders: a safeguard for fair competition?"*, by Grith Skovgaard Ølykke, discusses the novelty introduced by the amended Article 18(2) of the 2014 Directive, which requires verification and rejection of tenders that are abnormally low in order to ensure fair competition.

Illegal direct awards constitute the main obstacle to building an internal market in public procurement. In this respect, author Pedro Cerqueira Gomez argues, in Chapter 7, titled *"A lost proposal in the 2014 Public Procurement Package: is there any life for the proposed public procurement oversight bodies?"*, for the necessity of building a more pro-active system of monitoring, with the creation of an independent decentralised authority, as part of the EU legal framework.

IV. The third part examines the reforms introduced by the Council.
In Chapter 8, titled *"The provision on services of general economic interest in the 2014 Directive – pure reiteration of the obvious?"*, co-authors Cecilie Fanøe Petersen and Grith Skovgaard Ølykke take the view that the inclusion of the provisions of Article 1(4) and 1(5) in the 2014 Directive should be characterized as a deformation of the public procurement rules, given that these provisions should not change the current state of law.

Chapter 9, titled *"Clarification or missed opportunity? The provision of framework agreement in the 2014 Directive"*, by Marta Andrecka, examines the amendments to the provisions on framework agreements, under the 2014 Directive, and its consequences. The author critically assesses whether the EU legislator introduced necessary clarification to the framework agreement provisions in the new revision of procurement rules or failed to do so.

In Chapter 10, headed *"Requesting additional information – increase of flexibility and competition?"*, author Carina Risvig Hamer thoroughly explains that by adopting Article 56(3) of the 2014 Directive, the Council reformed the public procurement regime towards more flexibility, thereby striking the right balance between competition and equal treatment.

Chapter 11, titled *"Exclusion and self-cleaning in Article 57: discretion at the expense of clarity and trade?"*, by Sylvia de Mars, examines whether the discretion granted to contracting authorities by virtue of Article 57 of the 2014 Directive to disqualify certain economic operators will make the bidding regime clearer compared to its prior Article 45. The author concludes that the provision on exclusion is arguably deformed.

In Chapter 12, titled *"Modification of contracts during their term: principle of exception? – a view from the perspective of negative externalities"*, author Tim Bruyninckx examines the novelty introduced by Article 72 of Directive 2014, whereby, for the first time, a public procurement directive lays down provisions that govern modifications to existing contracts.

V. Part four of the book deals with the reforms introduced by the Parliament or resulting from a European Citizen's Initiative.

Chapter 13 titled *"Subcontracting matters: Articles 43 and 71 of the Directive"*, by Richard Graven, discusses two new provisions (Article 43 on labels and Article 71 on subcontracting) designed to address transparency and accountability concerns associated with subcontracting chains to better enable social procurement.

In Chapter 14, titled *"The magic of five in the duration of concessions: refining corollaries in the Concessions Directive"*, author Johan Wolswinkel considers that Article 18 of the Concessions Directive codifies existing CJEU case law and provides a reformation of the Concessions Directive.

Chapter 15, titled *"Public goods, special rights and competitive markets: Right2Water and utilities procurement regime"*, by Eleanor Aspey, provides an articulate analysis of the new legal framework for concessions contracts, previously covered only by the basic Treaty requirements in the utility sector, and the removal of the water sector from the Concessions Directive.

VI. As an epilogue, in Part IV, the editors jointly screen the 2014 Public Procurement Package under a political magnifying glass, make their overall evaluation of all preceding single contributions and conclude that the EU public procurement rules were rather deformed in 2014. Hence, there is plenty of scope for further future reform aimed at streamlining the regulation of such an important field of EU economic law.

The reader will much appreciate the appendix hereto, containing a background map (consisting of five tables) of the issues covered in the book.

VII. The book provides a coherent and comprehensive analysis of the 2014 Public Procurement Package in an inter-disciplinary approach, predominantly from a legal perspective.

It offers its readers a valuable insight to the legislative background leading to the 2014 Public Procurement Package, which is a useful tool for understanding the evolution of the EU government procurement legal framework. In this respect, several contributions criticise inherent shortcomings during the legislative process on the way for the adoption of the 2014 Package, reflecting inter-institutional competing interests and different approaches. However, the book's asset is the articulate presentation of the current state of EU government procurement law in the light of its evolutionary background (legislative and case-law).

The book is meticulously written and offers valuable insights in EU government procurement law. Thus, it is clearly a useful companion for lawyers, political scientists and economists (scholars and practitioners).

The contributors' research is supported by rich bibliography and by reference to extensive original sources.

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