Peer-reviewed version available at *Sustainability* **2019**, *11*, 205; doi:10.3390/su11010205

Article

Stabilization policies and technological shocks: Towards a sustainable economic growth path

Anelí Bongers[1*], Carmen Díaz-Roldán[2]

[1] University of Málaga, Department of Economics and Economic History; abongers@uma.es
[2] University of Castilla La-Mancha, Department of Economics; carmen.diazroldan@uclm.es
* Correspondence: abongers@uma.es; Tel.: +34-952-137332.

Abstract: The purpose of this paper is to explore the extent to which traditional economic policies can be oriented by sound practices. It is becoming widely accepted that sustainable economic growth (and not only economic growth) is the final target of economic policies; but most economic policies are applied just looking to the short-run without taking in account the long-run perspective. Our aim will be to show how a sustainable economic policy-making would be possible, making compatible the stabilization of the economy in the short-run with a sustainable economic growth in the long-run. We confront the design of economic policies with the 17 goals of the 2030 Agenda. We argue that all sustainable development goals can be attained by the design and implementation of sustainable economic policies. Finally, to illustrate this point we will conduct a simulation exercise to show under which combinations of demand policies technological shocks would promote a path of sustainable growth. Our results will provide a reference framework for a sustainable economic policy-making.

Keywords: Sustainable economic policy; sustainable economic growth; economic policies; technology.

1. Introduction

Economic policies designed and implemented by the governments can have important consequences for social and economic dynamics both in the short and the long-run. Traditionally, a distinction has been made between short-run demand economic policies and long-run supply-side economic policies, as they pursue different direct goals. Nowadays, it is becoming that the final objective of economic policies is the attainment of a sustainable economic growth in the long-run, which is assumed to be compatible with environmental sustainability. Free market forces do not guarantee socio-economic and environmental sustainability. Moreover, the market shows a number of failures (named market failures) which lead to an inefficient distribution of resources in the economy, and, consequently, produce net social welfare losses. Income and wealth inequality are two of the most important market failures, provoking various negative impacts on social welfare, putting at risk social cohesion and sustainable economic growth. Additionally, economic activity produces a number of externalities, that can be positive or negative, but that are not taken into account when individual economic agents (households or firms) take economic decisions. In this context, private and social costs are benefits are not equal, and hence, social welfare is not maximized. The existence of public goods or communal goods is another market failure.

Market failures and externalities are fundamental threats for sustainability. The consideration of sustainability in defining the objectives of public economic policies dated from the Brundtland Report in 1987 [1]. However, little have been done in reformulating traditional economic policies from a sustainability perspective. We consider that sustainability has two dimensions: economic and environmental [2], where the social component is included in the former. A first obstacle we will face here is the difficulty to define what a sustainable economic policy is in a rigorous way [3]. Separately, the concepts of "sustainability" and "economic policies" are well-known and widely accepted. However, the joint concept of a "sustainable economic policy" is more ambiguous. This new concept

implies that economic policies must be designed and implemented considering inequality reduction, social cohesion and environmental conservation as principal targets to achieve the final goal of sustainable economic growth. In this framework, economic growth cannot be in conflict with social cohesion and environmental preservation but mutually reinforced [4].

In this paper we argue that the "sustainability" perspective of economic policies must be considered as a key element when designing and implementing traditional economic policies, and that the final objective of economic policies is not economic growth, as it has been addressed in the past, but sustainability economic growth which entitles different social and environmental aspects that interact with economic growth. To this end, we will explore the implications of short and long-run economic policies for the sustainability of the socio-economic system. Socio-economic developments have put into question the sustainability of certain policy actuations which do not contribute to prevent economic crisis, or even do not stabilize the economy in the short-run [5], and by contrast, could be obstacles for sustainable development. A way to obtain an approximation to the definition of sustainable economic policies is confronting the existing economic policy instruments with the goals of the 2030 Agenda of the United Nations [6]. This set of Sustainable Development Goals (SDGs) will help us to define what sustainable economic growth is and to identify the policy instruments that must be employed to achieve all 17 SDGs and how policy-makers must design economic policies accordingly. In short, we argue that a economic policy designed by considering the goals of the 2030 Agenda can be defined as a sustainable economic policy.

To illustrate the implications of the implementation of alternative economic policies, we conduct a simulation exercise through a two-country aggregate demand-aggregate supply model describing a small monetary union. Using this theoretical framework, we will analyse under which conditions the increase in output due to a technological shock, would be more sustainable. This analysis, at an aggregate level, will allow us to have a frame of reference that could contribute to a better evaluation of public policies, and to shed light on possible institutional reforms that could be considered necessary. Our main argument here is that short-run and long-run economic policies that are not coordinated, showing conflicting targets, and without considering a global perspective, do not contribute positively to long-run sustainable growth.

The structure of the remainder of the paper is as follows. Sections 2 reviews the role of traditional economic policies and their implications for a sustainable economic growth. Section 3 evaluates how economic policies must be designed and implemented to guarantee the achievement of the Sustainable Development Goals established by the Agenda 2030 of United Nations. Section 4 presents a simulation exercise to investigate the connections of alternative traditional economic policies for long-run economic growth. Finally, Section 5 presents some concluding remarks.

2. Stabilization policies and sustainable economic growth.

In this section, on the one hand, we will briefly revise how demand policies can be implemented to guarantee short-run stabilization without putting a brake on economic growth. On the other hand, we will also analyse how a positive (supply-side) technological change could really became growth-driven from a sustainability perspective.

As is well known, economic policies can be classified as demand-oriented or supply-oriented. Demand policies are designed and implemented to guarantee short-run stabilization, but sometimes without having concern about the final objective of sustainable economic growth [7]. They are designed just to reduce or mitigate economic fluctuations of the economy induced by the business cycle, but where the different policies or instruments can come into conflict among them. Whereas we agree that economic fluctuations in the short-run can be harmful for economic growth, we argue that the approach followed by traditional economic policies is not adequate for attain sustainability. If the final goal of economic policy is economic growth, it is clear that reducing economic fluctuations in the short-run, is a way to guarantee a long-run stable growth path. However, if the final goal is sustainable economic growth, stabilization policies must be designed compatibilizing the stabilization target with the sustainability one.

Demand economic policies should address a number of short-run goals which can be compatible with their stabilization role in order to avoid conflicts with the long-run development. These goals are: increasing the efficiency in resources allocation; increasing the coordination of economic policies for guarantee redistribution and social cohesion; employment protection; the optimal size of the public sector; the correct provision of public goods (considering public goods in a wide sense, including health, education, air quality, etc.) and the proper functioning of the institutions. When looking to the long-run goals, they could be achieved by productivity gains through innovation policies oriented to: first, promoting expenditure on research and development; second, the education and training of workers using the advantages of new technologies; and third, promoting energy efficiency and renewable energy as key element for environmental protection.

Adopting a traditional view, the two main demand-side policies are the monetary policy and the fiscal policy. These economic policies include a large number of alternative instruments that affect a large number of variables both in the short- and long-run. The danger here lies is that these policies could be too short-run oriented, losing the long-run perspective. Furthermore, both stabilization policies can enter in conflict among them, reducing their effectiveness. In this sense, the design of these economic policies does not only have to take into account their long-run impact on sustainability but also they must consider their compatibility in terms of the different instruments these policies use for short-run stabilization.

Although monetary policy is by nature a short-run policy, monetary conditions are important for determining the long-run path of the economy. Among the main targets of the monetary policy are the inflation control, stabilizing the output-gap, and stabilization of unemployment. These targets are designed to achieve price sustainability, output sustainability and employment sustainability. The role of monetary policy as a sustainable policy is usually based on the independence and reputation of Central Banks, and the application of clear monetary rules, based on price and output stabilization. In this sense, monetary policy can be considered, by design, a policy compatible with sustainable economic growth, although the debate about the long-run effects of monetary policy remains open. The implications of monetary policy for long-run sustainable economic growth depend on their particular design and implementation by the Central Banks. For instance, in European countries monetary policy is driven by inflation. The idea is that inflation is one of the main factors affecting negatively economic growth and that the negative effects of inflation depend on inequality, affecting principally to lower income people. Other countries not only implement monetary policy depending on inflation but also considering the output gap o even the unemployment rate. What it clear for us, is that an independent central bank (avoiding financing government spending just by issuing more money), the definition of well-known target, either with respect to inflation or output gap, and the design of simple policy rules, are fundamental elements for ensuring sustainable economic growth from the monetary perspective. The only problematic aspect regarding monetary policy has to do with the role of Central Banks as the regulatory institution of the financial system. The financial system is an important element for economic growth, and hence, a sustainable financial system is needed to guarantee sustainable economic growth [8]. However, experience has shown that the financial system is not designed to be sustainable and can be a source of negative shocks hitting the economy in the short- and long-run. The development of the so-called macroprudential policies [9] and the design of a financial system with sustainable objectives, such as social cohesion, environmental sustainability, and the promotion of an inclusive economy [8]. In short, the definition of what a sustainable financial system should be includes the same elements that for any other sustainable economic policy.

The other principal stabilization policy is the fiscal policy, which can be either demand-oriented or supply-oriented. Fiscal policy makes use of several instruments to affect the economy in the short and long-run, as this policy is related to public revenues and how those resources are spending in the economy. Together with income and spending instruments, there are regulatory aspects of the economic activity and the provision of public goods that also are parts of the fiscal policy. Government size is increasing over time and nowadays it represents a large fraction of the total economy. This makes fiscal policy a fundamental economic policy affecting the behaviour of the economy and determining the growth path. The high importance of fiscal policy when designing

sustainable economic policy is reinforced by their impact on other policies, such as the health policy, education policy, energy policy, environmental policy, etc. All these policies, which by definition are sustainable policies if well-designed by sound practices, depend on the quantity of resources the government devote to each goal and on the type of fiscal instruments (taxes or subsidies) implemented by the government, and they has a great influence in determining the long-run growth path.

A number of factors must be considered for the development of a sustainable fiscal policy. First, fiscal policy implicitly includes mechanisms acting as automatic stabilizers of short-run fluctuations. Taxes and transfers act as autonomous components that reduce fluctuations of the economy, correcting automatically output-gap fluctuations. These automatic stabilizers are a fundamental characteristic of autonomous fiscal instruments and they should be developed further to reduce the impact of the business cycle on low income people, as a key factor for promoting social cohesion.

A second important role of fiscal policy is to correct probably the most important market failure: inequality. Inequality correction measures can be introduced in the design of the tax menu as well as in the transfer system. Fiscal policy should not only act to correct individual inequalities, but also need to be applied to correct structural imbalances and reduce regional disparities. Social cohesion need to be considered as a direct target of fiscal policy and taxing and spending policies must be oriented to assure this fundamental aspect of sustainability. Indeed, the combination of these instruments with the automatic stabilizers will offer a framework to reduce inequality and fostering social inclusion, with important benefits for social welfare and for sustainable economic growth.

Public debt is another threat for economic sustainability [10], given that is an intergenerational transfer of income from the future to the present. Public debt sustainability has to be assured, by a public balance surplus path or by large enough economic growth. Problems of sustainability of public debt (not enough fiscal income to sustain the government budget) will tension financial markets, affecting growth negatively. In this context, a sustainable economic policy cannot be developed if sustainability of public balance is not guaranteed.

Fiscal policy is also a fundamental pillar of environmental sustainability. Economic activity can affect negatively the environment, as private economic decisions does not take into account the negative externalities that certain type of production can generate over the environment. Fiscal policy can be a powerful economic policy in pursuing environmental sustainability. The power of supply-side fiscal policy are not been developed yet, as fiscal policy can be used to drive innovation and technological change. Fiscal instruments can be used to limit the negative effects of production activities on the environment by promoting energy efficiency and energy related technology change, as basic pillars of sustainable economic growth.

Finally, the sustainability of pension systems is another important issue. Most pension systems are based on an intergenerational transfer of income: current works transfer a portion of their income to older people who are retired from the labour market. This income transfers among generations is done generation by generation and is an important pillar of a sustainable economic system. A sustainable pension system is one in which intergenerational transfers as enough to assure an adequate pension for all old people. Retirement financing is challenged due to change in population flows and demographic patterns, technological changes affecting labour markets, increasing life expectancy, etc., and policies must be adapted to the new scenario.

After reviewing the performance of stabilization or demand side policies, it would be easier recognize that supply-side policies, aimed to enhance economic growth in the long-run, as well as positive supply shocks leading to an increase in output, would be more, or less successful depending of the demand structure. The so-called structural policies are those including structural reforms, labour market, institutions, etc., that assure the expected results of positive supply shocks. In other words, those assuring the proper conditions to favour a sustainable growth path. In this context, which is the role played by the structure of demand of the economy? In the next section, we will briefly revise the Sustainable Development Goals (SDGs) in the light of the role played by economic policies when trying to achieve those goals.

3. Sustainable economic policies and the sustainable development goals

It is really possible to design and implement sustainability of economic policies? If we look at the 17 sustainable development goals of the United Nations [6], we could ask ourselves what can be done by economic policies. In fact, we can use these sustainability goals to define what we understand by a sustainable economic policy, just by defining which policy instruments are needed and how have to be implemented to pursue these goals.

The Sustainable Development Goals (SDGs) or the 2030 Agenda, are 17 global goals, including 169 specific targets. They balance social, economic and environmental factors which in turn are the pillars for a sustainable economic growth. Following [10], we could argue that all 17 sustainable development goals cannot be achieved without an adequate design of economics policies, including short-run policies, and that a sustainable economic policy implies the design of policy instruments which incorporate all 17 sustainable development goals. The goals include social, economic and environmental development issues. In this context, social changes, innovations, and technological advances would play a crucial role.

The first group of goals are the following two:

- Goal 1: End poverty in all its forms everywhere
- Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

These two first goals point a persistent basic problem not solved with economic growth: poverty and food scarcity for some populations, including developed countries. These two goals can be achieved by a redefinition of traditional fiscal policy. Poverty is not a problem generated by the lack of resources, but by an inequal distribution of resources. The world produces enough food for all. The problem is how that food is distributed across counties and within countries. Inequality is a problem generated by the market forces, and hence, policies must be implemented to correct this market failure. End poverty needs the design of an adequate transfer fiscal policy to cover all in exclusion risk. Therefore, any policy designed to fight inequality can be considered as a sustainable economic policy, as is promoting social cohesion. Fiscal policies have several instruments to reduce inequality, including intragenerational transfers, intergenerational transfers, social security systems, income and wealth fiscal redistribution instruments, unemployment benefits and secure a minimum income, etc. On the other hand, fiscal policy is the ground of the provision of public goods, which is also a key factor in reducing inequality. Microeconomic definition of public goods is very narrow (non-excludable and non-rivalrous goods), and a new definition of public goods is needed. Education and health could not be considered as private goods anymore. These two goods are fundamental for social cohesion as they guarantee access to health and education for all, a key factor for reducing inequality. In sum, inequality, in all its forms, is one of the main threats for sustainability and hence, sustainable economic policies must be based in pursuing a path for assuring equality.

- Goal 3: Ensure healthy lives and promote well-being for all at all ages
- Goal 4: Ensure inclusive and quality education for all and promote lifelong learning
- Goal 5: Achieve gender equality and empower all women and girls

These three sustainability goals are related to the implementation of active health and education policies and could be reached through public expenditures policies in R&D, health, education and innovation [11]. Human capital and education attainments are key factors for economic growth. On the other hand, the health of population is another factor contributing to productivity growth. Active public educational policies are a basic pillar of economic growth. Furthermore, education is a vital factor for innovation, one ingredient for sustainable economic growth. The long run implications of active educational policies, also require institutional changes that imply structural transformations [12, 13]. We consider that health and education are public goods, as they produce a large amount of

positive externalities at both individual and aggregate level. This means that the quantity of these goods to be consumed has to be decided by the government and not by private agents. This is an important question as these goods are underproduced by the market, and hence, social welfare is not maximized. This makes the promotion of well-being and education for all ages a central issue in the fiscal policy design as a sustainable economic policy. Finally, as pointed out above, sustainability implies social cohesion, which means not only reducing income inequality but the removal of gender inequality of all types. Again, there is room to design fiscal policies and associated regulation under a gender equality perspective.

- Goal 6: Ensure access to water and sanitation for all
- Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Sustainable goals 6 and 7 need the implementation of energy and environmental economic policies. After assuring the provision of food for all, the next basic goods are water, sanitation and energy. In the literature we can found several studies like [14] where they analyse the importance and the obstacles to be able to have water and sanitation in developing countries. On the other hand, [15] argue that the benefits of the interventions, in absolute value, are greater than the cost of implementation. The technology needed to supply all these basic goods for all is already available and is cheaper.

- Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all.
- Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation.

Goal 8 matches perfectly with the final objective of sustainable economic policies, that is, sustainable economic growth. As indicated in the introduction, the final goal of sustainable economic policies is to promote sustainable economic growth and not simply economic growth. Promoting good jobs conditions and quality employment is fundamental for social and economic inclusion and cohesion. In the literature we can found several studies related to the development of this objective [16].

Objectives 8 and 9 are linked, since if we want to have sustainable economic growth, it is necessary to develop a network of adequate infrastructures. Sustainable goal 9 can be attained by improving the overall business environment and encouraging innovation. In this context, a supply-side long-run fiscal policy for promoting and guide technological advances compatibles with sustainability is compulsory and market-driving innovation can enter into conflict with social cohesion and environmental sustainability.

- Goal 10: Reduce inequality within and among countries

Sustainable goal 10 introduces a new dimension in the design of economic policies as it adopts an international perspective in the design of sustainable economic policies. First, reducing inequality within a country is a matter of fiscal policy. Traditional fiscal policy has several instruments that has been proved to be useful to reduce inequality. In fact, inequality is a sub-product of the market economy and economic policies must be continuously applied to mitigate inequality increasing. A different perspective must be considered when the objective is the reduction of inequality among countries. Disparities in income per capita among countries are very large. This goal would imply the development of a coordinated economic policy for promoting growth in all countries. International cooperation and coordination of economic policies would be positive for all countries, increasing world social welfare. However, more advances are needed to this direction, starting for banning “beggar thy neighbour” policies that go in the opposite direction. In the next section, we will present a simulation exercise to analyse how alternative economic policies can promote or not sustainable economic growth.

- Goal 11: Make cities inclusive, safe, resilient and sustainable.
- Goal 12: Ensure sustainable consumption and production.

To achieve these two objectives, it would be necessary to have sustainable production processes, through an adequate system of taxes and transfers. Sustainable production system must be implemented based in two factors: technology to increases efficiency, and renewable and sustainable inputs. As consumption depends on production, sustainable production is compulsory for sustainable consumption. This would implies a redesign, from top to bottom, of the supply chain for firms and the adequate technology to be used in each stage of the production process. Again innovation policies and instrument for promoting R&D are central to achieve these goals.

- Goal 13: Take urgent action to combat climate change and its impacts
- Goal 14: Conserve and sustainably use the oceans, seas and marine resources.
- Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.

This group of goals is related to the implementation of a sustainable environmental policy. Climate change is a global threat to life in the Earth [17]. Environmental issues are directed related to economic activity. Production is mainly driven by market forces, and hence, does not take into account negative externalities that are generated during the production process. Traditionally, Pigouvian taxes have been applied to reduce negative externalities generated by economic activity on the environment. These goals could be achieved through various economic policy instruments. Among them, we could mention energy policies, Pigouvian taxation to internalize externalities, and international agreements to protect marine resources. On the other hand, the promotion of renewable energy and energy efficiency by fostering investment in R&D and the substitution of fossil fuels by renewable energy sources are central policies to stop climate change. In this context, technological change will be an important factor for environmental sustainability. Again, international cooperation (as climate change is a global issue) is fundamental for the design of sustainable environmental policies.

- Goal 16: Promote just, peaceful and inclusive societies.
- Goal 17: Revitalize the global partnership for sustainable development.

The final two goals incorporate some aspects outside traditional economic policies but that are also important for the design of sustainable economic policies. Whereas social inclusion is at the heart of the design of sustainable economic policies, other aspects as a just and peaceful society would implies social changes beyond the direct objectives of such policies.

In summary, all 17 sustainable development goals could be achieved at little cost if existing economic policies were designed by sound practices. Current policy instruments can be developed further by considering the sustainability perspective. In next section, to illustrate this point, we will show under which combinations of demand policies technological shocks would promote a path of sustainable growth. Our results will provide a reference framework for a sustainable economic policy-making.

4. Sustainable economic policies: A simulation exercise

To illustrate the implications of economic policies for sustainability, in this section we present an example on how the particular design of economic policies affects the final goal of sustainable economic growth. Sustainable economic policies are analysed from an aggregate perspective, just by focusing on the final goal: sustainable economic growth. We will follow the approach by [18], where the departure point is a two-country aggregate demand-aggregate supply (AD-AS) model describing

a small monetary union formed by two symmetric countries. We focus in the particular case of a monetary union to ensure a full coordinated monetary policy to avoid "beggar thy neighbour" policies by using monetary policy. In this environment, both the central bank and the fiscal authorities (FAs) follow policy rules. The model also allows for the possibility of a more, or less conservative governor of the Central Bank, both an austere and non-austere fiscal policy and the use of different types of fiscal rules. Finally, the model also considers that countries could have different levels of public debt. Through such model, the management of a variety of economic policies can be analysed. In particular, we will study how the design and implementation of stabilization policies can determine the consequences of a technological innovation from the point of view of sustainability economic growth. This is an important question, as we can identify how short-run economic policies affect the economy in the long-run. To that end, in our empirical exercise, we will analyse under which conditions the increase in output due to a technological shock, would be more sustainable. In other words, we will offer an array of results that will allow us to conclude under which combinations of demand policies, technological progress would lead to a sustainable economic growth path.

We will focus in the case of a monetary union, where member states are constrained by a single monetary policy, and also by the discipline requirements for fiscal policy. Our contribution would be to show the scope of a positive technological shock, under the policy-making constraints of the monetary union. In other words, we will offer a reference of the proper combination of demand policies to favour the sustainability of technological progress. That is to say: how demand policies, short-run oriented, could contribute to consolidate supply-side developments. Since our model describes a monetary union, we assume full delegation of prices control to the monetary authority; therefore, public deficit will be the only demand policy instrument available at the national level. We will assume that FAs will try to minimize their loss function constrained by the economic framework (given by the reduced form of the macroeconomic model), and the explicit fiscal rule. Their objectives are to minimize output variations, with stabilization purposes, and to minimize public deficit changes, to achieve fiscal discipline. For doing that, we have adopted the following assumptions. The shocks suffered by the countries have been normalized to 1. Next, we will give numerical values to the parameters of the equations describing the model features (See the Appendix A for details):

1. In the monetary rule of the Central Bank: we will assign two different values to the weight of the inflation goal, to characterize a conservative or not conservative central banker.
2. Regarding the fiscal rules of the FAs, we will describe three kind of scenarios:
   - First, a "symmetric" scenario in which there is the same concern about deviations of debt and accumulated deficit than about deviations in output.
   - Second, a "disciplined" scenario in which there is a greater concern about deviations of debt and accumulated deficit than about deviations in output, aimed to fulfil fiscal consolidation supranational requirements.
   - Third, a "growth-promoting" scenario in which there is a greater concern about deviations in output than about deviations of debt and accumulated deficit.
3. In the loss function of the FAs we would assume that FAs could be more concerned about fiscal discipline or, on the contrary, they could be more concerned about output growth, to characterize a more austere or less austere national fiscal authority.

After solving the optimization problems for the cooperative and the non-cooperative solution of the FAs, we obtain the optimal solution for the budget deficits (fiscal policy instrument), and we are also able to calculate the corresponding values of output, inflation and the welfare losses according to the loss functions of the two FAs.

Under the individual solution, each country minimizes their loss functions; i.e.: the changes in their budget deficit (the policy instrument) and the output variations, in response both to technological shocks and to changes of the other country's deficit. On the contrary, under the

cooperative solution the countries minimize jointly a weighted average of their loss functions. According to these circumstances, the desirability of the cooperative solution against the individual solution will depend on the degree in which the loss function of the FAs shows a minor loss. Since we have supposed that a technological advance occurs, that shock translates into an expansive supply shockin terms of the model. And we have calculated, for each case, the variation in percentage experienced by the loss function of the FAs concerned about the consolidation and the stabilization, with respect to the case in which it was only concerned about the stabilization. Given the objective function of the FAs is a loss function, a higher absolute value means that losses are reduced more.

4.1. Results for the symetric case

In the symmetric exercise, both countries have the same level (high or low) of public debt, and their FAs can be either austere or non-austere. Results are shown in tables 1 to 4 for the cooperative and non-cooperative cases and for conservative versus non-conservative central bank, and considering the three alternative fiscal rules: Symmetric, disciplined, and growth-promoting.

Table 1. Conservative CB and cooperation between FAs. Cooperative solution.
(% of variation of welfare losses)

		High Debt	**Low Debt**
Austere FAs	FR-s	-0.93	-0.94
	FR-d	-0.92	-0.92
	FR-g	-0.92	-0.93
Non-austere FAs	FR-s	-0.87	-0.87
	FR-d	-0.87	-0.88
	FR-g	-0.88	-0.87

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

Table 2. Conservative CB and no cooperation between FAs. Nash solution.
(% of variation of welfare losses)

		High Debt	**Low Debt**
Austere FAs	FR-s	-0.92	-0.93
	FR-d	-0.93	-0.93
	FR-g	-0.93	-0.94
Non-austere FAs	FR-s	-0.88	-0.88
	FR-d	-0.88	-0.87
	FR-g	-0.87	-0.88

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

Table 3. No conservative CB and cooperation between FAs. Cooperative solution.
(% of variation of welfare losses)

		High Debt	**Low Debt**
Austere FAs	FR-s	-0.93	-0.92
	FR-d	-0.93	-0.92
	FR-g	-0.92	-0.94
Non-austere FAs	FR-s	-0.86	-0.87
	FR-d	-0.87	-0.87
	FR-g	-0.87	-0.88

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 31 October 2018 doi:10.20944/preprints201810.0744.v1

Peer-reviewed version available at Sustainability 2019, 11, 205; doi:10.3390/su11010205

Table 4. No Conservative CB and no cooperation between FAs. Nash solution. (% of variation of welfare losses)

		High Debt	Low Debt
Austere FAs	FR-s	-0.92	-0.93
	FR-d	-0.92	-0.93
	FR-g	-0.93	-0.92
Non-austere FAs	FR-s	-0.87	-0.89
	FR-d	-0.88	-0.88
	FR-g	-0.89	-0.87

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

4.1.1. Discussion of the main results in the symmetric case

In this case, both countries have the same level (high or low) of public debt, and their FAs are either austere or non-austere. Remember that given the objective function of the FAs is a loss function, a higher absolute value means that losses are reduced more.

We can observe (tables 1 to 4) that:

- Losses are always minimum when the FAs are austere.
- If the CB is conservative and the FAs cooperate, the best result is obtained for countries with
    - Low debt
    - a symmetric FR

The debt level would not be relevant when a disciplined FR is used, but better results would be reached if the FR promotes growth and debt is low. This result are consistent as a disciplined FR would implies debt sustainability.

- If the CB is conservative and the FAs do not cooperate, the best result is obtained for countries with
    - Low debt
    - a FR promoting growth

The debt would not be relevant if FAs use a disciplined FR, but a better result could be obtained if the FR is symmetric and the debt is low.

- If the CB is non-conservative and the FAs cooperate, the best result is obtained for countries with
    - Low debt
    - A FR promoting growth

If the debt is high, they should use a symmetric or disciplined FR.

- If the CB is conservative and the FAs do not cooperate, the best result is obtained for countries with
    - High debt
    - A FR promoting growth

If the debt is low, they should use a symmetric or disciplined FR.

The worst result, in terms of greater loss of welfare, occurs when the Central Bank is non-conservative, the FAs cooperate, the debt is high and symmetric FRs are used. What result clear, is that the best situation is when FAs are austere and the level of debt is low, as both conditions reduces short-run imbalances that could be a threat for long-run sustainable economic growth.

4.2. Results for asymmetric cases

Finally, we consider the asymmetric case. In the asymmetric exercise countries have different levels of public debt. We assume country 1 has high debt, and country 2 low debt. Additionally, the FAs of each country could be austere or no-austere. Results are show in tables 5 to 8.

Table 5. Conservative CB and cooperation between FAs. Cooperative solution.Country 1 high debt and country 2 low debt.
(% of variation of welfare losses)

			High Debt	
			Austere FA	Non-Austere FA
Low Debt	Austere FA	FR-s	-0.93	-0.87
		FR-d	-0.92	-0.87
		FR-g	-0.93	-0.87
	Non-austere FA	FR-s	-0.93	-0.87
		FR-d	-0.93	-0.87
		FR-g	-0.92	-0.87

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

Table 6. Conservative CB and no cooperation between FAs. Nash solution.
Country 1 high debt and country 2 low debt.
(% of variation of welfare losses)

			High Debt	
			Austere FA	Non-Austere FA
Low Debt	Austere FA	FR-s	0	-0.07
		FR-d	-0.01	-0.27
		FR-g	0	-0.11
	Non-austere FA	FR-s	-0.07	0
		FR-d	-0.17	-0.01
		FR-g	-0.12	0

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

Table 7. No conservative CB and cooperation between FAs. Cooperative solution.Country 1 high debt and country 2 low debt.
(% of variation of welfare losses)

			High Debt	
			Austere FA	Non-Austere FA
	Austere FA	FR-s	-0.92	-0.87

		FR-d	-0.92	-0.87
		FR-g	-0.92	-0.87
Low Debt	Non-austere FA			
		FR-s	-0.92	-0.87
		FR-d	-0.92	-0.87
		FR-g	-0.92	-0.87

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

.

Table 8. No conservative CB and no cooperation between FAs. Nash solution.Country 1 high debt and country 2 low debt.
(% of variation of welfare losses)

			High Debt	
			Austere FA	Non-Austere FA
	Austere FA	FR-s	0	-0.06
		FR-d	-0.01	-0.22
		FR-g	-0.01	-0.09
Low Debt	Non-austere FA			
		FR-s	-0.05	0
		FR-d	-0.14	-0.01
		FR-g	-0.09	0

Source: Own elaboration based on the model by [18] and the described scenario.
Note: FRs, FRd and FRg stand for the symmetric, disciplined and growth-promoting fiscal rules, respectively.

4.2.2. Discussion of the main results in the asymmetric case

In this case, both countries have different level (high or low) of public debt, and one of the FAs is austere while the other is non-austere. Remember that given that the objective function of the FAs is a loss function, a higher absolute value means that losses are reduced more.

We can observe (tables 5 to 8) that:

- The best result always occurs when in the country with high debt the FA is austere, and the FAs authorities of both countries cooperate.

This result is independent of:

- the degree of conservatism of the Central Bank
- the austerity or not of the FA of the country with low debt.
- the fiscal rule used (symmetric, disciplined or growth promoting).

- If the FA does not cooperate, the losses are not significantly reduced. Although, in a mild way, the best results are obtained if:
  - FAs use disciplined fiscal rules (giving more importance to fiscal consolidation than to economic growth).
  - the country with high debt has a non-austere FA, but the FA of the country with low debt has an austere FA.

5. Conclusions

This paper studies traditional stabilization policies introducing the sustainability perspective in order to obtain an approximation to the concept of sustainable economic policy. We argue that sustainability is a key aspect in the design and implementation of both short (demand) and long-run economic policies (supply-side) if the final goal is sustainable economic growth.

The incorporation of short-run goals pursuing sustainability to standard demand economic policies is a compulsory step but does not guarantee a sustainable economic policy. For that, it would also be necessary to incorporate additional long-run goals to these policies. Social cohesion and inclusion, and environmental protection are key elements of what a sustainable economic policy should be. Indeed, these policies should also incorporate as an objective fostering productivity gains through innovations policies oriented to promote expenditure on research and development, and to stimulate the education and training of workers using the advantages of new technologies. Those proposals have been recognized as the way of achieving the SDGs of the 2030 Agenda of the United Nations. And having those considerations in mind, we have tried to illustrate, how a proper combination of demand (short-run oriented) policies could favour the success of a technological shock in terms of lead to a sustainable economic growth (long-run oriented).

For doing that, in this paper, through a two-country aggregate demand-aggregate supply model describing a small monetary union, we have analysed under which conditions the increase in output due to a technological shock, would be more sustainable. Since our model describes a monetary union, we have assumed full delegation of prices control to the monetary authority; therefore, public deficit was the only demand policy instrument available at the national level. In this context, FAs minimize their loss function constrained by the economic framework and, also by an explicit fiscal rule. Being the FAs objectives to minimize output variations, with stabilization purposes, and to minimize public deficit changes, to achieve fiscal discipline. Under those circumstances, we have supposed that a technological advance takes place which, in terms of the model, translates into an expansive supply shock.

Our results show that in the symmetric case, when both countries show the same level of public debt, the best solution is obtained when both FAs are austere. This result is independent of the conservatism of the Central Bank, the type of fiscal rule used, and, also is independent of whether the FAs cooperate or not. But when we consider the asymmetric case, in which countries show different levels of public debt, the best solution is obtained when the country with high level has an austere FA, and the FAs of both countries cooperate. This result is independent of the type of fiscal rule used, and of whether the FAs cooperate or not.

Author Contributions: Conceptualization, C.D-R. and A.B.; methodology, C.D-R.; formal analysis, C.D-R. and A.B.; investigation, A.B.; calculations, C.D-R; writing—original draft preparation, A.B.; writing—review and editing, C.D-R.and A.B.; supervision, C.D-R. and A.B.

Funding: Anelí Bongers acknowledge financial support from Research Project financed by The Spanish Ministry of Science, Innovation and Universities, ECO2016-76818-C3-2-P and Carmen Díaz-Roldán acknowledges financial support from the Spanish Ministry of Science, Innovation and Universities through grant ECO-2016-78422-R.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

The macroeconomic model

Demand side

$$y_1 = -\alpha r + \beta(p_2 - p_1) + \gamma y_2 + g_1 \quad (1.A)$$

$$y_2 = -\alpha r + \beta(p_1 - p_2) + \gamma y_1 + g_2 \quad (2.A)$$

$$r = \mu\left[\frac{1}{2}\left(\Delta p_1 + \Delta p_2\right) - \Delta p^o\right] \quad (3.A)$$

From (1.A) to (3.A) we obtain the aggregate demand for each country

$$y_1 = -a\Delta p_1 \pm b\Delta p_2 \pm cy_2 + hg_1 + v_1 \quad (1)$$

$$y_2 = -a\Delta p_2 \pm b\Delta p_1 \pm cy_1 + hg_2 + v_2 \quad (2)$$

Supply side

$$\Delta w_1 = \Delta p_{1c}^E - \varphi u_1 + \phi \Delta prod_1 + z_1^w \quad (4.A)$$

$$\Delta p_1 = \Delta w_1 - \phi \Delta prod_1 + z_1^p \quad (5.A)$$

$$n_1 = y_1 - prod_1 \quad (6.A)$$

$$p_{1c}^E = p_{1c,-1} \quad (7.A)$$

$$p_{1c} = \eta p_1 + (1-\eta) p_2 \quad (8.A)$$

$$u_1 \equiv l_1 - n_1 \quad (9.A)$$

Where z^w captures the exogenous factors affecting wages determination, including taxes affecting labor market, such as contributions paid by employees, payroll taxes and indirect taxes. And z^p captures exogenous factors that affect pricing, including social security contributions by employers.

From (4.A) to (9.A) we obtain the aggregate supply for each country

$$y_1 = t\Delta p_1 - s_1 \quad (3)$$

$$y_2 = t\Delta p_2 - s_2 \quad (4)$$

The "*beggar-thy-neighbour*" effect prevails when policy-makers are particularly concerned by inflation targeting instead by output stabilization (the coefficient μ, in the monetary rule — equation (3.A) — is high enough when there is also an explicit output stabilization goal, or simply when inflation targeting is the unique objective as in our monetary rule).

Aggregate demand coefficients

$$a = \frac{\alpha\mu + 2\beta}{2div} \quad b = \frac{\alpha\mu - 2\beta}{2div} \quad c = \frac{\alpha - 2\gamma}{2div} \text{ and } div = \frac{2+\alpha}{2}, \quad h = \frac{1}{div}$$

$$v_i = -\frac{\alpha}{div} r_A + \frac{\alpha\mu}{div} \Delta p^o + \frac{\beta}{div} p_{2,-1} - \frac{\beta}{div} p_{1,-1}$$

Aggregate supply coefficients

$$t = \frac{1}{\varphi}$$

$$s_i = -\frac{1}{\varphi} \Delta p_{c,-1} + l + prod - \frac{1}{\varphi}(z^p + z^w)$$

Reduced form

$den = (ct + b)^2 - (a + t)^2 < 0$

$$A = -\frac{(a+t)}{den} t > 0, \quad B = \frac{(b+ct)}{den} t > 0, \quad C = \frac{(a-bc)t + a^2 - b^2}{den} > 0, \quad D = \frac{(b-ac)}{den} t > 0$$

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 31 October 2018 doi:10.20944/preprints201810.0744.v1

Peer-reviewed version available at Sustainability 2019, 11, 205; doi:10.3390/su11010205

$A' = -\frac{(a+t)}{den} > 0$, $B' = \frac{(b+ct)}{den} > 0$, $C' = \frac{(b-ct)c-(a+t)}{den} > 0$, $D' = \frac{(b-ac)}{den} > 0$

Solving (1) to (4), we obtain the reduced forms:

$y_1 = A\, hg_1 + A\, v_1 \pm B\, hg_2 \pm B\, v_2 - C\, s_1 - D\, s_2$ (5a)

$y_2 = A\, hg_2 + A v_2 \pm B\, hg_1 \pm B\, v_1 - C\, s_2 - D\, s_1$ (6a)

$\Delta p_1 = A' hg_1 + A' v_1 + B' hg_2 + B' v_2 + C' s_1 + D' s_2$ (7a)

$\Delta p_2 = A' hg_2 + A' v_2 + B' hg_1 + B' v_1 + C'\, s_2 + D' s_1$ (8a)

When the "*beggar-thy-neighbour*" effect prevails (*inflation targeting*):

$y_1 = A\, hg_1 + A\, v_1 - B\, hg_2 - B\, v_2 - C\, s_1 - D\, s_2$ (5)

$y_2 = A\, hg_2 + A v_2 - B\, hg_1 - B\, v_1 - C\, s_2 - D\, s_1$ (6)

$\Delta p_1 = A' hg_1 + A' v_1 + B' hg_2 + B' v_2 + C' s_1 + D' s_2$ (7)

$\Delta p_2 = A' hg_2 + A' v_2 + B' hg_1 + B' v_1 + C'\, s_2 + D' s_1$ (8)

The fiscal rule

Following [19], we will consider a fiscal rule which relates an explicit public deficit target (in terms of the GDP), g^o, with public debt deviations (in terms of the GDP) with respect to its optimal level ($d_{-1} - d^o$), and the output level y:

$$g_i^o = -\left[\delta(d_{i,-1} - d_i^o) + \theta y_i\right] \quad i = 1, 2 \qquad (9)$$

The public deficit adjusts according to the following path, where $0 \le \rho \le 1$:

$$g_i = (1-\rho) g_i^o + \rho g_{i,-1} \qquad (10)$$

From (9) and (10), we obtain the fiscal rules for each member country of the union:

$$g_i = -(1-\rho)\delta(d_{i,-1} - d_i^o) + \rho g_{i,-1} - (1-\rho)\theta y_i$$

Adding the variables that are given in period 1, and rewriting, we obtain the simplified fiscal rules for each member country of the union:

$$g_1 = k_1 - \lambda y_1 \qquad (11)$$

$$g_2 = k_2 - \lambda y_2 \qquad (12)$$

Notice that if $(d_{i,-1} - d_i^o) > 0$, then $k_i<0$, indicating a country with a relatively high level of debt. And the opposite holds for $k_i>0$, indicating a country with a relatively low level of debt.

Optimization problem

Independent decision and fiscal rule in both countries

$$\min_{g_1} \ \ell_1 = y_1^2 + \sigma g_1^2$$

s.t. (5) and (11)

Reaction functions:

$$g_1^{N,R} = g_1(g_2) = q_1^{N,R} g_2 + q_2^{N,R} v_2 - q_3^{N,R} v_1 - q_4^{N,R}$$

$$q_1^{N,R}, q_2^{N,R}, q_3^{N,R}, q_4^{N,R} > 0$$

Where:

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 31 October 2018 doi:10.20944/preprints201810.0744.v1

Peer-reviewed version available at Sustainability 2019, 11, 205; doi:10.3390/su11010205

$$\left|q_4^{N,R}\right| > 0 \text{ if } k_1 > 0$$

$$\left|q_4^{N,R}\right| < 0 \quad \text{if } k_1 < 0$$

$$q_1^{N,R} = \frac{B}{A}, q_2^{N,R} = \frac{B}{Ah}, q_3^{N,R} = \frac{1}{h}, q_4^{N,R} = \frac{k_1\lambda\sigma}{Ah(1+\lambda_2\sigma)}$$

Solving:

$$G_1^{N,R} = -\frac{1}{h} - \frac{k_1\sigma\lambda}{h(1+\sigma\lambda^2)(A-B)} = \frac{(B-A)(1+\sigma\lambda^2) - k_1\sigma\lambda}{h(1+\sigma\lambda^2)(A-B)}$$

$$G_2^{N,R} = 0 - \frac{k_1\sigma\lambda}{h(1+\sigma\lambda^2)(A-B)}$$

Solution (symmetric for g_2): $g_1^{N,R} = -G_1^{N,R}v_1 \pm G_2^{N,R}v_2$

Coordinated decision and fiscal rule in both countries

$$\min_{g_1,g_2} \quad L = \left[\frac{1}{2}\ell_1 + \frac{1}{2}\ell_2\right]$$

s.t.(5), (6), (11) and (12)

Reaction functions:

$$g_1^{C,R} = g_1(g_2) = q_1^{C,R}g_2 + q_2^{C,R}v_2 - q_3^{C,R}v_1 - q_4^{C,R}$$

$$q_1^{C,R}, q_2^{C,R}, q_3^{C,R}, q_4^{C,R} > 0, q_4^{C,R}$$

Where:

$$\left|q_4^{C,R}\right| > 0 \text{ if } (Ak_1 - Bk_2) < 0$$

$$\left|q_4^{C,R}\right| < 0 \quad \text{if } (Ak_1 - Bk_2) > 0$$

$$q_1^{C,R} = \frac{2AB}{(A^2+B^2)}, \quad q_2^{C,R} = \frac{2AB}{(A^2+B^2)h}, \quad q_3^{C,R} = \frac{1}{h}$$

$$q_4^{C,R} = \frac{(Ak_1 - Bk_2)\lambda\sigma}{(A^2+B^2)h(1+\lambda^2\sigma)}$$

Solving:

$$G_1^{C,R} = -\frac{1}{h} - \frac{(Ak_1 - Bk_2)\sigma_1\lambda}{h(1+\sigma_1\lambda^2)(A-B)^2} = -\frac{(1+\sigma\lambda^2)(A-B)^2 + (Ak_1 - Bk_2)\sigma_1\lambda}{h(1+\sigma_1\lambda^2)(A-B)^2}$$

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 31 October 2018 doi:10.20944/preprints201810.0744.v1

Peer-reviewed version available at Sustainability 2019, 11, 205; doi:10.3390/su11010205

$$G_2^{C,R} = -\frac{(Ak_1 - Bk_2)\sigma_2\lambda}{h(1+\sigma_2\lambda^2)(A-B)^2}$$

Solution (symmetric for g_2): $g_1^{C,R} = -G_1^{C,R}v_1 \pm G_2^{C,R}v_2$

Numerical values for the empirical exercise

Parameters of the model

<table>
<tr><td colspan="4">α = 0.28 β= 0.05 $\varphi = \frac{2}{3}$ $t = \frac{3}{2}$ $\gamma = \frac{1}{2}$ h = 0.87719</td></tr>
<tr><td colspan="2">μ = 0.8</td><td colspan="2">μ = 0.2</td></tr>
<tr><td colspan="2">a = 1.4211
b = 5.4386 × 10^{-2}
c = – 0.31579</td><td colspan="2">a = 6.8421 × 10^{-2}
b = – 1.9298 × 10^{-2}
c = – 0.31579</td></tr>
<tr><td colspan="2">den =– 2.5207</td><td colspan="2">den =– 2.2169</td></tr>
<tr><td>A = 0.97717
B = 0.24951
C = 7.3436× 10^{-2}
D = 5.9069× 10^{-2}</td><td>A' = 0.65145
B' = 0.16634
C' = 0.50460
D'=3.9379× 10^{-2}</td><td>A = 1.0612
B = 0.33356
C =2.8684× 10^{-2}
D =1.5621× 10^{-3}</td><td>A' = 0.70748
B' = 0.22237
C' = 0.57374
D'=1.0414× 10^{-3}</td></tr>
</table>

Parameters of the fiscal rules

<table>
<tr><td colspan="3">AF preferences: σ = 1.3 or σ = 0.7</td></tr>
<tr><td colspan="3">Fiscal rules</td></tr>
<tr><td colspan="3">i. Symmetrical FR: $\delta = \rho = \theta = (1-\rho)$ = 0.5
ii. Disciplined FR: $\delta = \rho$ = 0.75, and $\theta = (1-\rho)$ = 0.25
iii. Growth driving FR: $\delta = \rho$ = 0.25 and $\theta = (1-\rho)$ = 0.75</td></tr>
<tr><td></td><td>Hight debt: d_{-1} = 90</td><td>Low debt: d_{-1} = 30</td></tr>
<tr><td>i</td><td>g = 14.7 – y</td><td>g = – 15.3 – y</td></tr>
<tr><td>ii</td><td>g = 21.6 – 0.25 y</td><td>g = – 23.4 – 0.25 y</td></tr>
<tr><td>Iii</td><td>g = 7.4 – 0.75 y</td><td>g = – 7.6 – 0.75 y</td></tr>
</table>

References

1. United Nations. Our Common Future: Brundtland Report, 1987.
2. Kuhlnab, T.; Farrington, J. What is sustainability? Sustainability, **2010**, 2(11), 3436-3448; https://doi.org/10.3390/su2113436.
3. Goldin, I. and winters. L.A. *The Economics of Sustainable Development*. Cambridge University Press. 1995.
4. Barbier, E. The Concept of Sustainable Economic Development. Environmental Conservation, 1987, 14(2), 101-110. Doi:10.1017/S0376892900011449.
5. Carmona-González, N. Recent episodes on a globalized economy: An historical approach. In *Advances on International Economics*, Díaz-Roldán, C.; Perote, J., Eds.; Cambridge Scholars Publishing, Newcastle, United Kingdom, 2015, 2, 21-38.
6. United Nations, The Sustainable Development Goals Report, 2018. https://unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018.pdf
7. Roadmap for a sustainable financial system. United Nations, 2017.
8. Blanchard, O.; Dell'Ariccia, G.; Mauro, P. Rethinking macroeconomic policy. International Monetary Fund Staff position note. February 12, 2010.
9. Bank of England. The role of macroprudential policy. Bank of England Discussion Paper, November, 2009.
10. Zacharias, A. How time deficits and hidden poverty undermine the sustainable development goals. Policy Note, Levy Economics Institute of Bard College, 2017/4.
11. Vegas, E.; Coffin, C. When education expenditure matters: An empirical analysis of recent international data. *Comparative Education Review* **2015**; 59 (2), pp. 289-304.
12. Montgomery J.D. Social capital as a policy resource. In: Montgomery J.D., Inkeles A. (eds) Social Capital as a Policy Resource. Springer, Boston, 2001.
13. Pociovălișteanu, D.M., Novo-Corti, I., Aceleanu M.I, Șerban, A. & Grecu, E. Employment Policies for a Green Economy at the European Union Level, *Sustainability*, **2015**, 7(7), pages 1-20.
14. Novo-Corti, I., Pociovalisteanu, D.M. & Iorgulescu,R.I. Social Sustainability In Higher Education. The Role Of Institutions From Students' Point Of View, *Journal for Economic Forecasting, Institute for Economic Forecasting*, **2015**, vol. 0(3), pages 166-180,
15. Bartram J, Cairncross S. Hygiene, Sanitation, and Water: Forgotten Foundations of Health. *PLoS Med*, ***2010***, 7(11): e1000367. https://doi.org/10.1371/journal.pmed.1000367
16. Anker, R., Chernyshev, I., Egger, P., Mehran, F. and RITTER, J. Measuring decent work with statistical indicators. International Labor Review, 2008, 142 (2), https://doi.org/10.1111/j.1564-913X.2003.tb00257.x
17. Stern, Common and Barbier. Economic growth and environmental degradation: The environmental Kuznets curve and sustainable development, World Development, **1996**, 24 (7), 1151-1160.
18. Díaz-Roldán, C. Fiscal performance in monetary unions: How much austerity should be allowed? *Panoeconomicus*, **2017**, Volume 64 (1), pp. 61-76. http://dx.doi.org/10.2298/PAN140730021D
19. Ballabriga, F.; Martinez-Mongay, C. Has EMU shifted monetary and fiscal policies? *In*: Buti, M. (ed.). *Monetary and fiscal policies in EMU: Interactions and coordination*. 2002. Cambridge: Cambridge University Press.