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POPULATION GROWTH AND PREFERENCE CHANGE IN A GENERALIZED SOLOW GROWTH MODEL WITH GENDER TIME DISTRIBUTIONS

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Abstract: *The study builds a model of dynamic interactions between the birth rate, the mortality rate, the population, wealth accumulation, time distribution between work, leisure and children caring, habit formation and preference change. The production technology and markets are built on the Solow growth model. We base our modeling the population dynamics on the Haavelmo population model and the Barro-Becker fertility choice model. This study takes account of habit formation and preference change. Although it is influenced by the Ramsey growth theory with time preference and habit formation, it uses Zhang's approach to the household with habit formation and preference change. We synthesize different dynamic forces in a compact framework, using the utility function proposed by Zhang. Analytically, we focus on transitional processes as well as economic equilibrium. As the economic system is given by autonomous nonlinear differential equations, it is not easy to analyze its behavior. We simulate the model to demonstrate the existence of an equilibrium point and plot the motion of the dynamic system. We examine the effects of changes in weights given to the habit stock of children, the wife's wage rate having negative impact on the propensity to have children, the wife weighing less the habit stock of leisure time, the wife's habit stock of leisure time having negative impact on the husband's propensity to use leisure time, the wife's wage rate having negative impact on the husband's propensity to use leisure time, woman's human capital being improved, a rise in the total factor productivity, and the mother spending more time on each child fostering.*

Keywords: habit stock; preference change; gender discrimination; propensity to have children; birth and mortality rate; population growth; gender difference in time distribution; wealth accumulation.

JEL classification: J11; J12; J13; N3.

1. Introduction

The main purpose of this study is to examine dynamic relations between economic growth, population growth, and preference change. Preference change has been recognized by economists even since Adam Smith, it may be claimed that economics still lacks proper analytical frameworks for analyzing interactions between preference change, population change, and economic growth. In *The Theory of Moral Sentiments*, Adam Smith observes: "The man who lives within his income is naturally contented with his situation, which, by continual, though small accumulations, is growing better and better every day. He is enabled gradually to relax, both in the rigour of his parsimony and in the severity of his application; and he feels with double satisfaction this gradual increase of ease and enjoyment, from having felt before the hardship which attended the want of them." Fisher (1930: 72) observes the influence of wealth and income on preference difference: "Poverty bears down heavily on all portions of a man's expected life. But it increases the want for immediate income even more than it increases the want for future income." According to Fisher (1930: 81): "In the case of primitive races, children, and other uninstructed groups in society, the future is seldom considered in its true proportions." Fisher also discusses interactions between cultures and other factors such

as self-control, habit, concerns for the lives of other people, and fashion. There are empirical studies which confirm existence of interdependent relations between preference changes and other changes in social and economic conditions (Fuchs, 1982; Horioka; 1990; Olsen, 1993; Sheldon, 1997, 1998; Becker and Mulligan, 1997; Kirby *et al*. 2002; and Chao *et al*., 2009). The modeling of preference change in this study is influenced by the ideas about the time preference change and habit formation in the Ramsey-type neoclassical growth theory. Becker and Mulligan (1997: 729) observe: "Time preference plays a fundamental role in theories of saving and investment, economic growth, interest rate determination and asset pricing, addiction, and many other issues that are getting increasing attention from economists. Yet, since Samuelson's (1937) discounted utility model, rates of time preference are almost invariably taken as "given" or exogenous, with little discussion of what determines their level." An early formal modeling of endogenous time preference was proposed by Uzawa (1968). There are other studies on the implications of endogenous time preference for the macroeconomy (Epstein and Hynes, 1983; Obstfeld, 1990; Shin and Epstein, 1993; Palivos *et al*. 1997; Drugeon, 1996, 2000; Stern, 2006; Meng, 2006; Dioikitopoulos and Kalyvitis, 2010). The studies show that endogeneity of time preference is necessary to properly deal with economic growth and development. This study applies the basic ideas in the literature of habit formation and preference change. The idea of habit formation or habit persistence was introduced to formal economic analysis by Duesenberry (1949). Becker (1992) explains: "the habit acquired as a child or young adult generally continue to influence behavior even when the environment changes radically. For instance, Indian adults who migrate to the United States often eat the same type of cuisine they had in India, and continue to wear the same type clothing." The idea of habit formation is applied to different economic issues (e.g., Pollak, 1970; Mehra and Prescott, 1985; Sundaresan, 1989; Abel, 1990; Constantinides, 1990; de la Croix, 1996; Ravn *et al*. 2006; and Campbell and Cochrane, 1999; Boldrin *et al*. 2001; Huang, 2012). This study applies these ideas to explain habit formation and preference change in a neoclassical growth model.

The economic production and markets are based on the neoclassical growth theory. The seminal paper in the field is the Solow model. The neoclassical growth theory is mainly concerned with endogenous physical capital or wealth accumulation in freely competitive markets (Solow, 1956; Burmeister and Dobell, 1970; Azariadis, 1993; Barro and Sala-i-Martin, 1995). The model of this study is built within the framework of neoclassical growth theory. We follow the Solow model in modeling economic production and wealth accumulation. This study introduces habit formation of children and endogenous preference change in having children to neoclassical growth theory. Since Malthus published his *An Essay on the Principle of Population* in 1798, different economists proposed different ideas about interdependence between population change and economic growth. In the last two hundred years countries have experienced different patterns of population changes. This study deals with dynamic interactions between wealth accumulation and population dynamics with endogenous birth rate, mortality rate and gender time distribution. Population change is the net result of birth rate and mortality rate. In the literature of population dynamics many factors are supposed to be related to birth rates (Barro and Becker, 1989; Becker *et al*., 1990; Kirk, 1996; Galor and Weil, 1996; Galor and Weil, 1999; Doepke, 2004; Adsera, 2005; Bhattacharya and Qiao, 2007; Manuelli and Seshadri, 2009; Chu *et al.*, 2012; Bosi and Seegmuller, 2012; Hock and Weil, 2012; Varvarigos and Zakaria, 2013). Aging become a great concern in many modern economies. Given the population structure, aging is closely related to mortality rate (Cigno and Rosati, 1996; Robinson and Srinivasan, 1997; Schultz, 1993, 1998; Blackburn and Cipriani, 2002; Chakraborty, 2004; Hazan and Zoabi, 2006; Heijdra and Romp, 2008; Ludwig and Vogel, 2009; Lee and Mason, 2010; Balestra and Dottori, 2012; Lancia and Prarolo, 2012; and Ludwig *et al.*, 2012).

To explain birth and mortality rates we need to take account of gender differences in behaviour. As Flabbi (2010: 745) observes: "Even if wages and earnings for women and men in the United States have experienced a significant convergence in the 1970s and 1980s, their ratio has remained roughly constant at 75% since the mid-1990s… The United States is not an exception among OECD countries: they rank more or less average, with Northern European countries traditionally showing the lowest differentials and Japan the highest. These differentials persist after conditioning on observable productivity characteristics… ." Endogenous preferences should help to explain complicated patterns of gender division of time (e.g., Goodfriend and McDermott, 1995; Kelly, 1997; Edmonds and Pavcnik, 2006). It should be noted that this study is to integrate three models by Zhang (2012, 2013, 2015). Zhang (2015) develops a growth model with endogenous birth and mortality rates. Zhang (2012, 2013) builds the Solow-type models on the basis of the habit formation and time preference in the Ramsey-type growth theory. The rest of the paper is organized as follows. Section 2 defines the growth model with habit and preference dynamics. Section 3 deals with dynamic properties of the model and simulates the motion of the economy. Section 4 carries out comparative dynamic analysis studies effects of changes in some parameters on the system. Section 5 makes concluding remarks.

2. The basic model

The model is a synthesis of the three models by Zhang (2012, 2013, 2015). The model is built on the Solow growth model in describing the production sector (Solow, 1956). The economy has a single production sector, producing a single commodity for consumption and investment. Capital depreciates at a constant exponential rate, δ_k, which is independent of the manner of use. Technology of the production sector is characterized of constant returns to scale. All markets are perfectly competitive. Factors are inelastically supplied and the available factors are fully utilized at every moment. Saving is undertaken only by households. All earnings of firms are distributed in the form of payments to factors of production. Households own assets of the economy and distribute their incomes to consumption, child bearing, and wealth accumulation. The population of each gender is homogeneous. We assume that each family consists of husband, wife and children. All the families are identical. We use subscripts $q=1$ and $q=2$ to stand for man and woman respectively. We follow the same spirit as described by Albanesi and Olivetti (2009: 82): "Since the purpose of this paper is to study the joint determination of gender differentials in labor market outcomes and in the household division of labor, we abstract from modelling marriage decisions ...". We use $N(t)$ to stand for the population of each gender. Let $T_q(t)$ and $\overline{T}_q(t)$ stand for work time and time spent on taking care of children of gender q and $\overline{N}(t)$ for the flow of labor services used in time t for production. Let $N_q(t)$ stand for the qualified labor force of gender q. We have

$$N_q(t)=h_q T_q(t)N(t),\quad \overline{N}(t)=N_1(t)+N_1(t), \tag{1}$$

where h_q is the level of human capital of gender q.

2.1. The production sector

The production sector uses capital and labor as inputs. Let $K(t)$ stand for the capital stock at time t. We use $F(t)$ to represent the output level. The production function is

$$F(t) = AK^{\alpha}(t)\bar{N}^{\beta}(t), \quad \alpha, \beta > 0, \quad \alpha + \beta = 1, \qquad (2)$$

where A is the total productivity of the production sector, and α and β are respectively the constant output elasticities of capital and qualified labor input. Markets are competitive; thus labor and capital earn their marginal products, and firms earn zero profits. We denote $w(t)$ the wage rate of per unit of qualified work time in the labor market. The marginal conditions are

$$r(t) + \delta_k = \frac{\alpha F(t)}{K(t)}, \quad w(t) = \frac{\beta F(t)}{\bar{N}(t)}, \qquad (3)$$

where $w_q(t)$ are the wage rates of per unit of work time by gender q

$$w_1(t) = h_1 w(t), \quad w_2(t) = h_2 w(t).$$

2.2. The current and disposable incomes

We use an alternative approach to modelling consumer behaviour proposed by Zhang (1993). The representative household chooses the consumption level of commodity, leisure time, work time, number of children, as well as on amount of saving. We use $\bar{k}(t)$ to stand for wealth per household, i.e., $\bar{k}(t) = K(t)/N(t)$. The per household current income $y(t)$ from the interest and wage payments as follows

$$y(t) = r(t)\bar{k}(t) + w_1(t)T_1(t) + w_2(t)T_2(t).$$

The total value of wealth that a representative household can sell to purchase goods and to save is equal to $\bar{k}(t)$. We assume that selling and buying wealth can be conducted instantaneously without any transaction cost. The per capita disposable income of the household is defined as the sum of the current income and the wealth available for purchasing consumption goods and saving

$$\hat{y}(t) = y(t) + \bar{k}(t). \qquad (4)$$

2.3. The cost of children caring

Let $n(t)$ and $p_b(t)$ stand for the birth rate and the cost of birth at time. Following Zhang (2012, 2013), we assume that children will have the same level of wealth as that of the parent (see also Barro and Becker, 1989; Becker, 1981). In addition to the time spent on children, the cost of the parent is given by

$$p_b(t) = n(t)\bar{k}(t). \qquad (5)$$

In some societies, women are the primary providers of child care. We consider the following relation between fertility rate and the parent's time on raising children

$$\bar{T}_q(t) = \theta_q n(t), \ \ \theta_q \geq 0. \qquad (6)$$

The specified function form implies that if the parents want more children, they spend more time on child caring. This requirement is strict as child caring tends to exhibit increasing return to scale.

2.4. The budget and time constraint

The household distributes the total available budget between saving, $s(t)$, consumption of goods, $c(t)$, and bearing children, $p_b(t)$. The budget constraint is

$$p(t)c(t) + s(t) + \bar{k}(t)n(t) = \hat{y}(t). \qquad (7)$$

We consider that except work and child caring, parents also have their leisure. We denote the leisure time of gender q by $\tilde{T}_q(t)$. An adult is faced with the following time constraint

$$T_q(t) + \bar{T}_q(t) + \tilde{T}_q(t) = T_0, \qquad (8)$$

where T_0 is the total available time for leisure, work and children caring. Insert (8) in (7)

$$p(t)c(t) + s(t) + \bar{k}(t)n(t) + \bar{T}_1(t)w_1(t) + \bar{T}_2(t)w_2(t) + \tilde{T}_1(t)w_1(t) + \tilde{T}_2(t)w_2(t) = \bar{y}(t), \qquad (9)$$

where

$$\bar{y}(t) \equiv (1 + r(t))\bar{k}(t) + (w_1(t) + w_2(t))T_0.$$

The right-hand side is the "potential" income that the family can obtain by spending all the available time on work. The left-hand side is the sum of the consumption cost, the saving, the opportunity cost of bearing children, and opportunity cost of leisure. Insert (6) in (9)

$$c(t) + s(t) + \tilde{w}(t)n(t) + \tilde{T}_1(t)w_1(t) + \tilde{T}_2(t)w_2(t) = \bar{y}(t), \qquad (10)$$

where

$$\tilde{w}(t) \equiv \bar{k}(t) + h\,w(t), \ \ h \equiv \theta_1 h_1 + (1 - \varphi)\theta_2 h_2.$$

The variable $\tilde{w}(t)$ is the opportunity cost of children fostering.

2.5. The utility and optimal behavior

Following Zhang (2015), we assume that the utility is dependent on $c(t)$, $s(t)$, $\tilde{T}_q(t)$, and $n(t)$ as follows

$$U(t) = c^{\xi_0(t)}(t)s^{\lambda_0(t)}(t)\tilde{T}_1^{\sigma_{01}(t)}(t)\tilde{T}_2^{\sigma_{02}(t)}(t)n^{v_0(t)}(t),$$

where $\xi_0(t) > 0$ is called the propensity to consume, $\lambda_0(t) > 0$ the propensity to own wealth, $\sigma_{0q}(t) > 0$ the gender $q's$ propensity to use leisure time, and $v_0(t) > 0$ the propensity to have children. Maximizing $U(t)$ subject to (10) yields

$$c(t) = \xi(t)\bar{y}(t),\ \ s(t) = \lambda(t)\bar{y}(t),\ \ \tilde{T}_q(t) = \frac{\sigma_q(t)\bar{y}(t)}{w_q(t)},\ \ n(t) = \frac{\upsilon(t)\bar{y}(t)}{\tilde{w}(t)}, \qquad (11)$$

where

$$\xi(t) \equiv \xi_0(t)\rho(t),\ \ \lambda(t) \equiv \lambda_0(t)\rho(t),\ \ \tilde{T}_q(t) \equiv \sigma_{0q}(t)\rho(t),\ \ v(t) \equiv v_0(t)\rho(t),$$

$$\rho(t) \equiv \frac{1}{\xi_{01}(t) + \lambda_{01}(t) + \sigma_{01}(t) + \sigma_{02}(t) + \upsilon_0(t)}.$$

2.6. The time preference and the propensity to hold wealth

Following Zhang (2012, 2013), we now introduce preference changes. The modeling of the preference is strongly influenced by the literature of the neoclassical growth model with habit formation and preference change (e.g., Dornbusch and Frenkel, 1973; Persson and Svensson, 1985; Epstein, 1987; Chang *et al*. 2011; Blanchard and Fischer, 1989; Orphanides and Solow, 1990; Das, 2003; Smithin, 2004; Kam and Mohsin, 2006; and Hirose and Ikeda, 2008). Zhang (2012, 2013) forms endogenous change in the propensity to save on the basis of the literature about growth and preference change. According to Zhang, the propensity to save adapts to the wealth, wage rates in the following way

$$\lambda_0(t) = \bar{\lambda} + \lambda_1 w_1(t) + \lambda_2 w_2(t), \qquad (12)$$

where $\bar{\lambda} > 0$, λ_1, and λ_2, are parameters. This is a simplified form the preference. For simplicity, the propensity to save is assumed to be proportional to the wealth, wage rates. When $\lambda_w = \lambda_q = 0$, the propensity to hold wealth is constant. We don't specify the signs of λ_q in this stage of the analysis because the propensity to save may be positively or negatively related to these variables.

2.7. The habit formation for consumption and the propensity to consume consumer goods

We now model endogenous change in the propensity to consume goods. We base the ideas of habit formation in the literature of economic growth (Deaton and Muellbauer, 1980; Carroll, 2000; Amano and Laubach, 2004; Alvarez-Cuadrado *et al*., 2004; Gómez, 2008; Corrado and Holly, 2011). We build the habit formation with regard to consumer goods as follows

$$\dot{\hbar}_c(t) = \hat{\xi}\left[c(t) - \hbar_c(t)\right], \qquad (13)$$

where $\hbar_c(t)$ is the stock of habit with regard to the consumption good. A larger value for $\hat{\xi}$ implies lower weights given to more distant values of the levels of consumption. The parameter measures the relative weights of consumption at different times. This formation is based on the internal habit formation in the literature. If the current consumption is higher than the level of the habit stock, then the level of habit stock tends to rise, and vice versa. Following Zhang (2012), we assume that the propensity to consume is a function of the wage incomes and the habit stock as follows

$$\xi_0(t) = \bar{\xi} + \xi_1 w_1(t) + \xi_2 w_2(t) + \xi_h \hbar_c(t), \qquad (14)$$

where $\bar{\xi} > 0$, ξ_q, and $\xi_h \geq 0$ are parameters. It is reasonable to assume that the birth and mortality rates will also affect the propensities to consume. As shown in the appendix, it is straightforward to take account of these factors. If $\xi_q = 0$ and $\xi_h = 0$, the propensity is constant. The term $\xi_q w_q(t)$ implies that the propensity to consume is affected by the wage rates. If $\xi_w > (<) 0$, then a rise in the wage rate raises (reduces) the propensity to consume. It is reasonable to assume $\xi_w \geq 0$, at least for normal goods. If the goods under consideration are inferior, the sign may be opposite. In reality, relations between wage and consumption are very complicated (e.g., Lusardi, 1996; Storesletten, et al. 2004; and Lise and Seitz, 2011). The term $\xi_h \hbar(t)$ implies that if the habit stock is increasing, the propensity to consume will rise, and vice versa.

2.8. The habit formation for leisure times and the propensity to use leisure

The change in the propensity to use leisure is similar to the change in the propensity to consume consumer goods. Similar to (14), the evolution of the habit stock for leisure time $\hbar_{hq}(t)$ is

$$\dot{\hbar}_{hq}(t) = \hat{\sigma}_q \left[\widetilde{T}_q(t) - \hbar_{hq}(t)\right], \quad q = 1, 2, \qquad (15)$$

where $\hat{\sigma}_q$ is a non-negative parameter, measuring the relative weights of leisure time at different times. If the current leisure time is more than the level of the habit stock, the level of habit stock tends to rise, and vice versa. The propensities to use leisure time are specified as

$$\sigma_{0q}(t) = \bar{\sigma}_q + \sigma_{q1} w_1(t) + \sigma_{q2} w_2(t) + \tilde{\sigma}_{q1} \hbar_{T1}(t) + \tilde{\sigma}_{q2} \hbar_{T2}(t), \quad q = 1, 2, \qquad (16)$$

where $\bar{\sigma}_q$ are positive parameters, and signs of the parameters σ_{qj} and $\tilde{\sigma}_{qj}$ are ambiguous. The term $\sigma_{jq} w_q(t)$ implies that the propensity to use leisure time is affected by the wage rates.

2.9. The habit formation for having children and change in the propensity to have children

The evolution of the habit stock for having children $\hbar_b(t)$ is

$$\dot{\hbar}_b(t) = \hat{\sigma}_b\left[n(t) - \hbar_b(t)\right], \qquad (17)$$

where $\hat{\sigma}_b$ is a non-negative parameter, measuring the relative weights of birth rate at different times. The propensity to have children is specified as

$$v_0(t) = \hat{v} + v_1 w_1(t) + v_2 w_2(t) + v_b \hbar_b(t), \qquad (18)$$

where the parameter $\hat{v}$ is positive and signs of v_q and v_b are ambiguous.

2.10. The birth and mortality rates and population dynamics

According to the definitions, the population change follows

$$\dot{N}(t) = \left(n(t) - d(t)\right)N(t), \qquad (19)$$

where $n(t)$ and $d(t)$ are respectively the birth rate and mortality rate. The birth rate is given by (11). Influenced by different approaches in the literature of economic growth and population dynamics (e.g., Haavelmo, 1954; Razin and Ben-Zion, 1975; Stutzer, 1980; Yip and Zhang, 1997; Chu *et al.,* 2012), Zhang assumes that the mortality rate is negatively related to the disposable income in the following way

$$d(t) = \frac{\bar{\upsilon}\, N^b(t)}{\bar{y}^a(t)}, \qquad (20)$$

where $\bar{\upsilon} \geq 0$, $a \geq 0$. We call $\bar{\upsilon}$ the mortality rate parameter. As in the Haavelmo model, an improvement in living conditions implies that people live longer. The term $N^b(t)$ takes account of possible influences of the population on mortality. Insert (11) and (20) in (19)

$$\dot{N}(t) = \left(\frac{\upsilon\, \bar{y}(t)}{\tilde{w}(t)} - \frac{\bar{\upsilon}\, N^b(t)}{\bar{y}^a(t)}\right)N(t). \qquad (21)$$

2.11. Wealth dynamics

We now find dynamics of wealth accumulation. According to the definition of $s(t)$, the change in the household's wealth is given by

$$\dot{\bar{k}}(t) = s(t) - \bar{k}(t) = \lambda(t)\bar{y}(t) - \bar{k}(t). \qquad (22)$$

2.12. Demand for and supply of goods

The national saving is the sum of the households' saving. As output of the capital goods sector is equal to the net savings and the depreciation of capital stock, we have

$$S(t) + C(t) - K(t) + \delta_k K(t) = F(t), \qquad (23)$$

where $S(t) - K(t) + \delta_k K(t)$ is the sum of the net saving and depreciation and

$$S(t) = s(t)N(t), \;\; C(t) = c(t)N(t), \;\; K(t) = \bar{k}(t)N(t).$$

We have thus built the dynamic model. It should be noted that the model is general in the sense that the Solow model and the Haavelmo model can be considered as special cases of our model. Moreover, as our model is based on some well-known growth models with habit formation and preference change and includes some features which no other single theoretical model explains, we should be able to explain some interactions which other formal models fail to explain. We now examine dynamics of the model.

3. The dynamics and its properties

This section examines dynamics of the model. First, we introduce $z(t) \equiv (r(t) + \delta_k)/w(t)$. We show that the dynamics can be expressed by six differential equations with $z(t)$, $N(t)$, $\hbar_c(t)$, $\hbar_1(t)$, $\hbar_2(t)$, and $\hbar_b(t)$ as the variables.

Lemma

The dynamics of the economic system is governed by the six differential equations

$$\begin{aligned}
\dot{z} &= \tilde{\Omega}_z(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \\
\dot{\hbar}_c &= \tilde{\Omega}_c(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \\
\dot{\hbar}_{Tq} &= \tilde{\Omega}_q(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \;\; q = 1, 2, \\
\dot{\hbar}_b &= \tilde{\Omega}_b(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \\
\dot{N} &= \tilde{\Omega}_N(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \qquad (24)
\end{aligned}$$

where the functions $\tilde{\Omega}_m(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N)$ are functions of $z(t)$, $\hbar_c(t)$, $\hbar_{hq}(t)$, $\hbar_b(t)$, and $N(t)$ defined in the Appendix. Moreover, all the other variables are determined as functions of $z(t)$, $\hbar_c(t)$, $\hbar_{hq}(t)$, $\hbar_b(t)$, and $N(t)$: $\bar{k}(t)$ by (A11) $\rightarrow$ $r(t)$ and $w_q(t)$ by (A2) $\rightarrow$ $\bar{y}(t)$ by (A3) $\rightarrow$ $c(t)$, $s(t)$, $\tilde{T}_q(t)$, and $n(t)$ by (11) $\rightarrow \bar{T}_q(t)$ by (6) $\rightarrow T_q(t)$ by (A4) $\rightarrow$ $\bar{N}(t)$ by (1) $\rightarrow K(t)$ by (A1) $\rightarrow$ $F(t)$ by (2).

The differential equations system (24) has six variables. As demonstrated in the Appendix, the expressions are complicated. It is difficult to explicitly interpret economic implications of the six equations. For illustration, we simulate the model to illustrate behavior of the system.

In the remainder of this study, we specify the depreciation rate by $\delta_k = 0.05$, and let $T_0 = 24$. We specify the other parameters as follows

$$\alpha = 0.34,\ \lambda_0 = 0.6,\ \xi_0 = 0.2,\ \nu_0 = 0.4,\ \sigma_{10} = 0.15,\ \sigma_{10} = 0.15,\ A = 1,$$
$$a = 0.3,\ b = 0.3,\ h_1 = 3,\ h_2 = 2.4,\ \theta_1 = 2,\ \theta_2 = 5,\ \overline{\upsilon} = 1,\ \overline{\lambda} = 0.6,$$
$$\lambda_1 = \lambda_2 = -0.01,\ \overline{\sigma}_1 = 0.15,\ \overline{\sigma}_2 = 0.16,$$
$$\sigma_{11} = \sigma_{21} = \widetilde{\sigma}_{11} = \widetilde{\sigma}_{22} = 0.001,\ \sigma_{12} = \sigma_{22} = \widetilde{\sigma}_{12} = \widetilde{\sigma}_{21} = -0.001,\ \overline{\xi} = 0.2,$$
$$\xi_1 = \xi_2 = \xi_h = 0.001,\ \overline{\upsilon} = 0.4,\ \nu_1 = \nu_2 = \nu_b = 0.001,\ \hat{\xi} = \hat{\sigma}_1 = \hat{\sigma}_2 = \hat{\sigma}_b = 0.4.$$

The total productivity and the output elasticity of the production sector are respectively 1 and 0.34. It should be noted that both in theoretical simulations and empirical studies the output elasticity of capital in the Cobb-Douglas production is often valued approximately equal to 0.3 and the value of the total productivity is chosen to be close to unity (e.g., Miles and Scott, 2005; Abel et al, 2007). Although the chosen values of the preference parameters are not empirically based, we choose the coefficients associated with the wage and wealth very small so that we may effectively analyze the effects of changes in these coefficients on the economic structure. To follow the motion of the system, we specify the initial conditions

$$z(0) = 1.9,\ N(0) = 30,\ \hbar_c(0) = 21,\ \hbar_{h1}(0) = 11,\ \hbar_{h2}(0) = 16.5,\ \hbar_b(0) = 0.58.$$

The simulation result is plotted in Figure 1. The population rises from its low initial condition. The birth rate falls and mortality rate rises over the simulation period. The initial value of the habit stock of birth rate is much lower than the birth rate. The low habit stock reduces the birth rate. The wealth and opportunity cost of children rise. The labor force, total capital and output are increased. The wage rates are enhanced and rate of interest is reduced. The falling in birth rate is associated with falling in both man's and woman's time of children fostering. Both men and women work less hours and have more leisure hours. Both consumption level and habit stock of consumption level are augmented. The (relative) propensity to save falls. The father's (mother's) propensity to have leisure rises (falls). The propensity to have children falls.

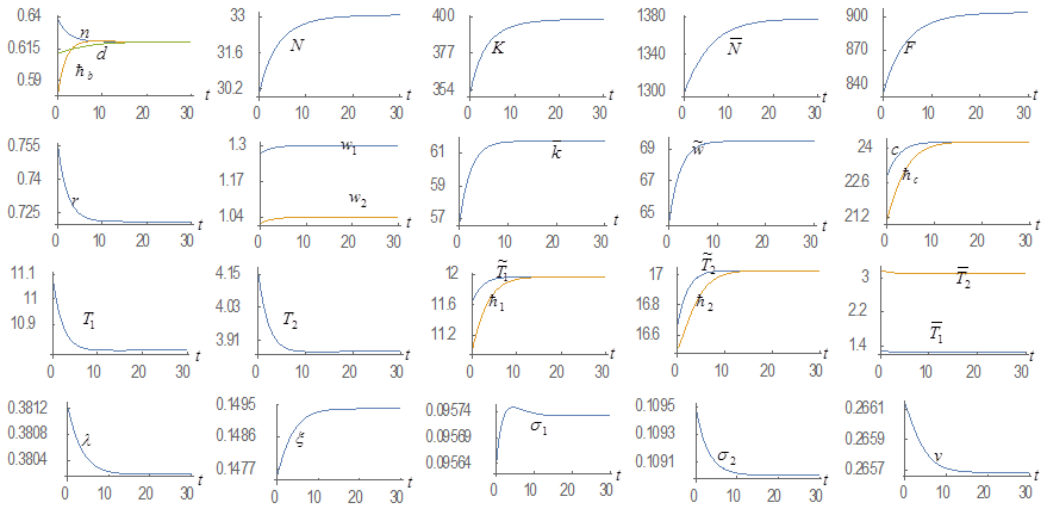

Figure 1: The Motion of the Economic System

It is straightforward to confirm that all the variables become stationary in the long term. This implies the existence of an equilibrium point. The simulation confirms that the system has an equilibrium point. We list the equilibrium values of the variables as follows

$$N = 33.06,\ K = 398.5,\ \overline{N} = 1377.8,\ F = 903.7,\ n = \hbar_b = d = 0.62,\ r = 0.72,$$
$$w_1 = 1.3,\ w_2 = 1.04,\ \widetilde{w} = 69.5,\ \bar{k} = 61.7,\ T_1 = 10.8,\ T_2 = 3.87,$$
$$\widetilde{T}_1 = \hbar_{h1} = 11.96,\ \widetilde{T}_2 = \hbar_{h2} = 17.03,\ \overline{T}_1 = 1.24,\ \overline{T}_2 = 3.1,\ c = \hbar_c = 24.25,$$
$$\lambda = 0.38,\ \xi = 0.15,\ \sigma_1 = 0.096,\ \sigma_2 = 0.109,\ v = 0.266.$$

We calculate the six eigenvalues:

$$-0.4,\ -0.3998,\ -0.387,\ -0.387 \pm 0.06,\ -0.326,\ -0.186.$$

As the six eigenvalues are negative, the equilibrium point is locally stable. Hence, the system always approaches its equilibrium point if it is not far from the equilibrium point.

4. Comparative dynamic analysis

We simulated the motion of the national economy. We now examine how the economic system reacts to some exogenous changes. As the lemma provides the computational procedure to calibrate the motion of all the variables, it is straightforward to examine effects of change in any parameter on transitory processes as well stationary states of all the variables. We use a variable $\overline{\Delta}x(t)$ to stand for the change rate of the variable $x(t)$ in percentage due to changes in the parameter value.

4.1. More weights being given to the habit stock of children

Values of children for parents are changeable due to so many possible factors such as economic conditions and cultural values, social customs, and traditions. We assume that the

propensity to have children is affected by the habit stock of children. We now study how the economic system will be affected if more weight is given to the habit stock of children is the following way: $v_b : 0.001 \Rightarrow 0.01$. The simulation result is plotted in Figure 2. The propensity to have children is enhanced as people weigh more on the family size in the past. It should be noted that in modern developed economies v_b seems to be declining. As more weight is given to the habit stock of children, the population increased. The birth rate, the habit stock of birth rate and the mortality rate are enhanced. The labor force and national output falls initially and rises in the long term. The rate of interest rises and the wage rates are reduced. The household wealth, consumption level, and opportunity cost of children fostering rise initially and fall in the long term. The parents work less hours and spend more time on taking care of children. The leisure times rise initially and fall in the long term. The propensities to save and to consume fall. The father's and mother's propensities to have leisure fall. The propensity to have children rises.

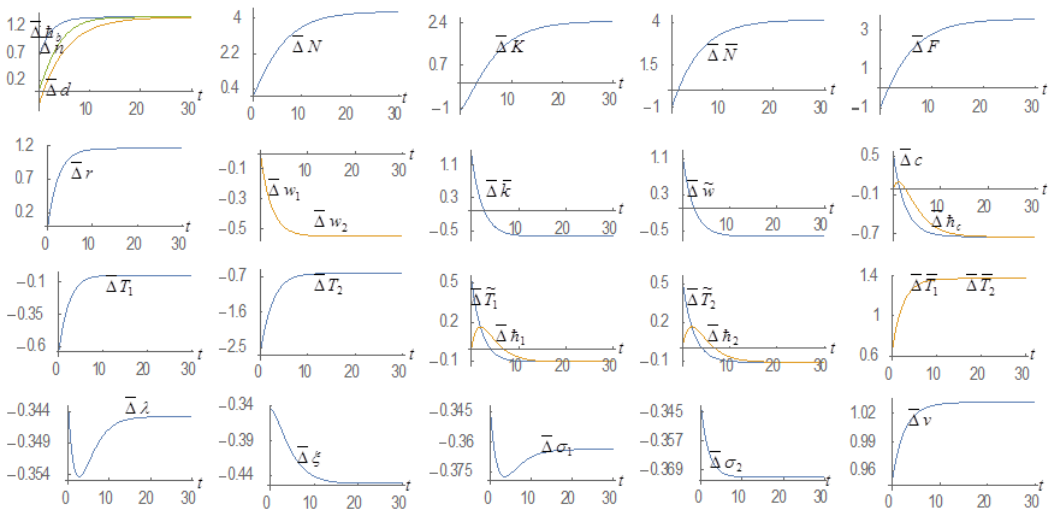

Figure 2: More Weights Being Given to the Habit Stock of Children

4.2. The wife's wage rate having negative impact on the propensity to have children

As the woman's social status and attitudes toward work and children are changed, the family's propensity for children may be influenced. We now allow the wife's wage to have negative impact on the propensity to have children in the following way: $v_2 : 0.001 \Rightarrow -0.005$. This implies that a rise in the mother's wage rate reduces the propensity to have children. The simulation result is plotted in Figure 3. The birth and mortality rates and the population fall. The labor force, national capital stock and national product rise initially and fall in the long term. The rate of interest falls and the wage rates rise. The household wealth, opportunity cost of children fostering, and consumption level fall initially and rise in the long term. The parents increase work hours and reduce hours of children fostering. The parents initially spend less leisure time and more leisure time in the long term. The propensities to save and to consume are enhanced. The father's and mother's propensities to have leisure fall. The propensity to have children falls.

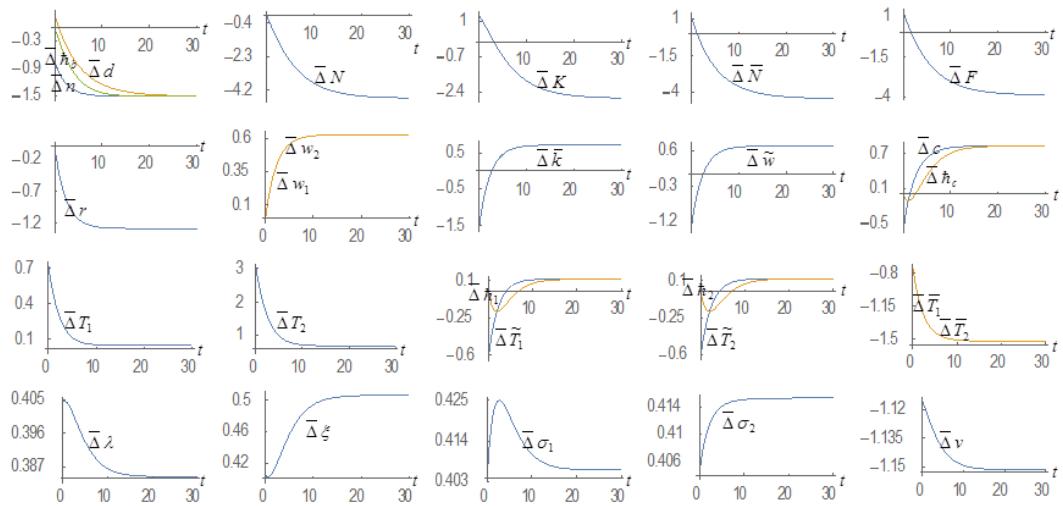

Figure 3: The Wife's Wage Rate Reducing the Propensity to Have Children

4.3. The wife weighing less the habit stock of leisure time

We now study how the national economy and household behavior are affected if women weigh more the habit stock of leisure time in the following way: $\tilde{\sigma}_{22}: 0.001 \Rightarrow -0.001$. The simulation result is plotted in Figure 4. This implies that the mother's habit stock of leisure time has negative impact on the propensity to use leisure time. The birth rate rises. The mortality rate falls initially and rises in the long term. The population, the labor force, national capital stock and national product are enhanced. The rate of interest rises and the wage rates fall. The household wealth, opportunity cost of children fostering, and consumption level are enhanced. The husband works less hours and spends more time on leisure and the wife works more hours and reduces leisure time. The parents initially spend more hours on taking care of children. The propensities to save and to consume are enhanced. The father's and mother's propensities to have leisure fall. The propensity to have children rises.

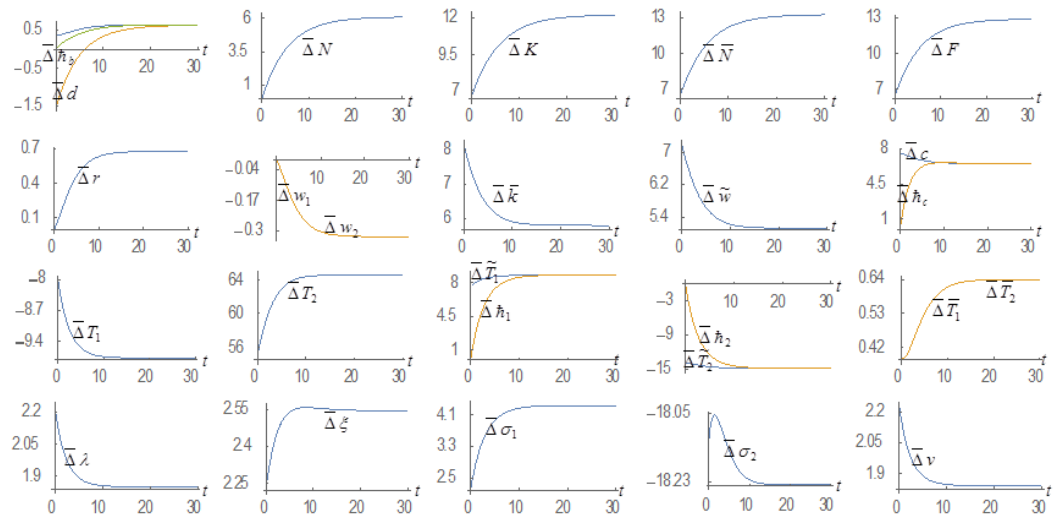

Figure 4: The Wife Weighing Less the Habit Stock of Leisure Time

4.4. The wife's habit stock of leisure time having negative impact on the husband's propensity to use leisure time

We now study how the national economy and household behavior are affected if women weigh more the habit stock of leisure time in the following way: $\tilde{\sigma}_{12}: -0.001 \Rightarrow 0.003$. The simulation result is plotted in Figure 5. The birth rate rises. The mortality rate falls initially and rises in the long term. The population, the labor force, national capital stock and national product are reduced. The rate of interest falls and the wage rates are enhanced. The household wealth, opportunity cost of children fostering, and consumption level are reduced. The husband works less hours and spends more time on leisure and the wife works more hours and reduces leisure time. The parents reduce hours on taking care of children. The propensities to save and to consume are lowered. The father's propensity to have leisure rises and mother's propensity to have leisure falls. The propensity to have children falls.

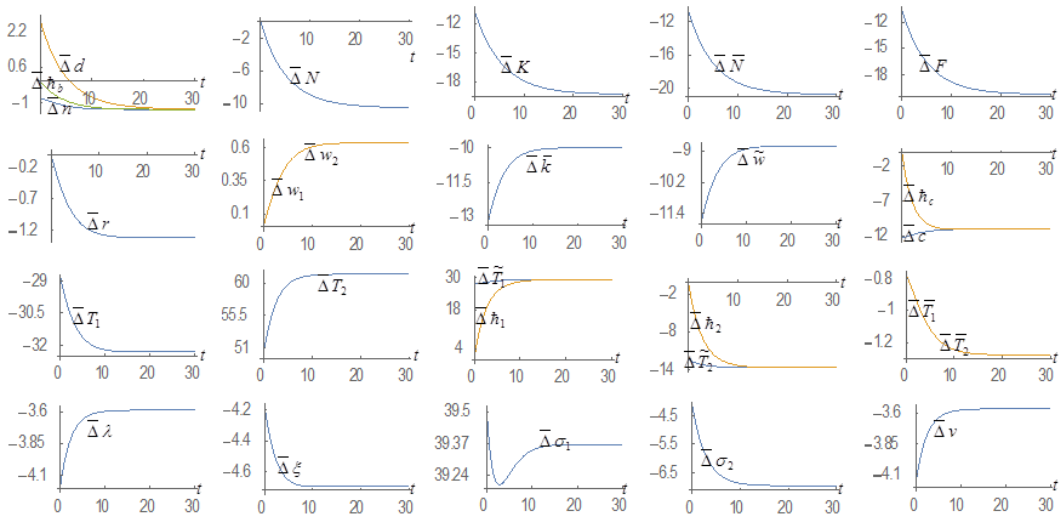

Figure 5: The Wife's Habit Stock of Leisure Time Having Negative Impact

4.5. The wife's wage rate having negative impact on the husband's propensity to use leisure time

We now study how the national economy and household behavior are affected if the wife's wage rate has negative impact on the husband's propensity to use leisure time as follows: $\sigma_{12}: -0.001 \Rightarrow 0.003$. The simulation result is plotted in Figure 6. The birth rate falls. The mortality rate rises initially and rises in the long term. The population, the labor force, national capital stock and national product are reduced. The rate of interest falls and the wage rates are enhanced. The household wealth, opportunity cost of children fostering, and consumption level are reduced. The husband works less hours and spends more time on leisure and the wife works more hours and reduces leisure time. The parents reduce hours on taking care of children. The propensities to save and to consume are lowered. The father's propensity to have leisure rises and mother's propensity to have leisure falls. The propensity to have children falls.

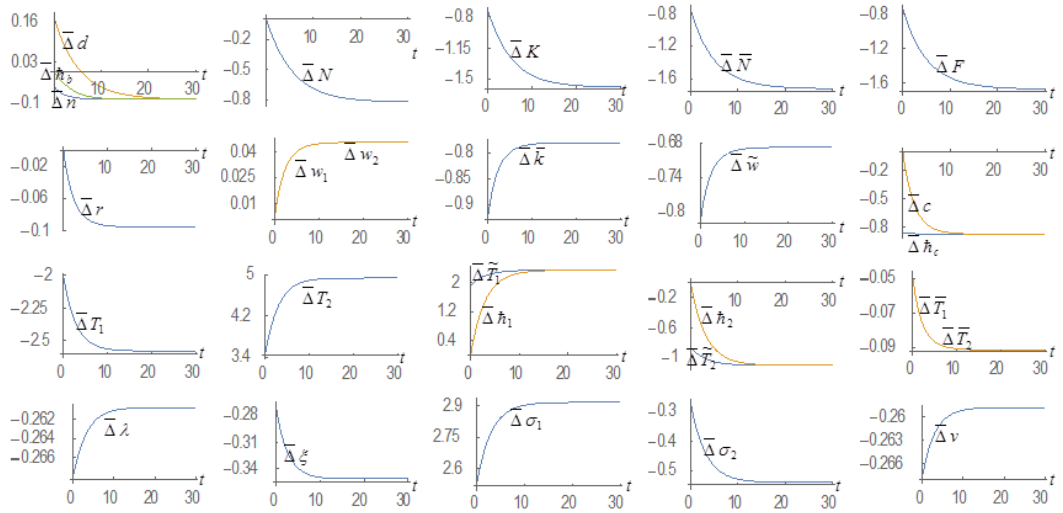

Figure 6: The Wife's Wage Rate Having Negative Impact on the Husband's Propensity to Use Leisure Time

4.6. Woman's human capital being improved

We now enhance the mother's human capital as follows: $h_2 : 2.4 \Rightarrow 2.6$. The results are plotted in Figure 7. As the mother accumulates more human capital, her wage income is increased. As the mother earns more per unit time, she works more and has less leisure time. The opportunity cost of child fostering is increased in association with the mother's wage rising. The father's wage is slightly affected. The father works less and stays longer at home. Both the mother and father shorten time of children fostering. The family consumes more and has more wealth. The capital, total labor input and output are increased. The mortality rate falls in association with improved living conditions. The net impact of falling birth and mortality rates increases the population. The propensity to save is reduced and the propensity to consume is enhanced. The man's propensity to use leisure time is increased and woman's propensity to use leisure time is reduced. The propensity to have children is increased.

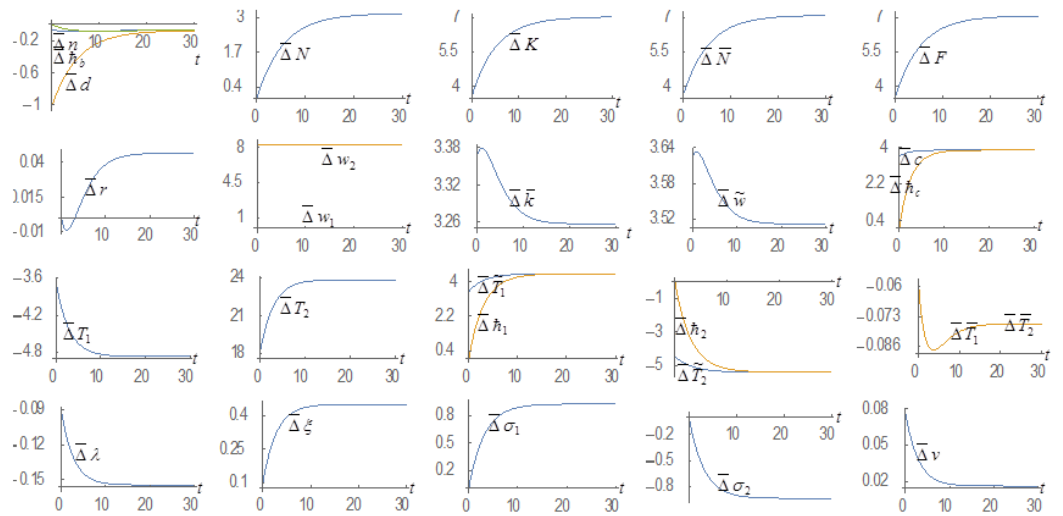

Figure 7: Woman's Human Capital Being Improved

4.7. A rise in the total factor productivity

We now allow the total factor productivity to be increased as follows: $A: 1 \Rightarrow 1.05$. An immediate consequence of the change enhances the output level and wage rates. The household wealth and opportunity cost fall initially and increase in the long term. The birth rate is increased. The mortality rate is reduced initially and enhanced in the long term. Both the man and woman work more hours. They spend less leisure hours and more hours on children caring. The national wealth, the population, the labor input, and national output are augmented. The propensity to save falls. The propensities to consume and to have children are enhanced. The propensities to have leisure rise initially and fall in the long term.

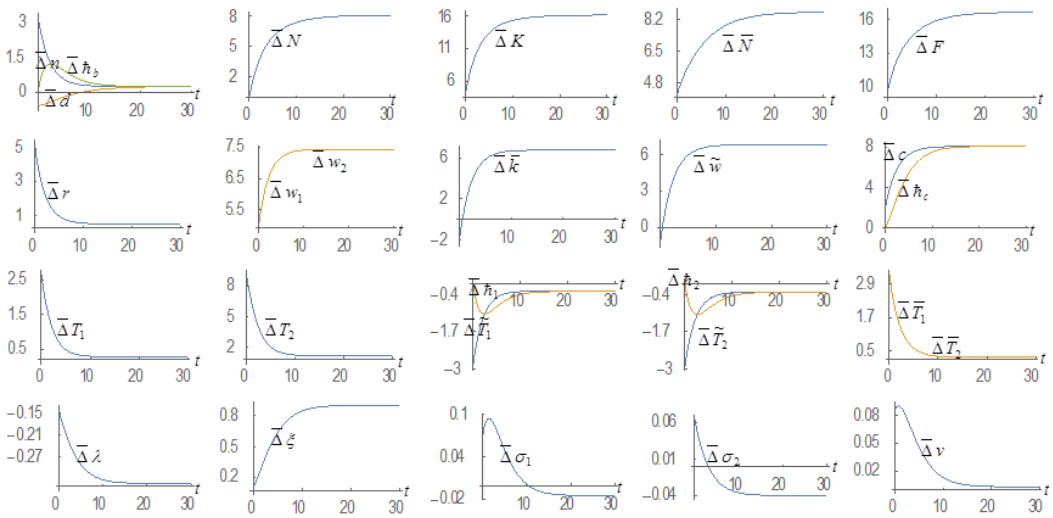

Figure 8: A Rise in the Total Factor Productivity

4.8. The mother spending more time on each child fostering

We now consider that the mother spends more hours with each child as follows: $\theta_2 : 5 \Rightarrow 5.5$. The father's time on children caring is slightly reduced and the mother's time is increased. Both the father and the mother spend less time on leisure. The mother works more hours and the father works less hours. The mother spends more time on child fostering and the father spends less time on child fostering. The wage rates are enhanced. The opportunity cost of children fostering falls initially and is increased in the long term. The household wealth is reduced. The population and the mortality rate fall. The rate of interest falls. The total wealth, total labor input and output are all reduced. The family consumes less.

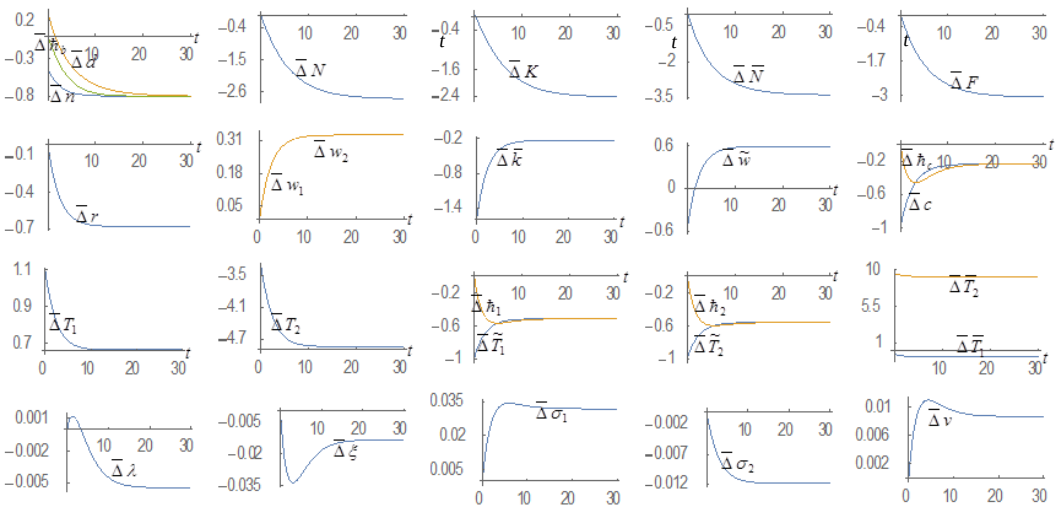

Figure 9: The Mother Spending More Time on Each Child Fostering

5. In conclusion

This study is concerned with economic growth and population change with habit formation and preference change within the analytical framework of the Solow one sector growth model. The study built a model of dynamic interactions between the birth rate, the mortality rate, the population, wealth accumulation, time distribution between work, leisure and children caring, habit formation and preference change. The production technology and markets were built on the Solow growth model. We based our modeling the population dynamics on the Haavelmo population model and the Barro-Becker fertility choice model. This study also took account of habit formation and preference change. Although it is influenced by the Ramsey growth theory with time preference and habit formation, it used Zhang's approach to the household with habit formation and preference change (Zhang, 2012, 2013). The study focuses on interactions among capital accumulation, economic structure, labor and capital distribution, habit formation and time preference in an integrated framework. We synthesized these dynamic forces in a compact framework, using the utility function proposed by Zhang. Analytically, we focus on transitional processes as well as economic equilibrium. As the economic system is given by autonomous nonlinear differential equations, it is not easy to analyze its behavior. We simulated the model to demonstrate the existence of an equilibrium point and motion of the dynamic system. We also examined the effects of changes in weights given to the habit stock of children, the wife's wage rate having negative impact on the propensity to have children, the wife weighing less the habit stock of leisure time, the wife's habit stock of leisure time having negative impact on the husband's propensity to use leisure time, the wife's wage rate having negative impact on the husband's propensity to use leisure time, woman's human capital being improved, a rise in the total factor productivity, and the mother spending more time on each child fostering. Our comparative dynamic analysis provides some insights into the complexity of dynamic processes of economic changes. For instance, when more weight is given to the habit stock of children, the propensity to have children is enhanced the population is increased; the birth rate, the habit stock of birth rate and the mortality rate are enhanced; the labor force and national output falls initially and rises in the long term; the rate of interest rises and the wage rates are reduced; the household wealth, consumption level, and opportunity cost of children fostering rise initially and fall in the long term; the parents work less hours and spend more time on taking care of children; the leisure times rise initially and fall in the long term; the

propensities to save and to consume fall, the father's and mother's propensities to have leisure fall; and the propensity to have children rises. There are many ways to generalize and extend our model. An obvious limitation of our model is that children caring function exhibits constant return to scale in the parent's time spent on children caring. It is possible to generalize our model by applying more general production or utility functions. Our research may also be extended and generalized to study some observed phenomena related to gender, human capital and economic development.

Appendix: Proving the lemma

We now show that the dynamics can be expressed by differential equations. From (3), we get

$$z \equiv \frac{r+\delta_k}{w} = \frac{\tilde{\alpha}\,\bar{N}}{K}, \qquad \text{(A1)}$$

where $\tilde{\alpha} \equiv \alpha/\beta$. Insert (A1) in (2) and (3)

$$r = \alpha A\left(\frac{z}{\tilde{\alpha}}\right)^{\beta} - \delta_k, \quad w = \beta A\left(\frac{\tilde{\alpha}}{z}\right)^{\alpha}, \quad w_1 = w h_1, \quad w_2 = w h_2. \qquad \text{(A2)}$$

We treat r, w and w_q as functions of z. From the definition of $\bar{y}$ and (3) we have

$$\bar{y} = (1+r)\bar{k} + h_0\, w, \qquad \text{(A3)}$$

were $h_0 \equiv (h_1 + h_2)T_0$. Use (8) and (11)

$$T_q = T_0 - \bar{T}_q - \tilde{T}_q = T_0 - \left(\frac{\theta_q \upsilon}{\tilde{w}} + \frac{\sigma_q}{w_q}\right)\bar{y}. \qquad \text{(A4)}$$

Insert (A3) in (A4)

$$T_q = \chi_q - \frac{\tilde{r}_q \bar{k} + \bar{r}_q}{\tilde{w}} - r_q \bar{k}, \qquad \text{(A5)}$$

where

$$\chi_q = T_0 - \frac{h_0\, w\sigma_q}{w_q}, \quad \tilde{r}_q \equiv \theta_q \upsilon(1+r), \quad \bar{r}_q \equiv h_0\, \theta_q \upsilon w, \quad r_q \equiv \frac{(1+r)\sigma_q}{w_q}.$$

Insert (A5) in (1)

$$\frac{\bar{N}}{N} = h_1 T_1 + h_2 T_2 = \chi - \frac{\tilde{r}\bar{k} + \bar{h}_0}{\tilde{w}} - \tilde{r}_0 \bar{k}, \qquad \text{(A6)}$$

where

$$\chi \equiv h_1 \chi_1 + h_2 \chi_2, \ \ \tilde{r} \equiv h_1 \tilde{r}_1 + h_2 \tilde{r}_2, \ \ \bar{h}_0 \equiv h_1 \bar{r}_1 + h_2 \bar{r}_2, \ \ \tilde{r}_0 \equiv h_1 r_1 + h_2 r_2.$$

From (16) we have

$$\bar{\lambda}\, \bar{y} - \delta \bar{k} = \frac{F}{N}, \qquad \text{(A7)}$$

where $\bar{\lambda} \equiv \lambda + \xi$ and $\delta \equiv 1 - \delta_k$. Insert (A3) and (3) in (A7)

$$\left(\bar{\lambda} + \bar{\lambda}\, r - \delta\right)\bar{k} + \bar{\lambda}\, h_0\, w = \frac{w \bar{N}}{N \beta}. \qquad \text{(A8)}$$

Insert (A6) in (A8)

$$\left(\frac{\left(\bar{\lambda} + \bar{\lambda}\, r - \delta\right)\beta}{w} + \tilde{r}_0\right)\bar{k} + \frac{\tilde{r}\, \bar{k} + \bar{h}_0}{\tilde{w}} + \beta\, \bar{\lambda}\, h_0 - \chi = 0. \qquad \text{(A9)}$$

From $\tilde{w} = \bar{k} + h w$ and (A9), we have

$$\bar{k}^2 + \tilde{m}_1 \bar{k} + \tilde{m}_2 = 0, \qquad \text{(A10)}$$

where

$$\tilde{m}_1\left(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, \bar{k}\right) \equiv \frac{\left(\bar{\lambda} + \bar{\lambda}\, r - \delta\right)h \beta + \tilde{r}_0\, h w + \beta\, \bar{\lambda}\, h_0 - \chi + \tilde{r}}{\tilde{m}},$$

$$\tilde{m}_2\left(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, \bar{k}\right) \equiv \frac{\bar{h}_0 + \left(\beta\, \bar{\lambda}\, h_0 - \chi\right)h w}{\tilde{m}},$$

$$\tilde{m}\left(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, \bar{k}\right) \equiv \frac{\left(\bar{\lambda} + \bar{\lambda}\, r - \delta\right)\beta}{w} + \tilde{r}_0.$$

Under this requirement it is straightforward to see that $\tilde{m}_1$, $\tilde{m}_2$, and $\tilde{m}$ are independent of $\bar{k}$. We solve (A10), treating $\bar{k}$ as the variable

$$\bar{k} = \Omega\left(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N\right) \equiv \frac{-\tilde{m}_1 \pm \sqrt{\tilde{m}_1^2 - 4\tilde{m}_2}}{2}. \qquad \text{(A11)}$$

From (A11) we determine $\bar{k}$ as a function of z, $\hbar_c$, $\hbar_{hq}$, and $\hbar_b$. We follow the following procedure to determine the variables as functions z, $\hbar_c$, $\hbar_{hq}$, $\hbar_b$, and N: $\bar{k}$ by (A11) $\rightarrow$ r and w_q by (A2) $\rightarrow$ $\bar{y}$ by (A3) $\rightarrow$ c, s, $\tilde{T}_q$, and n by (11) $\rightarrow$ $\bar{T}_q$ by (6) $\rightarrow$ T_q by (A4) $\rightarrow$ $\bar{N}$ by (1) $\rightarrow$ K by (A1) $\rightarrow$ F by (2). From this procedure, (13), (15), (17), (21), and (22), we have

$$\dot{\hbar}_c = \tilde{\Omega}_c(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N),$$
$$\dot{\hbar}_{Tq} = \tilde{\Omega}_q(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N),$$
$$\dot{\hbar}_b = \tilde{\Omega}_b(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N),$$
$$\dot{N} = \tilde{\Omega}_N(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N), \qquad \text{(A12)}$$
$$\dot{\bar{k}} = \tilde{\Omega}_k(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N). \qquad \text{(A13)}$$

We don't provide explicit expressions of the above equations as the expressions are tedious. From (A11), we have

$$\dot{\bar{k}} = \frac{\partial \Omega}{\partial z}\dot{z} + \frac{\partial \Omega}{\partial \hbar_c}\dot{\hbar}_c + \frac{\partial \Omega}{\partial \hbar_{h1}}\dot{\hbar}_{h1} + \frac{\partial \Omega}{\partial \hbar_{h2}}\dot{\hbar}_{h2} + \frac{\partial \Omega}{\partial \hbar_b}\dot{\hbar}_b + \frac{\partial \Omega}{\partial N}\dot{N}. \qquad \text{(A14)}$$

Insert (A12) in (A14)

$$\dot{\bar{k}} = \frac{\partial \Omega}{\partial z}\dot{z} + \tilde{\Omega}_c\frac{\partial \Omega}{\partial \hbar_c} + \tilde{\Omega}_1\frac{\partial \Omega}{\partial \hbar_{h1}} + \tilde{\Omega}_2\frac{\partial \Omega}{\partial \hbar_{h2}} + \tilde{\Omega}_b\frac{\partial \Omega}{\partial \hbar_b} + \tilde{\Omega}_N\frac{\partial \Omega}{\partial N}. \qquad \text{(A15)}$$

From (A13) and (A15) we solve

$$\dot{z} = \tilde{\Omega}_z(z, \hbar_c, \hbar_{h1}, \hbar_{h2}, \hbar_b, N)$$
$$\equiv \left(\tilde{\Omega}_k - \tilde{\Omega}_c\frac{\partial \Omega}{\partial \hbar_c} - \tilde{\Omega}_1\frac{\partial \Omega}{\partial \hbar_{h1}} - \tilde{\Omega}_2\frac{\partial \Omega}{\partial \hbar_{h2}} - \tilde{\Omega}_b\frac{\partial \Omega}{\partial \hbar_b} - \tilde{\Omega}_N\frac{\partial \Omega}{\partial N}\right)\left(\frac{\partial \Omega}{\partial z}\right)^{-1}. \qquad \text{(A16)}$$

We thus proved the lemma.

6. Acknowledgements
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(http://ideas.repec.org/top/top.person.anbpages.html)

FOREIGN DIRECT INVESTMENT AND TECHNOLOGICAL INNOVATION IN DEVELOPING COUNTRIES

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Abstract: *A large number of countries have enacted laws aimed at making it easier for firms to invest in their country, while many countries offer various monetary incentives and tax incentives to encourage inward Foreign Direct Investment (FDI). The desire to attract FDI is due not only to the fact that FDI brings in new investment boosting national income and employment, but also due to the expectation that inward FDI would also provide additional spillover benefits to the local economy that can result in higher productivity growth and increased export growth. This study aims to examine the impact of foreign direct investment on innovation in developing countries. The estimation of a panel threshold model on a sample of 54 developing countries for the 1980-2009 period shows the presence of non linear effects in the relationship between FDI and innovation. We find a threshold value of technological development below which FDI has a negative impact on innovation and above which FDI has a significant positive impact on innovation. We conclude that it is not enough for economic policy to attract foreign investments, it is still necessary to support domestic firms to build an absorptive capacity allowing them to enjoy the benefits of multinational firms.*

Keywords: foreign direct investment; innovation; absorptive capacity; non linear relationship.

JEL Classification: O3.

1. Introduction

Theoretical contributions have long established that innovation promotes economic development (e.g., Aghion and Howitt, 1992; Romer, 1990). The empirical evidence similarly suggests that technological progress, national innovative capacity and the productivity gains associated with innovation are important sources of economic growth (e.g., Geroski, 1989; Fagerberg et. al., 2007). Due to the beneficial role of technological progress in economic growth and development, further scholarly contributions have set out to identify the national determinants of innovation. These studies have found that innovation is not only positively influenced by factors directly associated with the generation of new knowledge such as R&D spending, the quality of education and specialization in industrial clusters but also by a nation's common innovation infrastructure, i.e., the economic and institutional environment (Grilliches, 1990; Aghion, 2004; Furman et. al., 2002; Varsakelis, 2006).

In this contribution we examine an economic element of a nation's innovation infrastructure: the Foreign Direct Investment (FDI). Indeed, a number of theoretical contributions emphasize the benecial effect of foreign investment on innovation and, ultimately, economic growth (Berger and Diez, 2008; Blomstrom and Kokko, 2002). Foreign investment is assumed to affect the domestic economy by bringing in much needed capital, new technologies, marketing techniques and management skills, and by bringing in secondary spillovers to the host economy that affects the performance of domestic firms. Such spillovers can arise due to the leakage of the MNCs proprietary knowledge or due to the

response of domestic firms to the arrival of foreign firms. Such spillovers -if present- are likely to affect the productivity of domestic firms in the same industry, but can also have effects on wages and market access, as well as productivity in upstream and downstream industries.

Due to the increasing importance of FDI, an empirical literature has developed examining its impact on economic performance in the host economy. Our study aims to enrich existing literature by examining the impact of FDI on innovation for 54 countries between 1980 and 2009. We suppose the presence of non linear effects in the relation FDI / innovation and estimate a panel threshold model developed by Hansen (1999). Our findings show that foreign investment allows to stimulate innovation only in countries with a high level of technological development. In sum, our findings suggest that economic policy should support domestic firms to build an absorptive capacity in order to enjoy the benefits of Multinational Companies.

This paper is organized as follows. In Section 2 we discuss the linkages between foreign direct investment and national innovative activity. In Section 3 we introduce the data and empirical methodology. Our empirical findings are presented and discussed in Section 4. Section 5 concludes.

2. Survey of the Literature

FDI may influence the technological innovation in host countries through several mechanisms: backward linkages, forward linkages, competitive effect, demonstration effect, effects on human capital formation and dissemination of knowledge through brain (Berger and Diez, 2008).

- Backward linkages

Multinational Companies (MNC) will provide inputs and services from domestic sources. These links are considered good opportunities for spillovers of MNC (Altenburg, 2000). In this case, the subsidiaries of MNCs provide information on international quality standards and can even support local providers through financial assistance, technology transfer, training and sharing of information and knowledge (UNCTAD, 2001).

- Forward linkages

Subsidiaries of the MNC sell products to domestic customers inducing therefore the knowledge transfer (especially in case of sale of capital equipment) through offering training in order to learn the operation and maintenance of the equipment.

- The competitive effect

MNC often enter domestic markets and compete with local firms. This can motivate domestic firms to increase their efforts to improve technologies which allow them to increase competitiveness. However, this competitive effect can threaten domestic firms to be driven from the market (crowding out effect).

- The demonstration effect

Subsidiaries of MNCs are distinguished by the high quality of their technology and management practices. Domestic companies are likely to benefit if they proceed to the observation, copying and adaptation of these technologies and practices.

- The effects on human capital formation

Subsidiaries are related to national research and education institutions to ensure an adequate supply of human resources. In this case, the MNC offer funding to students and access to new technologies (Blomstrom and Kokko, 2002). Furthermore, employment opportunities in the subsidiaries of MNCs may encourage students to choose science and technology streams. As long as MNC do not absorb all the graduates, this can increase the availability of highly skilled labor.

- The dissemination of knowledge through the staff mobility

MNC are characterized by the use of advanced technologies and the application of modern management practices. Their staff learns by doing and receive additional training in order to meet the skills requirements. Thanks to the mobility of labor, knowledge and skills are disseminated in the host economy (Altenburg, 2000). In addition, former employees can use this knowledge to establish their own businesses, thus enriching the economic structure (UNCTAD, 2001).

However, technological spillovers generated by foreign firms to domestic firms may be lower than expected. Indeed, sometimes MNC are not willing to transfer the most advanced technology because they fear the loss of intellectual property and future competition of companies that learn new technologies (Hayter and Han, 1998). From the perspective of the MNC, it will be rational to transfer the most obsolete technology. These old technologies have additional benefits. They are less complicated and require less skilled employees in the host country, they are less expensive and easier to explain.

The limits of success of technology transfer from MNC also exist on the side of the host country. In fact, technological capabilities of the beneficiary companies in developing countries and skills of their employees often prevent immediate understanding of advanced technologies (Cohen and Levinthall, 1990). In addition, communication barriers (various languages and ways of individual interaction) may impede the efficient transfer of technology.

Given these arguments, it is not surprising that despite the possible benefits from international technology transfer, the results of empirical works on the impact of FDI on innovation are mixed. In what follows, we review literature according to three groups of studies: those which find positive effects, those which find negative effects and those which show a non linear effects in the relationship between FDI and innovation.

In the first group, we cite the study of Sjoholm (1999) who shows that FDI is beneficial for companies in Indonesia. Cheung and Lin (2004) found positive effects of FDI on the number of patents in China. Using data on Japanese FDI into the United States, Branstetter (2001) finds evidence that FDI encourages technology spillovers through subsidiaries bringing technology from their countries of origin and through MNCs facilitating learning of foreign technologies. Keller and Yeaple (2009) using data on US manufacturing firms over the period 1987-1996 show that spillovers from foreign multinationals to US firms can explain a significant part of US manufacturing productivity growth. Kokko (1996) and Driffield (1999) find evidence of positive competition effects for Mexico and the UK respectively.

By contrast, in the second group of papers, Aitken and Harrison (1999) found that foreign participation in the capital of the company in Venezuela is positively correlated with productivity in the case of small businesses only. However, they did not find spillovers effects associated with joint ventures for companies without foreign participation with lower productivity due to FDI. Chen (2007) also showed that spillovers effects in China are not as significant as he thought. Indeed, he found that the impact of FDI on regional innovation capacity is weak: The entry of FDI is not important in improving indigenous innovation capacity. Furthermore, inflows of FDI can have effects of crowding out on innovation and national R&D activity. Using the population of UK manufacturing firms, Haskel et. al., (2007) find that spillovers are positive and economically significant along industry lines, but find no significant evidence of spillovers occurring along regional lines.

The third group of studies state that technology transfer through FDI requires absorptive capacity of host nations. Absorptive capacity of a firm is “the ability to recognize the value of new information, assimilate it, and apply it to commercial ends” (Cohen and Levinthal, 1990: 128). Monastiriotis and Alegria (2011) find a significant effect of technological distance between investing nation and host nation, and internalization capacity of host nation in the processes of technology transfer via FDI. Yokota and Tomohara (2010) report that

technology transfer through FDI is related to host countries' skilled work force capital. Similarly, Sinani and Klaus (2004) investigate the relationship between foreign presence and productivity through host nation's human capital and emphasize human capital's catalyst effect to this association. Xu (2000) provides a study comparing FDI impacts caused by US multinational enterprises on a host country's national productivity level between developed and developing countries. After performing a longitudinal analysis using the data collected from 40 countries from 1966 to 1994 in which US MNEs have been operating, she finds that US MNC contributes to the productivity growth in developed countries but not in low developed countries.

Considering the literature review above, we suppose a non linear relationship between FDI and innovation. We assume that the impact of foreign investment inflows on innovation depends on the nation's absorptive capacity.

3. Methodology

3.1 Sample description

Our sample includes 54 developing countries: Algeria, Argentina, Bangladesh, benin, Bolivia, Brazil, Burundi, Cameroon, Chile, Colombia, Congo, Costa Rica, Dominican Republic, Equador, Egypt, El Salvador, Fiji, Gabon, Ghana, Guatemala, Haiti, Honduras, Indonesia, Iran, Jamaica, Jordan, Kenya, Malawi, Malaysia, Mali, Maurice, Mexico, Morocco, Nepal, Nicaragua, Niger, Pakistan, Panama, Paraguay, Perou, Philippines, Senegal, Sierra Leone, South Africa, Sri Lanka, Syria, Thailand, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Zambia, Zimbabwe.

The study uses data for 6 periods: 1980-1985; 1985-1990; 1990-1995; 1995-2000; 2000-2005; 2005-2009.

3.2 Data

We have collected variables in every 5 years for the 1980–2009 period.We use the number of patent applications filed in US Patent and Trademark Office (USPTO) as a measure of innovation, denoted by **PAT**. To measure foreign direct investment, we use the share of FDI inflows in GDP (**FDI**). Data are from Word Development Indicators. The absorptive capacity is measured by the level of technological development. We use per capita GDP, denoted by **GDP**. The data on PPP converted GDP per capita, at 2005 constant prices come from Penn World Table.

Three control variables are used in this study: human capital, institutions and country's size. The new growth theories are considered the most significant to explain innovation and economic growth at the macro level by the human capital factor (Aghion and Howitt, 1998). Furman et. al. (2002), Ulku (2007) and Gumbau Albert and Maudos (2009) found a positive relationship between levels of human capital and innovation.

To measure human capital stock, we use the variable **EDUC**: It's the educational attainment for population aged 15 and over at the secondary level. These ratios are collected from Barro and Lee database.

Sala-i-Martin (2002) argues that it is difficult to create new and better technologies if an economy has not good institutions. Mahagaonkar (2008) shows a negative relationship between corruption and innovation.Tebaldi and Elmslie (2013) confirmed a positive link between the quality of economic institutions and innovation.

We have data on measures of economic freedom, **EF**, from Fraser Institut. The freedom index ranges from 0 to 10, with a higher index indicating a higher level of economic freedom. Pritchett (1996) recognizes four reasons why a large population could be useful for the increasing of productivity: innovation by population pressures, b) innovation produced by greater numbers, c) scale economies, d) agglomeration economies. Lerner (2002), Furman

et. al. (2002) and Chen and Puttitanun (2005) found a positive impact of country size on technological innovation.
The size of country is measured by number of population **POP**. Data for this variable are from Word Development Indicators.
Variables PAT, GDP and POP are in natural logarithme. Qualitative variables and those expressed as a percentage are not transformed in log (Furman et. al., 2002).
Summary statistics for the six variables are given in Table 1.

Table 1: Summary statistics

	Mean	Median	Stand. dev	Minimum	Maximum
PAT	17,61	2	49,584	0	383,4
FDI	1,845	1,229	2,351	-5,281	20,906
GDP	4065,17	3449,651	3019,9	310,92	12283,29
EDUC	26,62	25,65	14,368	1,6	72,5
EF	5,539	5,592	1,164	1,781	7,921
POP	29262035,3	12779953,6	40862784	668032,8	232328289

3.3 Panel Threshold Model

According to Hansen (1999), a threshold model with r regimes is defined as follow:
$Y_{it} = \alpha_i + \beta X + \delta_1 c_{it}\, I(d_{it} \le \gamma_1) + \delta_2 c_{it}\, I(\gamma_1 < d_{it} \le \gamma_2) + \dots \delta_r c_{it}\, I(\gamma_{r-1} < d_{it}) + \varepsilon_{it}$ (**1**)
où $\gamma_1 < \gamma_2 < \dots < \gamma_{r-1}$.
For the purpose of the present study, we construct the single threshold model as follows:
$Y_{it} = \alpha_i + \beta X + \delta c_{it} * I(d_{it} \le \gamma) + \theta c_{it} * I(d_{it} > \gamma) + \varepsilon_{it}$ (**2**)
Y_{it} represents dependant variable (PAT), c_{it} is foreign direct investment, d_{it} is the threshold variable: the level of technological development (GDP); and γ is the estimated threshold value. X is a vector of four variables: GDP, EDUC, EF, POP. α_i: the fixed effect which represents the heterogeneity of companies under different operating conditions. I(.) is an indicator function. The error term ε_{it} is independent and identically distributed with zero mean and finite variance o^2. The subscript i stands for the cross-sections (i = 1, 2,…54) and t indexes time (t = 1, 2,…6). Specification (2) highlights two regimes: one regime for which the variable d_{it} is less than or equal to the threshold γ and a second regime for which the variable d_{it} is greater than the threshold γ. Our equation (2) can be rewritten as follows:

$$\begin{cases} Y_{it} = \alpha_i + \beta X + \delta d_{it} & \text{si } d_{it} \le \gamma \quad (\mathbf{3}) \\ Y_{it} = \alpha_i + \beta X + \theta d_{it} & \text{si } d_{it} > \gamma \quad (\mathbf{4}) \end{cases}$$

To estimate this model, we first eliminate the individual effect α_i using the within transformation estimation techniques in the traditional fixed effect model of panel data. By using the ordinary least squares and minimizing the concentrated sum of squares of errors, S1(γ) , we can obtain the estimators of our threshold value and the residual variance, $\hat{\gamma}$ and ô2, respectively.
The second step will consist in testing the null hypothesis of linearity, H0: δ = θ which can be based on the likelihood ratio test:

$F1 = (S0 - S1(\hat{\gamma})) / ô2,$

S0 is the sum of squared errors under H0 and S1 the sum of squared residuals under H1. However, as the asymptotic distribution of F1 is non standard, we use the procedure of bootstrap to construct the critical values and p-value.
Upon the existence of threshold effect, H0: δ = θ, we should test for the asymptotic distribution of threshold estimate, H0: $\gamma = \gamma_0$, and adopt the likelihood ratio test:

LR1 (γ) = (S1(γ) - S1($\hat{\gamma}$)) / ô2 with the asymptotic confidence intervals:

c (α) = −2log(1− $\sqrt{1-\alpha}$).

The panel threshold model is estimated by the computer program Matlab 2012.

4. Findings

Table 2 presents the test statistics F1, F2, and F3, along with their bootstrap p-values. It shows that the tests for a double threshold F2 and a triple threshold F3 are insignificant with a bootstrap p-value of 0,2 and 0,545 respectively. Only the test for a single threshold F1 is significant with a bootstrap p-value of 0,035. Thus, we conclude that foreign direct investments have only one threshold effect on country innovation.

The point estimate of the threshold ($\hat{\gamma}$) is 5620,486 PPP and his asymptotic confidence interval is [4547,862 ; 5885,592].

Table 2: Tests for threshold effects

Single threshold effect test	
Threshold value	5620,486
F1	25,571
P-value	0,035
(Critical value of F 10%, 5%, 1%)	(16,2 ; 20,4 ; 32,2)
Double threshold effect test	
Threshold values	812,378 ; 5620,486
F2	12,063
P-value	0,2
(Critical value of F 10%, 5%, 1%)	(16,6 ; 20,4 ; 26,3)
Triple threshold effect test	
Threshold values	594,272 ; 812,378 ; 5620,486
F3	5,583
P-value	0,545
(Critical value of F 10%, 5%, 1%)	(12,6 ; 14,6 ; 15,8)

More information can be learned about the threshold estimate from plot of the concentrated likelihood ratio function LR1(γ) in Figure 1.

Figure 1 LConfidence Interval Construction in Single Threshold Model

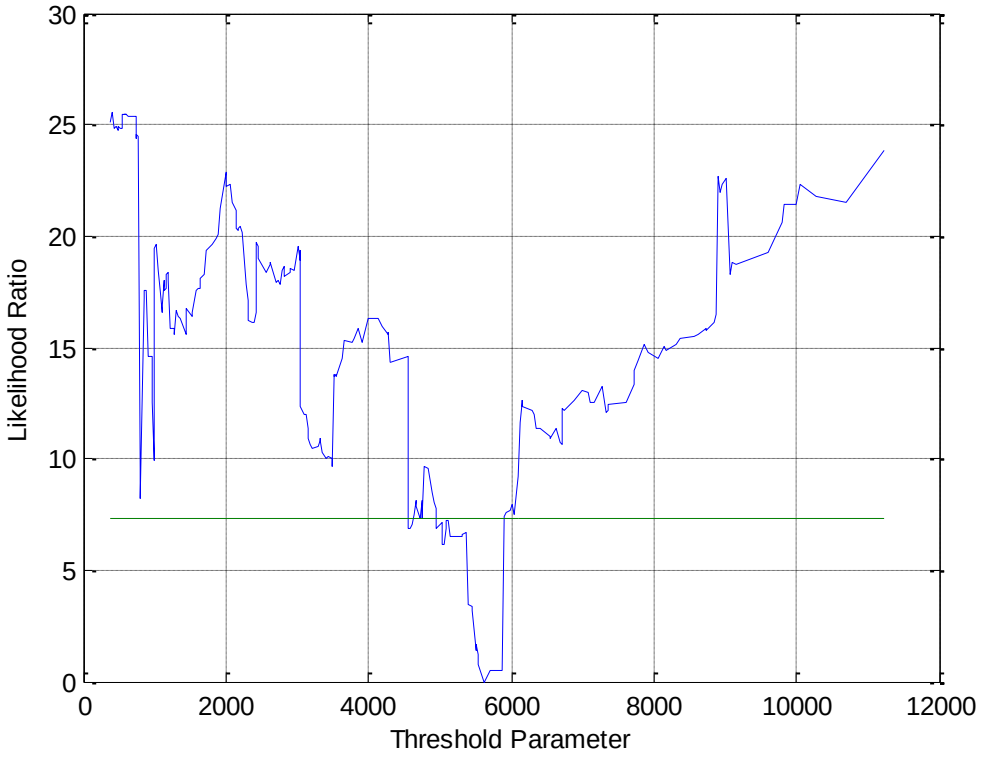

Table 3 : Estimation of coefficients

	Coefficient	**OLS SE**	**T(OLS)**	**White SE**	**T(White)**
GDP	0,665	0,224	2,96***	0,234	2,84***
EDUC	0,018	0,006	3***	0,006	3***
EF	0,056	0,046	1,21	0,035	1,6
POP	0,437	0,254	1,72*	0,254	1,72*
FDI I(GDP <= 5620,486)	-0,057	0,027	-2,11**	0,019	-3***
FDI I(GDP > 5620,486)	0,094	0,03	3,13***	0,025	3,76***

Table 3 reports estimation results of the panel threshold model. It shows that FDI affects significantly the level of innovation. However, this impact is different depending on the regime. In the first regime, where the level of technological development is less than or equal to the threshold value (5620,486 PPP), the effect of FDI is negative and significant. In the second regime where countries are characterized by a high level of economic development, the effect is positive and significant at 1%. In the first class, when the share in GDP of inflows of foreign investments increases by 1 %, the number of patent applications filed in the USPTO decreases by 0,057%. On the other hand, in the second regime, an increase of 1% in FDI inflows allows an increase of 0,094 % in number of patent applications. Thus, we find that only countries with a high level of economic development can benefit in terms of innovation from the increase in the level of foreign direct investment. As expected, our results confirm the nonlinear relationship between the foreign investments and the level of technological innovation. They are consistent with those of Sinani and Klaus (2004) and

Monastiriotis and Alegria (2011). These results highlight that advantages of foreign direct investments are not automatic. They require an initial outlay in terms of investment in machinery, tools and human capital training. Absorptive capacity of host countries is very crucial to benefit from advanced technology and other assets of foreign firms.
For the control variables, the GDP per capita, the education level and the size of the country have a positive and significant impact on innovation. The institutional framework is not significant. We find that the effect of GDP per capita is positive and significant. This result is consistent with that found by Furman et. al. (2002) and Hu and Mathews (2005). Interpreting the coefficient as elasticity, a 10% increase in GDP is associated with a 4,66 % rise in international patent output. As suggested by proponents of endogenous growth, a country's existing level of technological sophistication plays a key role in determining innovative output.
The coefficient for EDUC is positive (0,018) and significant. This result highlights the importance of the stock of human capital for innovation. Population has a positive and significant sign. This result shows the presence of scale economies.
In contrast to these findings, the impact of the economic freedom index is not significant. This implies that the institutional environment in developing countries is unfavourable to innovative activity.

5. Conclusion

The purpose of this paper is to examine the effect of foreign direct investment on innovation in developing counries. The estimation of panel threshold model shows the presence of non linear effects in the relationship between FDI and innovation. We find a threshold value of technological development below which FDI have a negative impact on innovation and above which FDI have a significant positive impact on innovation. The results imply that the strength of the FDI effect on innovation capabilities depends upon the absorptive capacity of and the complementary assets in the domestic sector.
The present study has important implications. First, the significant presence of threshold effects calls into question the relevance of any econometric specification assuming a linear relationship between FDI and innovation. Second, it is not enough for economic policy to attract foreign investments, it is still necessary to build in domestic firms an absorptive capacity in order to enjoy the benefits of multinational firms.

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Bio-note

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THE RELATIONSHIP BETWEEN INCOME AND HEALTH. COMPARATIVE STUDY ROMANIA VS. UKRAINE

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Abstract: *The hereby work plans on analysing to what extent the life expectancy is subject to the influence by different markers, like: GDP, the percentage of GDP allocated for the health system, as well as the income level in Romania and Ukraine. We consider that a comparative analysis between the two countries is representative since, as it results from the data and the diagrams presented within the work, both the GDP evolution and the percentage allocated from GDP for the health system reveal a different evolution, ranging in both countries, unlike the life expectancy going through an ascending trend, slow for both cases. Partially considering the specialized literature in use, our attention was drawn towards the evolution of the income obtained by the people. More precisely, commencing from Keynes' Basic Psychological Law stipulating that along with the income growth the expenditure on health, education and training the human resource will increase, we have chosen to econometrically test these theories for Romania and Ukraine. Therefore, we would like to research, using a simple linear regression model, whether the income growth, which represents the independent variable, obtained by the people, has a significant contribution in life expectancy (the dependent variable) increase in Romania, as well as in Ukraine.*

Keywords: life expectancy; GDP; individual income; wage.

JEL classification: C12; I12.

1. The connection between income and life expectancy of the population

The connection between the costs-income levels but especially consumption, was greatly covered during the years. The most popular writing in this sense is The Fundamental Psychological Law formulated by the renowned English economist John M. Keynes, according to which "as a general rule, and in average, people tend to increase consumption when income is higher, but not by how much the income has risen" (Florea, 2008: 64).
Analyzing this we must not overlook the fact that in Romania, most part of individuals spend their personal gains on assuring the bare necessities as Maslow's pyramid shows. Supply of energy and home consumption warm water is one of the primary needs of economic agents, which is a significant percentage from the basic costs of the population.
About the variations of demand based on income F. Engel, economist and statistician, wrote a series of observations currently found in the literature under the name of "Engel's laws", as follows: according to the first law, the greater the income, the greater the provision costs but only in absolute value, because in relative value there is a decrease recorded. In the second and third laws, Engel considers that the share of expenses for clothing, fuel, household and illumination will stay the same irrespective of the income share only to state in his fourth law

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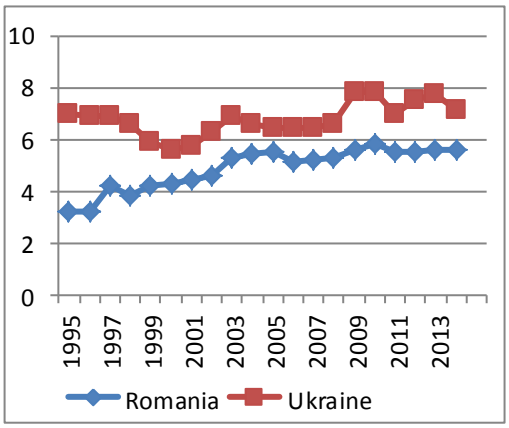
that the sundry expenses will shift depending on the fluctuations registered by income. These laws came to life after various economical-statistical investigations but the present conclusion is that only the first and last of the laws are working in the existing economic context.

Also supported by economic investigations, the economists Pranab Bardhan and Christopher Udry (Bardhan and Udry, 2009) have identified a series of economical-social implications resulted after the alteration of the available income in a positive sense. They have conducted various studies and investigations both in developed countries and in developing ones concluding that in the developed countries the income increase would determine increase of expenses with health, education and updating human capital, as well as with raising and education of children. In the developing countries, costs go to health and the acquisition of high technology goods. For the latter, it was concluded that there is a reverse relation between the available income and peoples' desire to emigrate. From the category of negative effects of economic growths, the most frequent is the decrease of the rate of reproduction both in developing countries and especially in the developed ones.

Another no less interesting angle is the one presented by the economists Costea Carmen, Popescu Constantin and Taşnadi Alexandru, who stated that there is a direct proportional connection between the income level and the number of healthy days. In other words, "a higher wages means a greater stock of health" (Costea, Popescu and Taşnadi, 2010: 350).



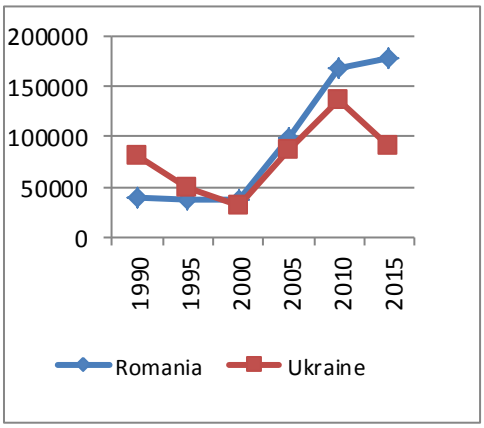


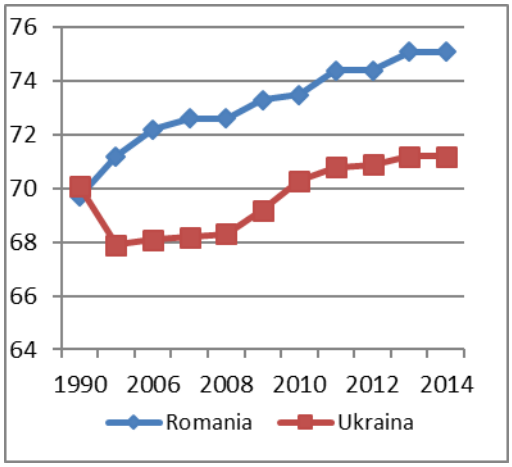
Figure 1: Total expenditure on health % of GDP in Romania vs. Ukraine

Figure 2: GDP at market prices (current as US$-billion) in Romania vs. Ukraine

Source: Figures drawn up by the authors based on the data published on the World Health Organization website available online at http://apps.who.int/nha/database/Key_In-dicators_by_Country/Index/en, accessed on the 11th of July, 2016

In the above presented figures, it is obvious that, in both cases studied, life expectancy was on a rising trend. Now we are well aware that this owes to the new discoveries made in medicine, techniques, technology, diet, which, at least in the analyzed countries, is plentiful. As we speak more and more about how our present way of life is not quite a healthy one, that our diet contains many substances bad for us, we wished to see if hope for a healthy life has increased at the same time with life expectancy in general (Badulescu and Badulescu, 2014). This factor indicates "average life duration spent in different conditions: total survival, survival without chronic diseases and handicap free survival" (European Health & Life Expectancy).

What is peculiar is that Ukraine, though it settles a larger percentage of the GDP for the health system, scores a lesser life expectancy than Romania and even an inferior „healthy life expectancy" than Romania, as it will be noticeable in the next figures. It is beyond doubt that the size of GDP is what really matters, therefore we directed our attention to its evolution also. Considering the figure 4 presenting the GDP evolution in both analyzed countries, we may ascertain that it went through major changes compared to the life expectancy or the healthy life expectancy, where the trend is ascension and almost linear.



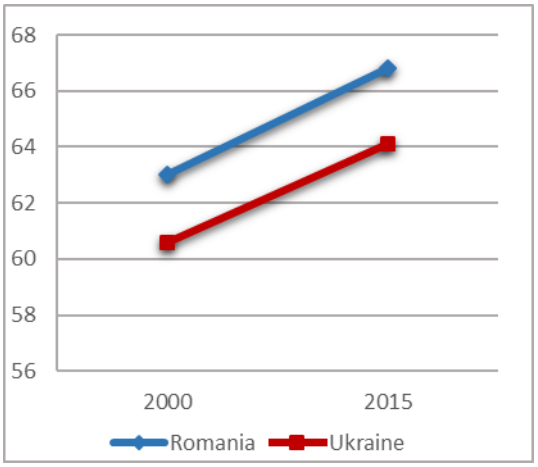


Figure 3: Life expectancy at birth in Romania vs. Ukraine

Figure 4: Healthy life expectancy at birth in Romania vs. Ukraine

Source: Figures drawn up by the authors based on the data published on the World Health Organization website available online at http://apps.who.int/nha/database/Key_In-dicators_by_Country/Index/en, accessed on the 11th of July, 2016

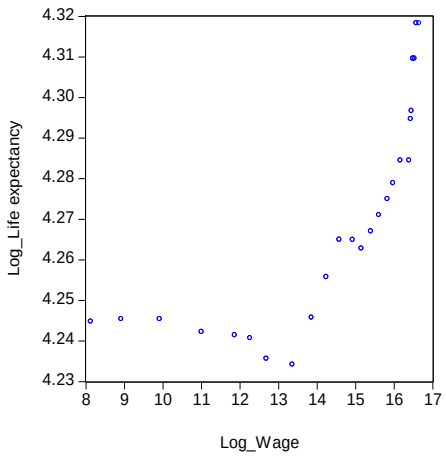
As it may be concluded from the above figures, individuals not only that they live longer, but they also have a higher healthy life expectancy. Nevertheless, the size of GDP as well as the percentage allocated from it towards the health system has a significant contribution on the life expectancy increase; we may notice that they directly reflect on each other, though at the first glance it is not extremely powerful.

After analysing part of the macroeconomic factors contributing to the increase of life expectancy, we will approach to the microeconomic factors, respectively we would like to analyse the size of the individual income contributing to the life expectancy increase. Further on, we would like to find out if to the increase of these factors also contribute, in a significant way, the increase of wages obtained by the individuals, fact that allow them to pay greater attention on the quality of life.

2. Empirical evaluation of the relationship between life expectancy and income

In analysing simple regression, firstly we take into account aspects related to identifying explanatory variables. We will use data referring to the life expectancy (LE_t) and the income from Romania and Ukraine, during 1990 – 2014. Starting from Milton Friedman's theory according to which the consumption is directly proportional to the permanent income, in this model we considered that the permanent income of an individual is the salary received by him. The difference between total and permanent income (wages in this case) is called transitory income by Friedman. It should also be specified and that income includes amount of money obtained from various sources such as gifts, bonuses etc., thus the real value of

the income of an individual is not known exactly, which is why in our analysis the income will be measured with the help of the wages indicator (WG_t), this indicator being part of the income.
Starting from these variables, we want to identify the impact the wage has on the life expectancy. Given the exponential evolution of the variables considered, the numerical values were transformed by logarithm and the influence of seasonal factors was eliminated using Tramo-Seats method. The new variables were further symbolized in case of Romania: life expectancy - Log_LER and the wage - Log_WGR, while in the case of Ukraine: life expectancy - Log_LEU and the wage - Log_WGU.
Specifying an econometric model assumes choosing a mathematical function (*f(x)*) with the help of which the connection between the two variables can be described. In the case of a single factor model, the most common used method is the graphical representation of the two strings of values with the help of the scatter plot. Thus, in order to identify the relation between the mentioned variables, we have created a graphic representation of the pair of points which include the values of the variables, the life expectancy and the wages (in figure 5 we have the Romanian case and in the figure 6 we have the Ukraine case). Based on the data provided by World Bank, The National Institute of Statistics of Romania (INSSE), The State Statistics Service of Ukraine and using the Eviews software, we have obtained the following results:



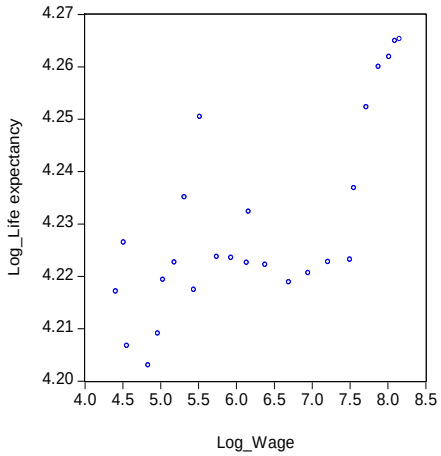


Figure 5: LER–WGR correlation in Romania **Figure 6:** LEU–WGU correlation in Ukraine
Source: authors' representation using Eviews software based on the data provided by World Bank, INSSE and The State Statistics Service of Ukraine

Seeing that the points are situated in a well-defined area in both figures, we can say that between the dependent variable – life expectancy and the independent variable –wage – there is a direct connection. In order to identify the connection between these variables and of the intensity of their connection, we will suppose that between the variables there is a linear connection form.

2.1. The correlation between life expectancy and wage in Romania

The simple linear regression model proposed in studying the evolution of the life expectancy (Y) in relation to the wages (X) in Romania has the form:

$$Log\_LER=c(1)*Log\_WGR+c(2)+\varepsilon_t \quad (1)$$

The main problem of each regression model is determining the parameters of the model. For determining these parameters, we will use the generalized least squares method. In order to test the validity of the hypothesis on which the classic model is based on, various statistical tests will be used. To estimate the parameters of the model (1), we have used the Eviews program, with the help of which we obtained the following results at a sample level:

Table 1: The estimation of regression equation (1)

Dependent Variable: Log_LER
Method: Least Squares
Sample: 1990 2014
Included observations: 25
Log_LER =C(1)* Log_WGR+C(2)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.008204	0.001360	6.030056	0.0000
C(2)	4.152699	0.019635	211.4983	0.0000

R-squared	0.612544	Mean dependent var	4.269293
Adjusted R-squared	0.595698	S.D. dependent var	0.026849
S.E. of regression	0.017072	Akaike info criterion	-5.226126
Sum squared resid	0.006703	Schwarz criterion	-5.128616
Log likelihood	67.32657	Hannan-Quinn criter.	-5.199081
F-statistic	36.36158	Durbin-Watson stat	0.147086
Prob(F-statistic)	0.000004		

Source: authors' estimates using Eviews based on the data provided by World Bank and INSSE

According to the table above, we can notice the existence of a direct relation between wages and life expectancy. Therefore, for an increase by 1% of the wages, the average increase of life expectancy is 0.008204. Thereby, it can be observed that the c(1) and c(2) coefficients are significantly different from zero, at the sample level, as well as for the entire population. The probability that the null hypothesis is true is smaller than 5% (p=0.0000 for both coefficients), so it can be stated that the null hypothesis is rejected and the only accepted true hypothesis is the alternative H_1 ($c(1) \neq 0$, and $c(2) \neq 0$).

In order to measure the intensity of the endogenous variable's dependency from regression factors, the determination coefficient needs to be found out. Based on the obtained results, at a sample level, there is a medium link between the endogenous and exogenous variables, the R^2 adjusted is equal to 0.595698. In order to study the size of R^2 adjusted for the entire population, we used the Fisher test.

Because $F_{calc} = 36.36158 > F_{tab} = 4.24$ (Andrei, et. al, 2008) the results prove that the null hypothesis is rejected, so the influence of exogenous variables is significant. If the difference between F_{calc} and F_{tab} increases, the link between the two variables is medium at the level of the entire population.

In order to find out the autocorrelation of errors, we have used the Durbin-Watson test (Andrei et. al., 2008: 126). Working with a significance level of $\alpha = 0.05$, the number of exogenous variables is *k=1* and the number of observations is T=25, from the Durbin-Watson distribution table we find the following values: $d_1 = 1.28$ and $d_2 = 1.45$. Because $0 < DW_{calc} = 0.147086 < d_1 = 1.28$, the errors are auto correlated in a positive manner, the H_0 hypothesis is rejected, so the independence hypothesis of errors is not verified.

In order to eliminate the autocorrelation phenomenon, we used the Cochrane-Orcutt method (Stancu, 2011: 246), which states that estimating the ρ coefficient and making a regression through quasi-difference in a model that has the form:

$$Y_t = c(1)\ X_{1t} + c(2) + \varepsilon_t \quad (2)$$

$$Y_{t-1} = c(1)\ X_{1t-1} + c(2) + \ \varepsilon_{t-1} \quad (3)$$

The ρ coefficient is determined through direct regression of the residue on the delayed (t-1) value of it. Thus the quasi-differential value is written as:

$$Y_t - \rho\ Y_{t-1} = c(1)(X_{1t} - \rho\ X_{1t-1}\ ) + c(2)\ (1-\rho) + u_t \quad (4)$$

Starting from the regression model that presents the relationship between life expectancy and wage, we re-estimated the value of the ρ parameter and the previous regression, until the stability of the c(1), c(2) parameters. The ρ parameter is estimated using the smallest squares method, observing the hypothesis that the residues follow a self-regressive first order process: $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, where u_t is a white noise and ρ ϵ *R*. After the calculus, we have obtained the value of ρ as being equal to 0.93.
Thus, based on the previous regression and the (4) base relation, corresponding to the ρ parameter estimated above, we have equation:

$$Log\_LER_t - \rho Log\_LER_{t-1} = c(1)(Log\_WGR - \rho Log\_WGR_{t-1}) + c(2)(1-\rho) + u_t \quad (5)$$

We check the qualities of the new model, repeating the same stages as for the previous model. In order to estimate its parameters, we used the generalized least squares method and we obtained the following results:

Table 2: Estimating the parameters of the new regression model (5)

Dependent Variable: Log_LER-0.93* Log_LER(-1) *Method: Least Squares* *Included observation: 24 after adjustments* Log_LER-0.93* Log_LER(-1)=C(1)*(Log_WGR-0.93* Log_WGR(-1))+C(2)*(1-0.93)		
Testing the significance of the parameters (Student Test)	C(1) C(2)	0.018320 (Prob=0.0109) 4.662447 (Prob=0.0000)
Adjusted R-squared		0.226610
Independence of errors (Durbin Watson Test)	DW_{calc}	1.697202*
Homoscedasticity of errors (White Test)	F_{calc}	1.059619 (Prob=0.3644)
Normality of errors (Jarque Bera Test)	JB_{calc}	0.090778 (Prob=0.955626)

* Working with a significance level of α= 0.05, the number of exogenous variables is k=1, and the number of observations is T=24, from the Durbin-Watson distribution table we find the following values: d1 = 1.27 and d2 = 1.44.
Source: authors' estimates using Eviews

The two parameters of the new model are significantly different from zero, at the sample level, but also at the level of the entire population, a fact that is confirmed by the probability that the null hypothesis is correct, a probability that is smaller than 5% in the case of the two parameters.

In order to measure the intensity of the endogenous variable's dependency to regression factors, the determination coefficient is used. At a sample level, there is a medium to weak intensity link between the variables, because R^2 adjusted = 0.226610. At the level of the entire population, we have used the Fisher test. Because F_{calc} = 7.739188 > F_{tab} = 4.24 (Andrei, et. al, 2008), the result is that the null hypothesis is rejected (Prob = 0.010872).
As to what the testing of the fundamental hypothesis referring to the random u_t variable is concerned for the new model, we have reached the following conclusions:
-*the independence hypothesis* of the values of the residual variable u_t is confirmed this time, because the Durbin-Watson statistic is equal to 1.697202, so that d_2 = 1.44 < DW_{calc} = 1.697202 < 4-d_2 = 2.56, meaning the errors of the model are independent;
-*the homoscedasticity hypothesis* of the residual variable u_t is confirmed, because, as the data from table 2 shows, the probability related to the Fisher statistic is higher than 5%, which determines the acceptance of the H_0 hypothesis as being true.
-*the normality hypothesis* of the random variable u_t is confirmed. One way of checking the normality of errors hypothesis is the Jarque-Berra test, which is an asymptotic test, usable in the case of a large volume sample, which follows a chi-squared distribution with two degrees of freedom (Meșter, 2012: 150). Because the related probability of accepting the null hypothesis as being true (Prob=0.955626) is larger than 5%, we can state that the normality of errors hypothesis cannot be rejected for the level of the entire population, the errors being normally distributed.

2.2. The correlation between life expectancy and wage in Ukraine
In terms of determining a link between the life expectancy (Y) and the wages (X) in Ukraine case, we will use also a simple linear regression model witch has the form:

$$Log\_LEU=c(1)*Log\_WGU+c(2)+\varepsilon_t \quad (6)$$

For determining the parameters of this regression, we use the generalized least squares method. Therefore, using the Eviews program we obtained the following results at a sample level:

Table 3: The estimation of regression equation (6)

Dependent Variable: Log_LEU
Method: Least Squares
Sample: 1990 2014
Included observations: 25
Log_LEU =C(1)* Log_WGU +C(2)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.010626	0.002095	5.073401	0.0000
C(2)	4.164099	0.013309	312.8789	0.0000
R-squared	0.528102	Mean dependent var		4.230344
Adjusted R-squared	0.507585	S.D. dependent var		0.018358
S.E. of regression	0.012882	Akaike info criterion		-5.789320
Sum squared resid	0.003817	Schwarz criterion		-5.691810
Log likelihood	74.36650	Hannan-Quinn criter.		-5.762275
F-statistic	25.73940	Durbin-Watson stat		0.440628
Prob(F-statistic)	0.000039			

Source: authors' estimates using Eviews based on the data provided by World Bank and The State Statistics Service of Ukraine

It can be seen that at a sample level, the function through which we define the model (6) is ascending. Therefore, we can notice the existence of a direct relation between wages and life expectancy in the Ukraine case. More than that, based on the data from the table above, we can see that for an increase by 1% of the wages, the average increase of life expectancy is 0.010626. Following the calculations made with the help of the Eviews program, we can see that the two parameters are significantly different from zero at the sample level, as well as for the entire population. Because the probability that the null hypothesis is true is smaller than 5% (p=0.0000 for both coefficients), it can be stated that the null hypothesis is rejected and the only accepted true hypothesis is the alternative H_1 ($c(1) \neq 0$, and $c(2) \neq 0$).
As to what the R^2 adjusted determination coefficient is concerned, this is equal to 0.507585 at sample level, which suggests a medium link between the model variables. For the entire population, we used the Fisher test. Because $F_{calc} = 25.73940 > F_{tab} = 4.24$ (Andrei, et. al, 2008) the results prove that the null hypothesis is rejected, so the influence of exogenous variables is significant and the link between the two variables is medium also at the entire population.
The Durbin-Watson test is used to find out the autocorrelation of errors (Andrei et al, 2008: 126). In order to choose a correct hypothesis, the $DW_{calc} = 0.44$ (table 3) statistic is determined. Working with a significance level of $\alpha = 0.05$, the number of exogenous variables is *k=1* and the number of observations is T=25, from the Durbin-Watson distribution table we find the following values: $d_1 = 1.28$ and $d_2 = 1.45$. Because $0 < DW_{calc} = 0.440628 < d_1 = 1.28$, the errors are auto correlated in a positive manner and the H_0 hypothesis is rejected, so the independence hypothesis of errors is not verified.
In order to eliminate the autocorrelation phenomenon, we used the Cochrane-Orcutt method (Stancu, 2011: 246) as in the case of Ukraine regression. After the calculus, we have obtained the value of ρ as being equal to 0.77 and the equation is written:

$$Log\_LEU_t - \rho Log\_LEU_{t-1} = c(1)(Log\_WGU - \rho Log\_WGU_{t-1}) + c(2)(1-\rho) + u_t \quad (7)$$

We check the qualities of the new model, repeating the same stages as for the previous model (6). For estimating the parameters of the new regression model (7), we used the generalized least squares method and we obtained the following results:

Table 4: Estimating the parameters of the new regression model (7)

Dependent Variable: Log_LEU-0.77*Log_LEU (-1) *Method: Least Squares* *Included observation: 24 after adjustments* Log_LEU-0.77*Log_LEU (-1)=C(1)*(Log_WGU-0.77* Log_WGU(-1))+C(2)*(1-0.77)		
Testing the significance of the parameters (Student Test)	C(1) C(2)	0.007975 (Prob=0.0426) 4.178692 (Prob=0.0000)
Adjusted R-squared		0.136410
Independence of errors (Durbin Watson Test)	DW_{calc}	1.203632*
Homoscedasticity of errors (White Test)	F_{calc}	0.711628 (Prob=0.5023)
Normality of errors (Jarque Bera Test)	JB_{calc}	0.384801 (Prob=0.824976)

* Working with a significance level of $\alpha = 0.01$, the number of exogenous variables is k=1, and the number of observations is T=24, from the Durbin-Watson distribution table we find the following values: d1 = 1.037 and d2 = 1.199.
Source: the authors' calculus

The results related to the two parameters of the new model show that this two are significantly different from zero, at the sample level, but also at the level of the entire population, a fact that is confirmed by the probability that the null hypothesis is correct, a probability that is smaller than 5% in the case of the two parameters.
In order to measure the intensity of the link between the two variables, the determination coefficient is found. At a sample level, between the endogenous and exogenous variables is a medium to weak intensity link between the variables, because R^2 adjusted = 0.136410. At the level of the entire population, we have used the Fisher test. Because $F_{calc} = 4.632999 > F_{tab} = 4.24$ (Andrei, et. al, 2008), the result is that the null hypothesis is rejected (Prob = 0.042594).
Testing the basic hypotheses referring to the random u_t variable, we have reached the following conclusions:
-*the independence hypothesis.* Because the Durbin-Watson statistic is equal to 1.203632, the values of the residual variable u_t is confirmed. So $d_2 = 1.199 < DW_{calc} = 1.203632 < 4-d_2 = 2.801$, meaning the errors of the model are independent for $\alpha = 0.01$;
-*the homoscedasticity hypothesis.* In order to check this hypothesis, we use the White test. Because the probability related to the Fisher statistic is higher than 5%, the homoscedasticity of the residual variable u_t is confirmed which determines the acceptance of the H_0 hypothesis as being true.
-*the normality hypothesis* of the random variable u_t is confirmed. Because probability related to the Jarque Bera test (Prob=0.824976) is larger than 5%, we can state that the normality of errors hypothesis cannot be rejected for the level of the entire population, the errors being normally distributed.
Also, it could be observed that the procedure for eliminating the autocorrelation of errors does not alter the structure of the regressions, both for Romania and the Ukraine. The R^2 adjusted determination coefficient, as well as the c(1) and c(2) coefficients have values close to those from the first estimated equation (model (1) – the Romania case and model (6) – Ukraine case).

3. In conclusion

Using the regression analysis, we have identified that between the life expectancy and the wages exists a direct correlation, both for Romania and the Ukraine. More than that, we find that in Romania, for an increase by 1% of the wages, the average increase of life expectancy is 0.008204, while in Ukraine, for an increase by 1% of the wages, the average increase of life expectancy is 0.010626. So, what we have assumed along with the theories presented within the first part of the work proved to be accurate, that both for Romania and Ukraine, between the wages and the life expectancy there is a direct connection. In other words, though the life expectancy bears the influence of GDP and the percentage allocated from GDP to the health system, the net income secured by each individual directly and consistently the life expectancy.

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DOES STOCK MARKET DEVELOPMENT PLAY ANY ROLE IN THE EFFECT OF FDI ON ECONOMIC GROWTH IN NIGERIA? AN EMPIRICAL INVESTIGATION

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Abstract
The objective of the paper is to investigate whether stock market development plays any role in the effect of foreign direct investment (FDI) on economic growth in Nigeria. Using annual time series data that span the period from 1981 to 2014, and employing the fully modified ordinary least squares (FMOLS) estimation technique, the empirical evidence indicates that FDI, domestic investment and stock market development positively and significantly affect economic growth, but the effect of the interaction between stock market development and FDI on economic growth is negative and significant, indicating that the Nigerian bourse is not yet fully developed to engender positive growth effect of FDI. The study further finds that government consumption expenditure and trade openness adversely affect the growth of the country's real GDP per capita. Recommendations of the paper include efforts by the government to design and implement programmes and policies aimed at enhancing the attractiveness of the country to foreign and local investors, efforts by capital market regulators to enhance stock market efficiency, reduction of government consumption expenditures and import control.

Keywords: Foreign Direct Investment; Stock Market Development; Economic Growth; Interaction Term; FMOLS.

JEL Codes: F21; F23; F43; O16; O47; P45.

1. Introduction

Gross investment in an economy according to Agosin and Mayer (2000) comprises domestic investment and foreign investment of which foreign direct investment constitutes a significant part. The inflow of foreign direct investment to an economy is envisaged to complement domestic investment therein *all things being equal* especially where there is dearth of savings (or savings gap) according to the two-gap model. Increase in investment arising from domestic capital formation and inflow of foreign direct and portfolio investments to the economy according to various growth models (neoclassical and endogenous growth models) will engender increase in economic growth rate.

Feldstein (2000) identified three benefits of FDI to host countries. The first benefit is that FDI provides a mechanism for transference of technology that cannot be achieved through financial investment or through trade in goods and services. The second is human capital development as countries that receive FDI often gain employee training as an automatic by-product of operating the new business. Such human capital development is important for all categories of workers ranging from production workers to managers and executives. The third is the revenue accruing to the government of the host-country in the form of corporate tax revenue imposed on the profits of the multinationals through which FDI flows into the country.

Listing of foreign firms or multinational corporations through which FDI is channeled into a host country on the stock market could be beneficial to the individuals, that is local investors who would take up part ownership of the foreign firms by buying or investing in their stocks to

either partake in the profit of the corporations through dividends when it is declared, or reap capital gains where the stocks appreciate in value through trade in stocks in the bourse, thus enhancing their incomes; it could be beneficial to the government by enhancing government revenue derived from withholding tax on dividend to shareholders, etc; it also enhances the income of market players especially the stockbrokers and issuing houses whose income also get enhanced as they render stockbrokerage and allied services to the corporations and their shareholders. All these translate into enhanced national income. However, dominance of the stock market by foreign firms could have adverse effect on the growth of a nation's economy if the stock market is not well developed.

This study is motivated by the observation that though numerous multinational corporations operate in Nigeria's economy, only a small fraction of these are listed on the country's stock market. Several studies have shown that stock market development positively affects growth (Olweny and Kimani, 2011; Ovat, 2012; Ogboi and Oladipo, 2012; Ahmad, Khan and Tariq, 2012). A major determinant of the extent of the development of the stock market is the number of firms listed thereon. This enhances market capitalization and market liquidity which are key indicators of stock market development. Listing of multinationals on the stock exchange will no doubt enhance the market size and liquidity (Aigheyisi and Edore, 2013), just as foreign portfolio investment enhances the growth of the capital market (Eniekezimene, 2013). Thus the inflow of FDI to the economy (through the multinational companies), if interacted with stock market development indicators is hypothesized in this study to enhance the impact of FDI on economic growth. The objective of this paper therefore is to investigate whether the extent of development of the stock market is a significant determinant of the effect of FDI on the growth of Nigeria's economy. In other words, the study intends to investigate whether the effect of FDI on economic growth of Nigeria depends on the extent of development of the country's bourse. Though numerous studies have been conducted to investigate the effect of FDI on Nigeria's economic growth, none to our knowledge have yet investigated the role the stock market plays in this effect. A gap therefore exists in the literature and this study intends to fill this gap.

2. Brief Review of the Literature: Theory and Empirical Evidence

The inflow of FDI into an economy, especially the LDCs where there is a dearth of investment as a result of low savings rate, raises the level of investment therein thereby accelerating the growth of such economies. This is actually a major tenet of the two-gap model which has been described as an extension of the Harrod-Domar model (which shows that the rate of growth of an economy is jointly determined by the national savings rate, that is the national savings-income ratio, and the national capital-output ratio, suggesting that the more a country can save and invest, the faster it can grow). The model identifies two gaps which necessitate foreign finance and foreign exchange inflows, namely the savings-gap arising from low level of savings, and the foreign exchange gap arising from low level of export (and high level of imports). The savings-gap can be closed with foreign direct investment, while the foreign exchange gap can be bridged with foreign aid (Akande and Oluyomi, 2010). The two-gap model therefore provides an explanation of how capital inflows affect economic growth by increasing the level of investment in the economy. However, the empirical evidence on the effect of FDI on economic growth has been mixed, and yet remains inconclusive.

Numerous studies have investigated the effect of FDI on economic growth in various countries and regions. The empirical evidence has been inconclusive. Umoh, Jacob and Chuku (2012) employ various methodologies such as error correction methodology, Granger causality test and the three stage least squares technique for simultaneous equations modeling to investigate the relationship between FDI and growth in Nigeria. The evidence shows that a feedback relationship exists between the variables that is, FDI

positively and significantly affects growth, just as growth positively and significantly affects FDI inflows. Hassen and Anis (2012) also find significant positive effect of FDI on long-run growth in Tunisia using data that span the period from 1975 to 2009 and employing the time series technique of cointegration and error correction analysis. Turkcan, Duman and Yetkiner (2008) test the endogenous relationship between FDI and economic growth using a panel data set for 23 OECD countries for the period from 1975 to 2004. FDI and growth are treated as endogenous variables and a two-equation system of simultaneous equation estimated using the generalized moment of means. The study finds a two-way positive and significant relationship between FDI and economic growth. Liu (2005) employs single equation and simultaneous equations techniques to investigate the effect of FDI on economic growth using panel data set for 84 countries over the period from 1970 to 1999. The analysis finds that FDI positively and significantly affects growth, directly, and indirectly through its interactions terms as the interaction of FDI with human capital is observed to exert strong positive effect on economic growth, while the interaction of FDI with technology gap is observed to exert significant negative impact on growth.

However, applying the OLS estimation technique to analyse data that span the period from 1970 to 2007, Olokoyo (2012) finds no significant effect of FDI on economic growth in Nigeria. Similarly, using same methodology, Danja (2012) finds no evidence of significant effect of FDI on economic growth in Nigeria. The study by Louzi and Abadi (2011) on the effect of FDI on economic growth of Jordan using cointegration and error correction analysis finds no evidence of significant effect of FDI on gross domestic product in the 1990-2009 period. Alfaro (2003) employs OLS with White's correction for heteroskedasticity and instrumental variables techniques to investigate the effect of FDI in various sectors on economic using cross country data on 47 countries for the period 1981-1999. The analysis indicates that FDI exerts ambiguous effect on growth: FDI in the primary sector negatively affects growth; FDI in the manufacturing sector positively affects growth; while the growth effect of FDI in the service sector is ambiguous. Another study by Alfaro et al (2006) finds that well developed local financial markets are important for the effect of FDI on economic growth, as financial markets act as channel for the realization of the linkage effect as well as create positive spillovers of FDI to economic growth.

The role of host countries' financial markets in the effect of FDI on economic growth has also been investigated empirically. A common strand in majority of the studies is that well developed financial markets are essential for FDI to positively affect economic growth. We present below some empirical evidence on the FDI-financial market-economic growth relationship.

Nunnenkamp and Spatz (2004) examine the relevance of host-economy characteristics (such as real GDP per capita, level of schooling, institutional development and openness/closeness of the economy) and industry characteristics (such as technology intensity, factor requirements, linkages to local and foreign markets, and the degree of foreign vertical integration of foreign affiliates) in the effect of FDI on economic growth in developing economies. Evidence from the cross-country analysis indicates that higher FDI stock in a particular period tend to be associated with lower growth in subsequent period in economies with unfavourable characteristics, suggesting that FDI crowds out domestic investment in those economies. The picture is however brighter for economies with favourable characteristics. Specifically, it is found that availability of complimentary human capital in host countries is important for FDI to stimulate economic growth. It is also found that sound institutions are a prerequisite for attracting and benefiting from the market-seeking and efficiency-seeking FDI. Openness to trade is also found to be a *sine quanon* to successfully participate in the widely perceived trend towards efficiency seeking FDI.

Alfaro *et al* (2003) examine the role financial markets play in the relationship between FDI and economic development using cross0country analysis of data on seventy countries. The

empirical analysis provides ample evidence that the level of development of the financial markets is crucial for FDI to positively affect economic development. Specifically, the evidence shows that well developed financial markets allow significant gains from trade, while the effect of FDI alone on economic development is ambiguous.

Esfandyari (2015) investigates the role of financial market development in the foreign direct investment effect on economic growth in the Developing 8 (D8) countries namely Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey, with emphasis on Iran, using data for the period from 2004 to 2013. The empirical evidence shows that FDI alone has no significant effect on economic growth in the countries, but when interacted with a threshold level of financial development, FDI positively and significantly affects growth, suggesting that the D8 countries should channel efforts towards developing their domestic financial markets before absorbing FDI.

Raheem and Oyinlola (2013) examine the relationship between FDI and economic growth in 15 African countries, putting the role of the level of financial sector development into consideration. The two-stage least squares instrumental variable technique is used to estimate the model specified for the investigation. The results suggest that financial sector development is a precursor for positive effect of FDI on economic growth, suggesting that policies directed towards attracting FDI should go along with policies aimed at financial sector development, and not precede it.

Hsu and Wu (2006) investigate the role of financial intermediary in the effect of FDI on economic growth using cross country data for the period from 1975 to 2005. The least squares, limited information maximum likelihood (LIML) and the Fuller methods are used to estimate the model specified, while the heteroskedasticity robust limited information maximum likelihood (HLIM) and the heteroskedasticity robust Fuller (HFUL) estimators are used to control for heteroskedasticity. Contrary to previous works, the empirical evidence shows that economies with well developed financial markets do not necessarily benefit more from FDI to accelerate their economic growth as the interaction term for FDI and financial market variable is observed to be negative and significant.

Sghaier and Abida (2013) conduct a study to investigate whether the depth of the financial system of a recipient country affects the impact of FDI on growth. The system GMM is employed to analyse panel data spanning the period from 1980 to 2011 on four countries of North Africa namely Tunisia, Algeria, Morocco and Egypt. The study finds strong evidence in support of positive effect of FDI on growth. It also finds that the development of the financial is an important prerequisite for FDI to positively affect economic growth.

3. Theoretical Model and Methodology

Following the work of Sghaier and Abida (2013) which investigates whether the depth of the financial system of a recipient country affects the impact of FDI on growth, we specify our model to investigate whether the extent of development of Nigeria's stock market affects the impact of FDI on the country's economic growth. The model is specified functionally as:

$$RGDPPC = f(FDI, MCAP, FDI*MCAP, X) \quad (1)$$

Where:

RGDPPC represents (logarithm of) real GDP per capita (proxy for economic growth;

FDI is logarithm of net inflow of foreign investment as a percentage of GDP;

MCAP represents logarithm of market capitalization as percentage of GDP, a measure of stock market development;

FDI*MCAP is an interaction term capturing interaction between FDI and stock market development. This variable is incorporated in the model to investigate whether the extent of development of the stock market influences the effect of FDI on economic growth;

X represents a battery of control variables identified in the literature as growth determinants. In this study we incorporate government consumption expenditure as

percentage of GDP (GOVCON), domestic investment rate measured as gross fixed capital formation as percentage of GDP (DINV), trade openness (TOPEN) and inflation (INF) as relevant control variables. Incorporating these into equation 1, and specifying the model in the form in which it could be estimated, we have:

$$RGDPPC_t = \beta_0 + \beta_1 FDI_t + \beta_2 MCAP_t + \beta_3 FDI*MCAP_t + \beta_4 DINV_t + \beta_5 GOVCON_t + \beta_6 TOPEN_t + \beta_7 INF_t + \varepsilon_t \quad (2)$$

The variables are as defined above. ε_t is the error term assumed to be normally distributed with zero mean and constant variance. The *a priori* expectations are: $(\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6) > 0$, $\beta_7 < 0$. These imply that FDI, stock market development, interaction between FDI and stock market development, domestic investment, government consumption expenditure and openness of the economy to trade positively affect real GDP per capita in the long run, while inflation negatively affects real GDP per capita. The neoclassical growth models such as the Solow's growth model, the augmented Solow growth model, etc. identify investment as a key determinant of economic growth. According to these models, increase in investment rate engenders increase in the rate of growth of the economy.

The inclusion of government expenditure as a growth determinant is justified by the Keynesian expenditure- economic growth theory within IS-LM framework and the Ram's (1986) growth accounting model which identify government expenditure as a growth stimulant acting through the multiplier and positive externality effects respectively, where it is productive. However, Barro (1990) has argued that government expenditure on consumption could be growth-retarding, while government capital and investment expenditures could enhance economic growth.

The New Growth theory recognizes the role of trade in the growth process (Roe and Mohtadi, 1999).The theory posits that the long-run growth path of an economy can possibly be influenced by international trade as it guarantees access to acquisition of leading technologies of developed countries (Barro and Lee,1994). Thus, openness to trade enhances economic growth ceteris paribus. The effect of inflation on economic growth has been copiously investigated by various researchers. The evidence suggests that high rate of inflation (beyond some threshold) adversely affects growth as it reduces the level of investment and the efficiency of productive factors (Andres and Hernando, 1999; Gregorio, 1999).

The model (equation 2) shall be estimated using the Fully Modified Ordinary Least Squares (FMOLS) Estimation technique (FMOLS) developed by Phillips and Hansen (1990). The methodology modifies the least square estimator to account for serial correlation effects and for endogeneity in the regressors that results from the existence of a cointegrating relationship to yield optimal estimates of long-run (cointegrating) regressions (Phillips, 1993). The analysis begins with unit root test for the variables for ascertain the time series properties of the variables. This shall be performed using the Phillips-Perron test. The unit root test shall be followed by the cointegration test to determine the existence or otherwise of long-run (cointegration) relationship among the variables, and thereafter, if the variables are found to be cointegrated, the model shall be estimated using the FMOLS technique.

Data used for the analysis are annual time series data spanning the period from 1981 to 2014. They were sourced from the Central Bank of Nigeria's Statistical Bulletin (2014) and World Bank's World Development Indicators (2014). Specifically, data on real GDP per capita, foreign direct investment, trade openness, government final consumption expenditure, domestic investment and inflation were obtained from the World Development Indicators database while data on stock market capitalization were sourced from the Central Bank of Nigeria Statistical Bulletin. The model shall be estimated using the logarithm of all variables except inflation which is measured as the annual percentage change in the consumers' price index. All estimations shall be performed with the aid of EVIEWS 8 software.

4. Results and Discussion

4.1. Unit Root and Cointegration Test

The results of the test for unit root in each of the data series using the Phillips-Perron method is presented in Table 1.

Table 1. Phillips-Perron Unit Root Test Results

Phillips-Perron Test							
Variables	**Levels**			**First Difference**			**Order of Integration**
	PP test stat	**Test Critical Value (5%)**	**Infe-rence**	**PP test stat**	**Test Critical Value (5%)**	**Inference**	
RGDPPC	-1.9114	-3.5530	NS	-4.9103	-3.5578	S	I(1)
FDI	-2.3846	-3.5530	NS	-28.4277	-3.5578	S	I(1)
DINV	-2.0873	-3.5530	NS	-5.7704	-3.5578	S	I(1)
MCAP	-1.9363	-3.5530	NS	-4.3813	-3.5578	S	I(1)
FDI*MCAP	-2.5064	-3.5530	NS	-6.8884	-3.5578	S	I(1)
GOVCON	2.6255	-3.5530	NS	-6.3167	-3.5578	S	I(1)
TOPEN	-1.8390	-3.5530	NS	-7.6451	-3.5578	S	I(1)
INF	-2.6352	-3.5530	NS	-9.7482	-3.5578	S	I(1)

NS = Not stationary; S = Stationary

The unit root test results indicate that the variables are non-stationary at levels, but stationary at first differences. Thus, they are integrated of order 1, that is they are all I(1). Considering that the variables are 1(1), an appropriate procedure to test for cointegration among them is the Johansen cointegration test procedure. The results of the test comprising the Trace test and the Maximum Eigenvalue test are presented in Tables 2A and 2B.

Table 2A. Johansen Cointegration Test Result (Trace Test)

Sample (adjusted): 1983 2014
Included observations: 32 after adjustments
Trend assumption: Linear deterministic trend
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.919332	251.8076	159.5297	0.0000
At most 1 *	0.851071	171.2502	125.6154	0.0000
At most 2 *	0.625241	110.3131	95.75366	0.0034
At most 3 *	0.581518	78.90604	69.81889	0.0079
At most 4 *	0.559253	51.03014	47.85613	0.0244
At most 5	0.324319	24.81301	29.79707	0.1682
At most 6	0.271240	12.26792	15.49471	0.1445
At most 7	0.064769	2.142790	3.841466	0.1432

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 2B. Johansen Cointegration Test Result (Maximum Eigenvalue)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.919332	80.55734	52.36261	0.0000
At most 1 *	0.851071	60.93706	46.23142	0.0007
At most 2	0.625241	31.40711	40.07757	0.3365
At most 3	0.581518	27.87591	33.87687	0.2193
At most 4	0.559253	26.21713	27.58434	0.0740
At most 5	0.324319	12.54509	21.13162	0.4949
At most 6	0.271240	10.12513	14.26460	0.2038
At most 7	0.064769	2.142790	3.841466	0.1432

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Trace test indicates 5 cointegrating equations while the Maximum Eigenvalue test indicates 2 cointegration equations. These suggest that long-run relationship exists among the variables. The relationship is estimated using the FMOLS estimator.

4.2. Fully Modified OLS Estimation Results

The result of estimation of the specified model using the FMOLS estimator is presented in Table 3.

Table 3. FMOLS Estimation Results

Dependent Variable: LOG(RGDPPC)
Method: Fully Modified Least Squares (FMOLS)
Included observations: 33 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.077353	0.036239	2.134513	0.0428
DINV	0.285797	0.040165	7.115508	0.0000
MCAP	0.399001	0.028640	13.93146	0.0000
FDI*MCAP	-0.001801	0.000489	-3.685332	0.0011
GOVCON	-0.080500	0.036344	-2.214928	0.0361
TOPEN	-0.150529	0.055373	-2.718459	0.0117
INF	0.000442	0.000873	0.506210	0.6171
C	5.704261	0.290255	19.65260	0.0000
R-squared	0.915321	Adjusted R-squared		0.891611
Long-run variance	0.004336			

Table 4. Test for Multicolinearity

Variable	Centered VIF
FDI	4.477903
DINV	1.753749
MCAP	3.946053
FDI*MCAP	4.394684
GOVCON	1.287033
TOPEN	2.841337
INF	1.900972
C	NA

The result shows that foreign direct investment, domestic investment and stock market development positively and significantly affect economic growth in the long-run. These conform to *a priori* (theoretical) expectations. A 10% increase in net foreign direct investment is associated with 0.8% increase in real GDP per capita; a 10% increase in domestic investment is associated with 2.9% rise in the real GDP per capita. The coefficients and the associated t-ratios of FDI and DINV indicate that though both variables significantly affect growth, domestic investment contributes more to economic growth than foreign direct investment. A 10% rise in market capitalization as a percentage of GDP (stock market development) is associated with 4% rise in the real GDP per capita. However, the effect of interaction between FDI and stock market development variable on real GDP per capita is negative and highly statistically significant even at the 1% level. This is contrary to *a priori* expectations and it suggests that the Nigerian bourse is not yet fully developed and consequently, does not have the capacity to absorb FDI and to translate it into positive effect on growth.

Trade openness is observed to have had negative and significant effect on Nigeria's real GDP per capita. The effect is highly significant even at the 2% level. This could be attributed to the (precarious) import dependence nature of the economy which tends to put much pressure on, and depletes the nation's reserves of foreign exchange as well as engenders unfavourable balance of trade especially in non-oil commodities. These serve to adversely affect the real GDP per capita.

The effect of government consumption expenditure on real GDP per capita is negative and significant at the 5% level. This is an indication that government expenditure on consumption has been unproductive and hence, growth-reducing and it confirms Barro's (1990) prediction. A 10% increase in government final consumption expenditure has been associated with 0.8% reduction in real GDP per capita. The effect of inflation on economic growth has not been significant.

An examination of the diagnostic statistics reveals that the model has very high goodness of fit as indicated by the coefficient of determination (R-squared) which shows that over 92% of the systematic variation in the dependent variable is explained by the regressors. The variance inflation factor (VIF) test for multicolinearity indicates absence of the problem of multicolinearity in the model as the VIFs are all less than 5. Thus, the model can be relied upon for policy.

5. Conclusion and Recommendations

In this paper we empirically investigated whether the extent of development of the stock market affect the effect of FDI on economic growth using Nigeria data spanning the period from 1981 to 2014. The Phillips-Hansen fully modified ordinary least squares (FMOLS) estimation technique was used to estimate a multiple linear regression model specified for the investigation. The empirical evidence indicates that net inflow of FDI, domestic

investment and stock market development positively affected economic growth, but the interaction between FDI and stock market development negatively affected the growth of the nation's economy indicating that Nigeria's stock market is not yet fully developed to enhance the effect of FDI on economic growth. Further evidence from the analysis is that government consumption expenditure had been unproductive and growth-reducing and that trade openness had adversely affected the growth of the nation's real GDP per capita.

In view of the empirical evidence, we proffer, as recommendations for policy considerations, efforts by the government design and implement policies and programmes aimed increasing the attractiveness of the economy to foreign and local investors (such as favourable tax regimes and infrastructural development to reduce the cost of doing business, affordable interest rates to reduce cost of capital especially to domestic investors, etc.); efforts to develop the country's stock market (such as introduction of trade in equity derivatives, proper regulation of the stock market by the capital market regulators to enhance its efficiency, etc); reduction in government consumption expenditures, reduction in the degree of trade openness through import control. These will no doubt boost the country's real GDP per capita.

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Bio-note

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STATE-OWNED, ACQUISITION OR GREENFIELD BANKS IN THE NEW EU MEMBER STATES. A POST-CRISIS ANALYSIS

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Abstract: *The political and economic changes taking place at the end of the 20th century have provided Western European banks the opportunity to enter into Central and Eastern European (CEE) markets. Their entry was made either by greenfield investment or by acquisition of existing domestic banks. The motivations for the entry decision were various, e.g. managerial decisions, tightening profit margins in home markets, challengers imitation, profit-maximizations, looking for new customers in new markets, or keeping and extending relations with existing customers on the new markets where they are implanted. The expansion was amplified by the deregulation, the global capital expansion and the emergence of a single currency, throughout a period of prosperity and economic growth lasting for almost two decades (1990-2008). Until the crisis, changes in the CEE banking markets mainly concerned the increasing share of foreign capital (in market share, assets, number of branches and employees) along with the diminishing importance of state-owned banks. After 2008, the process displays new features: the restructuring of banks, mergers or strategic acquisitions, reducing operations in certain countries or even exits, adjusting the number of units and employees, improving efficiency and profitability indicators etc. Domestic banks, both private and state-owned, have bridged the gap (at least in terms of efficiency) separating them from the leaders, i.e. mostly the subsidiaries of large international banks. Apparently, greenfield banks are losing the importance they had in the preceding period (1990-2008). This paper aims at investigating the relation between foreign banks' mode of entry into the emerging markets of CEE (i.e. acquisition vs greenfield) and the strategies' results on those markets, before and after the crisis. Although foreign banks have implemented common strategies at group level, often dependent on the entry mode, these strategies were influenced by the specific features of the host markets and, quite frequently, by transformations occurred within home markets. We found that the entry is relevant for the development of the banks, but less than in the previous period, i.e. when banks entered the emerging markets of CEE*.

Keywords: foreign banks; entry mode; CEE, EU member states; post-crisis.

JEL Classification: G21; F36; G34; G01; L10.

1. Introduction

It is a matter for debate how foreign banks build their market entry or input strategy, starting with motivation, access (and continuation) costs, expectations of market development in that country, market share planned to be achieved (Ngoc-Anh Vo Thi and Vencappa, 2008). However, the decision on the entry into certain market must take into account the law and the host states' authorities' expectations. Thus, there are cases where the host state expects

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to keep under its control a significant part of domestic capital banks, and prefers to let foreign banking groups enter the market as subsidiaries or branches of parent banks. In other situations, the authorities desire to quickly improve the banking system, possibly by selling some local banks to major investors abroad, thus obtaining both funds by selling their shares and, in the same time, aiming to increase competitiveness in the national banking system (Hurduc & Nitu, 2011).

This study is aiming to analyse the actions of foreign banks in the Central and Eastern European (CEE) countries, before and after the crisis, looking to the evolution of the main banks in six of the most representative countries of the region, focusing on their "input" or "access" strategies in the market. The paper is organized as follows: in the next (second) part we briefly review the literature on bank capital entry modes, strategies and effects; in the third part, we present the research methodology and discuss the results; and finally, we reach a conclusion on the current state of the banking market in CEE countries.

This document resumes some of the themes from our papers presented at international conferences in Ostrava, Czech Republic and Oradea, Romania, (Badulescu and Moruţan, 2016a), (Badulescu and Moruţan, 2016b) to which we refer in the text.

1. A literature review regarding motives, behaviours and effects of the foreign banks' entry on the emerging markets

The literature points out various reasons or causes on bank entries on foreign markets. A first set of causes is included in the managerial decision or the so-called empire-building tendencies of banks (but also found in the case of other large companies). In this set, we find a convergence of the firm's growth strategies with socio-psychological elements of top managers: power, social status, compensation, prestige (Baumol, 1959), (Jensen, 1986). Avoiding to recognize the failure of decisions, legislative restrictions or narrowing profit margins on the domestic market, managers have to face the alternative - either to decrease the activity and layoffs, or to enter into foreign markets (Berger, DeYoung, Genay, & Udell, 2000).

Another set of causes could be subsumed into a "profit-maximization strategy". These are based on economies of scale and scope that can develop in international expansion, particularly, through technological advances, changing market possibilities and exploiting some traditional links or relations (commercial, historical, linguistic). In this category we can add opportunities brought by the huge new markets (ex. BRICS) that enables scale economies to gain new meanings and dimensions.

Finally, between reasons or causes to enter a foreign market we find the need to acquire new customers on new markets or to maintain (or expand) the relationship with clients onto the new markets where they are rooted or "the follow customer strategy" (Konopielko, 1999). This strategy is not just about increasing the volume of transactions with those international customers, but it also means diversification of services, especially cross-border services. Ultimately, the expansion of foreign banks could entail additional customers from their home countries seeking new opportunities in markets already known to their bank-partner (Badulescu and Badulescu, 2008).

These reasons are translated, in practical terms, into entry strategies as: follow the client strategy, lead your client overseas strategy, look for a new market strategy or follow your leader strategy (Arnold, 2003), (Petrou, 2009), (McIntyre & Chandrasekhar, 2013), (Hurduc & Nitu, 2011).

The first step taken into entering a new market is, surprisingly, the lack of a physical presence in the target market, by establishing cross-border lending relationships. However, for an effective expansion we refer, therefore, to the two main forms of entry into a foreign market: (1) greenfield investment or *de novo* bank, i.e. the establishment of an institution from scratch, in the host country, in most cases, under the name of parent company; and (2)

acquisition of a bank, or obtaining a control position in a local institution (Badulescu and Moruţan, 2016b).

A greenfield investment involves the initial establishment of a branch (agency) or a local subsidiary of the foreign bank. A branch of a foreign bank does not act as an independent legal entity, but as a part of the parent bank. This can provide a full range of banking services while operating under the basis of the parent bank capital requirements.

A subsidiary of a foreign bank is a separate legal entity, rightfully registered in the host country, where the foreign investor has a majority of shares. In terms of costs of the establishment, a branch is less expensive than a subsidiary since there are no incorporation costs; therefore there is no need for a board of directors etc. However, as part of the parent bank, a branch requires attention in terms of supervision, as this subsidiary's involvement in major unauthorized transactions could lead to serious issues for the parent bank. Instead, a subsidiary may fail even if the parent bank is solvable and vice-versa, because is an independent entity. It is clear that the argument is somehow wire-drawn: the owned entity cannot act in a different way than the owner, unless in exceptional cases and on short term. Moreover, a major constraint for a subsidiary is that it can be involved in lending activity based only on its own capitalization, therefore is not suitable for larger lending (retail or corporate) (Ngoc-Anh Vo Thi & Vencappa, 2008).

The advantages of purchasing a local bank are part of a different strategy. For example, this "entry" provides access to local information, a functional retail banking network which will ensure a fast growth on the home market, resources to the local currency. Overall, this type of input or "entry" is convenient for a multinational banks should they know very few things about the local markets.

A foreign bank may choose to purchase a bank with poor results from a new market for two main reasons. First, the purchase price would be lower than for a bank with better financial results. The second aspect is the strategic orientation of a network of branches that will support the new business in all regions of the country. This network would be too costly to start from scratch compared to purchasing a domestic bank, which has already developed such a network (Hurduc and Nitu 2011).

In terms of efficiency, foreign banks bring on emerging markets superior lending technologies, risk management and marketing solutions. Gradually, the transfer of expertise, organization, technology and qualified personnel is taking place in domestic banks as well, reducing rent extraction phenomena and monopolistic behaviour. Despite all these benefits, there are critical opinions stating that the foreign banks' efficiency is a result of cherry-picking behaviours, leaving the less interesting clients, such as small and medium-size enterprises (SMEs) to domestic banks (Badulescu, Simut and Badulescu, 2014).

There is evidence questioning the scale of these destabilizing phenomena, pointing out that foreign banks have a stabilizing effect on aggregate lending during local crises. Especially in the case of CEE markets, De Haas and Van Lelyveld (2006) and De Haas (2014) found that banks acquired by foreign capital, unlike independent local banks, have additional access to the resources of parent banks, being able to overcome difficult moments and even capitalize the opportunities given by a temporary shortage in the credit supply from local banks. From this study's point of view, the entry mode counts: green-field banks seem to be (by their subsidiaries - foreign legal entities) more likely to transmit negative shocks from international markets to host markets compared to foreign banks acquiring important domestic banks.

2. Method and results

The objective of our research is to investigate foreign banks' actions in CEE, before and after the recent crisis. In particular, we were interested to find out if there are differences in the evolution and behaviour of foreign banks in the banking systems in CEE, based on their mode of entry (greenfield vs acquisition), respectively, between those banks and domestic banks (private or state-owned). For this purpose, we have selected seven of the most important foreign banks (groups) in CEE countries, and their evolution has been analysed over approximatively 10 years (2004-2014) in six countries from CEE, according to three relevant indicators: market share by assets, number of branches and number of employees. Analysing the data for Poland (see Table 1), we notice than the largest market share in assets belongs to PKO Bank Polski (a state-owned bank), with a relatively constant market share, ranging from 15.2% in 2004 to 15.9% in 2014. Next we find banks which have entered through acquisitions: Bank Pekao (Unicredit Group, Italy), Bank Zachodni WBK (Santander Group, Spain), mBank (Commerzbank, Germany) and ING Bank. Last on the list is the only greenfield top bank in Poland, namely Raiffeisen Polbank, the only with a consistent growth on market share, nearly doubled in 2014 compared to 2004.

Table 1: Main banks in Poland, in terms of market share, number of branches and number of employees (2004, 2008, 2014)

Bank (type of capital / entry mode)	**Market- share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
PKO Bank Polski (state-owned)	15.2	15	15.9	3140	2000	1319	35.4	29.2	29.0
Bank Pekao (foreign acquisition)	10.9	14	10.9	782	1102	1034	15.3	22.0	18.8
Bank Zachodni WBK (foreign acquisition)	4.6	6	7.9	387	505	788	7.0	9.6	14.8
mBank (foreign acquisition)	5.7	9	7.7	200	372	268	3.0	5.4	6.3
ING (foreign acquisition)	5.9	8	6.5	332	439	401	7.0	8.3	7.7
Millenium (foreign acquisition)	3.7	5	4	287	490	423	4.0	7.0	6.1
RaiffeisenBank (greenfield)	1.9	3	3.5	70	123	351		3.3	5.5

Source: Raiffeisen Bank, Annual Reports for 2004, 2008, 2014

In terms of number of units and number of employees, the largest bank in the Polish banking system has a decreasing trend from one period to another, cutting down the number of units to almost a third in 2014 compared to 2004, meanwhile the number of employees decreased with almost 20% compared with the same year. Banks with foreign capital (except Bank Zachodni WBK with an increasing evolution, practically doubling both the number of employees and units in 2014 vs 2004) present an oscillating trend. We could notice a growth both in number of employees and units in 2008 compared to 2004, but also a drop in 2014. Raiffeisen Bank Polbank confirms its expansion on this market, tripling the number of units and doubling the number of employees in 2014 compared to 2008.

Table 2: Main banks in Hungary, in terms of market share, number of branches and number of employees (2004, 2008, 2014)

Bank (type of capital / entry mode)	**Market- share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
OTP Bank (state-owned)	24.2	18	22	377	382	381	7.9	8.3	8.0
K&H Bank (foreign acquisition)	9.6	9	7.6	160	231	210	3.0	3.9	3.2
CIB Bank (foreign acquisition)	7.1	9	7.3	568	153	95	2.0	3.8	2.5
Unicredit (foreign acquisition)	5.4	5	7	43	115	85	1.2	1.9	1.7
Raiffeisen (greenfield)	6.5	8	6.7	72	141	104	1.8	3.5	2.3
Erste Bank (foreign acquisition)	6.6	8	5.9	172	226	128	2.5	3.2	2.7
MkB (foreign acquisition)	8.7	8	5.5	50	219	79	1.6	0.8	2.0

Source: Raiffeisen Bank, Annual Reports for 2004, 2008, 2014

The data analysis of the banking system in Hungary (see Table 2) shows that the largest market share in assets belongs to OTP Bank, a state-owned bank, with a market share going from 24.2% in 2004 to 22% in 2014. In the second place, at a sizeable distance, there is K&H Bank (KBC, Belgium), with a market share of 7.6% in 2014, but declining during the whole period, followed by CIB Bank (Intesa Group, Italy), and Unicredit (the latter increasing gradually over the past 10 years).

Raiffeisen Hungary (a greenfield bank) has a unstable evolution of the market share. In terms of number of units and employees, the figure remains approximately stable during these 10 years in the case of OTP Bank. It is irregular in the case of the banks with foreign funds such as K&H, Unicredit, Erste Bank and MkB (increasing in 2008 compared to 2004 and decreasing in 2014 compared to 2008) but presents significant declines in the case of Erste Bank, confirming the reorganization of the bank in this country. Furthermore, Raiffeisen Bank, the only green-field bank in the top, also experienced a policy of reorganization on this market, the number of units and employees massively fluctuating from one period to another. However, the biggest decline in number of units is that of CIB Bank, where the number of units in 2014 does not exceed 20% of the 2008 value, meanwhile the number of employees plummeted by approximately 35%.

Table 3: Main banks in Czech Republic, in terms of market share, number of branches and number of employees (2004, 2008, 2014)

Bank (type of capital /entry mode)	**Market- share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
CSOB (foreign acquisition)	23.2	17	18.4	210	284	319	7.0	8.7	7.4
Ceska Sporitelna (foreign acquisition)	22	18	15.9	647	646	644	11.8	10.9	10.5
Komerční banka (foreign acquisition)	17.4	15	15.7	335	394	399	7.3	8.8	8.5
Unicredit (foreign acquisition)	5.4	7	9.1	64	56	173	2.0	1.7	2.9
GE Money (foreign acquisition)	2.2	2	2.6	129	219	243	2.0	2.3	3.2
Raiffeisen (greenfield)	2.4	4	2.4	48	100	119	1.1	2.2	2.6

Source: Raiffeisen Bank, Annual Reports for 2004, 2008, 2014

Contrasting with Hungary and Poland, the Czech banking system (Table 3) is controlled by foreign banks entering the market through acquisition: CSOB (member of KBC, Belgium) with market shares going between 22% and 18%, followed by two banks with substantial market shares (about 15-16%): Ceska Sporitelna (Erste Group, Austria) and Komercni banka (Societe Generale, France). Unicredit Czech Republic has an increasing market share in 2014 compared to 2004.
Further away follows a group of three banks, each with different evolutions: GE Money (part of GE Capital Group USA) and Raiffeisen Czech Republic (greenfield). CSOB has expanded its banking unit network until 2014, increasing by more than 100 establishments compared to 2004, while the number of staff members has been fluctuating. In the top of the list, we find that Ceska Sporitelna and Komercni Banka have maintained a constant number of territorial units and also with a low employee turnover. Unicredit Bank and GE Money Bank, as well as Raiffeisen Bank– have had an increasing trend in the number of units (tripling compared to 2004 in the case of Unicredit and Raiffeisen and doubling in the case of GE Money). The number of staff members has also increased from 2004 to 2008 for Unicredit and GE Money, as well as Raiffeisen Bank (even if less striking than the other two).

Table 4: Main banks in Croatia, in terms of market share, number of branches and number of employees (2004, 2008, 2014)

Bank (type of capital / entry mode)	**Market- share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
Zagrebačka Banka (foreign acquisition)	25.1	24	25.4	123	130	79	4.1	4.7	4.4
Privredna Banka Zagreb (foreign acquisition)	18.7	17	17.1		230	197		4.5	3.2
Erste & Steiermärkische Bank (foreign acquisition)	11.3	12	14.1	120	159	158	1.5	2.0	2.7
Raiffeisen Bank (greenfield)	10.6	11	7.8	35	70	70	1.6	2.6	2.3
Splitska Banka (foreign acquisition)	4.4	7	7.1	111	134	108	1.2	1.5	1.4
Hypo Alpe Adria Bank (greenfield)	9.9	10	7	25	97	74	0.9	1.3	1.5
Hrvatska Postanska Banka (state-owned)	2.4	4	4.3	3	37	51	0.3	1.5	1.1

Source: Raiffeisen Bank, Annual Reports for 2004, 2008, 2014

As in the case of the Czech Republic, the Croatian banking system (Table 4) can be divided into four levels. The most important bank is Zagrebačka Banka (part of Unicredit Group, Italiy), with a market share of more than a quarter of the total banking system. It is followed by a group of two banks, both entering via acquisition, Privredna Banka (Intesa, Italy) and Erste & Steiermärkische (part of Erste Group, Austria), respectively. The third group of banks consists of three banks with market shares between 7 and 8%, two of them entering the market as greenfield - Raiffeisen Bank and HypoAlpe-Adria-Bank, as well as Splitska Banka (part of Group Societe Generale, France). Although it has preserved the largest market share, Zagrebacka Banka had in these 10 years a downward trend in the number of units, plunging by almost a half in 2014 compared to 2008. In terms of employees, they have remained fairly stable over the past 10 years. Privedna Banka decreased its number of units in 2014 compared to 2008, and the number of employees was cut-down with almost 30%.

The number of units of Erste & Steiermärkische remained relatively constant, the number of staff members surging by almost 40% compared to 2008. The Raiffeisen number of units remained the same in 2014 compared to 2008, while the number of employees slightly decreased (less than 10%) compared to 2008.The other three top banks have a different evolution, Splitska presents a decrease of both (employees and units) compared to 2008, while Hypo Alpe, although decreases the number of units, increases the number of employees. Finally, the trend of Hrvatska Postanska is upturned compared to Hypo, i.e. it has increased the number of units, but reduced by almost a half the number of employees.

Table 5: Main banks in Bulgaria, in terms of market share, number of branches and number of employees (2004, 2008, 2014**)**

Bank (type of capital / entry mode)	**Market-share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
UniCredit Bulbank (foreign acquisition)	14.5	16	17.4	94	260	194	1.8	3.9	3.6
DSK Bank (foreign acquisition)	13.1	12	11.7	333	379	376	3.8	3.7	3.6
First Investment Bank (state-owned)	6.6	6	10.2	76	171	178	1.0	2.7	3.1
United Bulgarian Bank (foreign acquisition)	8.8	11	7.7	118	279	199	2.0	3.3	2.5
Eurobank (foreign acquisition)	4.7	8	7.2	123	223	188	1.2	2.8	2.5
Raiffeisen bank (greenfield)	8	10	7	51	195	154	0.8	3.7	2.9
SG Expressbank (foreign acquisition)	3.1	4	5.4	48	142	156	0.9	1.4	1.6

Source: Raiffeisen Bank, Annual Reports for 2004, 2008, 2014

Regarding the market share by assets in the Bulgarian banking system (Table 5), the first position belongs to Unicredit Bulbank (Unicredit, Italy) with a market share that has increased during the entire analysed period. DSK (OTP Hungary) follows with a decreasing market share. On the third place we find First Investment Bank (a state-owned bank), followed by United Bulgarian Bank (member of NBG Greece), Eurobank (Eurobank, Greece) and Raiffeisen Bank (a greenfield entry), all three with a negative trend compared to the 2008 period. The last on this ranking is SG Expressbank (Societe Generale, France) with an increasing market share from one period to another. In terms of number of units and employees, the main bank – Unicredit Bulbank experienced a decrease compared to 2008. In the case of DSK, the number of units and personnel remained stationary in 2014 compared to 2008, and for the First Investment Bank, the number of units and employees increased significantly in 2014 compared to 2008. The next three banks in Top 7 have varied over the past 10 years, number of branches employees increased in 2008 compared to 2004, while in 2008-2014 period trend have reversed, for both indicators and for most of these banks. Finally, the SG Expressbank registers a steady growth in market share and number of units and employees from one period to another, even if the bank reaches less than half of the first-ranked banks' figures.

Table 6: Main banks in Romania, in terms of market share, number of branches and number of employees (2004, 2008, 2014)

Bank (type of capital / entry mode)	**Market-share (%)**			**No. of branches**			**No. of employees (ths)**		
	'04	**'08**	**'14**	**'04**	**'08**	**'14**	**'04**	**'08**	**'14**
BCR (foreign acquisition)	26.2	20.3	16.2	315	641	538	12.5	9.1	7.1
BRD (foreign acquisition)	13.1	15.7	12.4	235	930	860	4.4	9.1	7.2
Banca Transilvania (private owned)	2.9	5.4	9.8	115	482	550	2.0	6.5	6.0
Raiffeisen Bank (foreign acquisition)	9.1	6	7.9	204	574	527	4.7	7.3	5.2
Unicredit (foreign acquisition)	1.4	5.5	7.9	82	242	183	1.2	3.0	3.4
CEC Bank (state-owned)	5.8	4.3	7.7	1300	1404	1077	9.2	6.6	6.3
Alpha Bank (greenfield)	3.2	5.5	4.6	19	200	151		2.5	2.0

Source: Raiffeisen Bank International, Annual Reports for 2004, 2008, 2014

In the Romanian banking system (see Table 6), in terms of market share (assets) we find in a leading position the Romanian Commercial Bank (BCR), part of Erste Group Austria, yet decreasing over the entire period. The distance from the challenger (BRD, part of Societe Generale France) is constantly reduced, even this bank has a changing market share. The third position belongs to Banca Transilvania (foreign capital) with a sustained growth in market share, followed by Raiffeisen Bank (initially a greenfield bank) with a oscillating trend. Unicredit Bank (which previously entered the Romanian market by acquiring a small foreign banks), continued to purchase another two medium-sized banks during 2004-2008, and reached 8% market share in 2014. CEC Bank (the only state-owned bank in this top), doubled its market share in 2014 compared to 2008. Alpha Bank, a greenfield bank (a subsidiary of Alpha Bank Group, Greece) displays a declining market share in 2014, compared to 2008.

Regarding the evolution of the bank units, BCR, BRD, Raiffeisen Bank and Unicredit, i.e. the major banks that entered through acquisition in the banking market of Romania, have changed their trends from one period to another, increasing sharply in 2008 compared to 2004 then diminishing noticeably until 2014. Moreover, with the exception of Unicredit, which recorded a higher number of employees in 2014 compared to 2008, all the other three major banks had reduced their staff members during the 2008-2014 period. The most significant cut-down was realized by BCR Erste, which had undergone a most profound reorganization for a top bank.

Banca Transilvania registers a small reduction (below 10%) in the number of employees in 2014 (compared to 2008), but markedly increased the number of banking units from one period to another, from 115 units in 2004 to 550 2014.

With CEC Bank and Alpha Bank (two distinct banks in terms of nature and origin of funds), the situation was identical, both banks recording a decrease in number of units in 2014 compared to 2008. In addition, during this period, the number of employees declined.

3. **In conclusions**

Foreign banks that have entered in the last two decades on CEE banking markets (by greenfield or by acquisition of a domestic bank) develop both common and national-specific features. Some of these developments (on CEE markets) are the expression of the transformation undergone by parent banks on home markets. The parent banks could be, in turn, the subject of restructuring, sale or merger processes, which could often change the perspective or the behaviour of their subsidiaries, on various markets.

We notice, therefore, a clear domination of foreign banks entered via acquisitions, both in number and assets. It is undeniable in countries like the Czech Republic, Romania, Bulgaria, Croatia, and noticeable (with presence in the top 3 or top 5) in the other countries of the CEE. In two important countries of the region (Poland and Hungary) that had experienced banking reforms and market opening for foreign capital since the early 90s, the state-owned bank maintains a remarkably robust position at the top. In the other countries, the domestic capital banks are, relatively, low, but on improving trends, especially in the financial performances. Surprisingly, *de novo* banks, represented in all 6 countries almost exclusively by Raiffeisen Bank, have no special strategy or particular behaviour, and they are situated at the bottom of the ranking. Our conclusions deserve to be supplemented in some details. First of all, this is a deduction based on the analysis of some stages occurring in the past 10 years. It is likely that the presence of these greenfield banks were better highlighted (in terms of market share, financial performance, efficiency, know-how) in the previous period (1995-2004), when the banking systems of CEE were dominated by a few state banks, several small size domestic (private) banks, and the internal reorganization of large banks, privatised or not, was not yet completed. In our opinion, the analysed phenomena (between 2004 and 2014), does not necessarily represent an expression of diminishing the importance of the greenfield banks, but rather a sign of maturing and consolidation of banking systems in the CEE region. It is unlikely that on developed, competitive, well-supervised markets, that concluded their reorganization and overcame the crisis, this type of bank (or any other) would distinguish itself by the systematic changes in market share or outstanding developments in performance indicators.

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BUDGET AND POLITICAL INSTITUTIONS AND BUDGETARY PERFORMANCE

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Abstract: *In this study, the role of budget and political institutions in promoting the efficiency of the budget process in Nigeria is examined. Efficiency of the budget process is described as budget activities that aid fiscal policy to respond asymmetrically to the business cycle by contracting during booms and expanding during recession. The direct institutions guiding the budget process as well as politically motivated institutional influences are considered in the study in order to show their varied impacts. Descriptive and correlation analyses are employed in describing the relationships using budget data obtained from annual budget reports in Nigeria. The empirical results from the study compare well with both regional and international positions; the budgetary process in Nigeria is fraught with largescale inefficiencies in terms of preparation and allocations. Moreover, budget institutions in Nigeria are shown to be weak in terms of maintaining accelerated processes or efficient resource use. The institutions do not provide the expected formidable guard against inefficiency of budget outcomes in Nigeria. This is largely due to strong influences of political factors in fiscal operation which, in turn, is due to inconsistent oil price development overtime. Thus, more external factors appear to bear in on the budgetary processes in Nigeria. To ensure improved countercyclical fiscal performance based on budgetary provisions therefore, the institutional framework of budget processes has to be strengthened.*

Keywords: Budgetary process; budgetary institutions; Nigeria.

JEL Classification: E62; H5; H77.

1. Introduction

The debate on fiscal policy as an essential agent of macroeconomic management in developing economies has focused on the output growth outcomes. The consensus in this regard is that in developing countries fiscal policy is highly procyclical, owing mainly to the effects of political economy factors. The proposition is that while developed countries are equipped with strong institutions and political systems, developing countries rarely have strong, healthy and stable institutions (Gavin and Perotti, 1997; Kaminsky, Reinhart and Vegh, 2004; and Talvi and Vegh, 2005). The predominance of resource dependence for fiscal activities has further compounded the efficiency tragedy of fiscal policy in these countries. Barnett and Ossowski (2002) identify this problem by highlighting the exhaustible nature of revenue streams and uncertainty posed by volatile income flows that are exogenous. This has led to implications that resource-rich developing economies have not performed well relative to their developed counterparts. While this may be true in the case of Nigeria, additional forces may be at work, persistently rendering fiscal stabilization efforts to be weak.

The difficulties posed by a volatile, unpredictable, and exhaustible source of fiscal revenue to fiscal management have been compounded in a number of cases by institutional weaknesses (IMF, 2007). Such institutional weaknesses hold powerful influences on the success and sustainability of fiscal management in Nigeria. For instance, dynamic factors

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surrounding Nigeria's fiscal setup have persistently derided the effectiveness of the Fiscal Responsibility Act which was introduced in 2007 to ensure that oil price shocks are not transmitted directly into the Nigerian economy.

Fiscal institutions surrounding the budget preparation in Nigeria seem to be weakened by persistent political institutional influences. Successful budget preparation within the medium term expenditure framework (MTEF) has often been intensely challenged due to pressures from political actors involved within the fiscal space. Benchmarks for budgetary applications are often manipulated to suit political interests with attendant delays in budget presentation and implementation. However, the introduction of the rules does not seem to have extensively stymied perennial political incursions in the budget processes. The data indicate that the oil price benchmark for the budget has grown by 260 percentage points from $20 pb in 2003 to $72 pb in 2012, even though neither the deficit ratio nor output forecast has changed considerably over the period. The National Assembly seldom adjusts output forecast, but are wont to amend either the oil price benchmark or total spending in each of the years.

Apparently the rationale for budgetary adjustment is based on current movements in oil prices and revenues. For instance, oil price benchmark was reduced from the initial presidential submission in 2009 in response to dramatic fall in oil prices in late 2008, but the benchmark was increased in 2010 with improvement in oil prices and expectation of fairly stable movement over the next periods. Indeed, Frankel (2011) noted that overly optimistic official forecasts tend to stem from the influence of politics which can exacerbate when 'the government is formally subject to budget rules.' As Olomola (2012) aptly observed, budget delays have occurred in terms of the preparation, screening, approval and implementation" in Nigeria. He maintained that the usually long delay in publishing the approved budget for both official and unofficial use has intensified in recent years, leading to weakening of the institutional foundations of transparency and accountability that are firm guards of the budgetary process. According to Olomola (2012), perpetual delays in release of approved budgets has led to ad hoc provisions have been made by both the legislative and executive arms of government to 'operationally extended from 12 to 15 months – a move which signaled the collapse of the budget process.'

In Nigeria, fiscal institutions would be more successful in aiding budget performance when there is broad political support for pursuing fiscal objectives. The main question that this study focuses on is whether budget and political institutions have had any success in ensuring budgetary regularity and efficiency in fiscal manage in Nigeria since these institutions were put in place. This will constitute the background upon which fiscal institutions in Nigeria can be considered as either effective or weak. Apparently, procyclical fiscal policy and disproportionate increases in government spending during oil booms in the country can be a manifestation of weak budget institutions that lead to weak fiscal management.

2. Literature

North (1990, 1992) set the pace for analyzing institutional factor influences on economic performance. Most of the studies that followed North's work show the positive benefits of improved quality of institutions in general output and growth outcomes (for instance, Kaufmann, Kraay and Zoido-Lobaton, 2003; Acemoglu, Johnson, and Robinson, 2005; and Akpan and Effiong, 2012) usually through the channels of policy analysis and the decision making processes of governance. The specific roles of institutions in coordinating and aligning fiscal policy with macroeconomic objectives have also received some attention although most of the studies focus on cross-country analysis (e.g. Frankel, 2011; Debrun and Kapoor, 2010; and Lledo, Yackovlev and Grdenne, 2009). These studies confirm that fiscal institutions are essential in the determination of fiscal behaviour in developing

countries. They also investigate reasons why budget institutions play a role in shaping the fiscal response to the cycle. The general consensus is that budgetary spending tends to expand during booms, often resulting in increased spending commitments which are difficult to rescind. The overall implications of the studies give the direction that well-designed and efficiently managed budget institutions can enable policymakers to adopt a countercyclical policy stance by reducing the deficit bias, raising awareness about the medium term implications of policy actions, and by highlighting the need for sustainable policies.

The *common pool phenomenon* - which arises when the various decision makers involved in the budgetary process (legislators, the finance minister, line ministers, etc.) compete for public resources and fail to internalize the current and future costs of their choices (Velasco, 1999) – has a strong impact on the nature of the budget process and the quality of budget outcomes (Dabla-Norris et al, 2010). In the same vein, information asymmetry and incentive incompatibilities between the government and voters and within the government hierarchy (e.g., between the federal and state governments) can also influence the size, allocation, and use of budgeted resources (Dixit, 1998; and Lienert, 2005). Unless regulated by strong institutional arrangements, the common pool phenomenon can result in a "deficit bias" in the form of excessive expenditures, deficits and debt levels (see IMF, 2010). Strong core fiscal institutions can counteract this bias by ensuring that the budgetary consequences of policy decisions are appropriately taken into account.

Hallerberg and Wolff (2006) researched literature and noted that problems with fiscal discipline can arise from at least two sources: Differences between long-run and short-run benefits can induce deficit spending biases if policy makers discount the future more heavily than private consumers, second, differences between the marginal benefit and marginal cost to an individual group in the budget making process lead to a common pool resource problem Procedural rules of the budget process can be used as a commitment device to reduce this spending bias. The main feature characterizing fiscal institutions can thus be characterized by the degree to which they centralize the decision-making process (Hallerberg, Strauch, and von Hagen 2004). Good budget institutions centralize the process and reduce the spending bias associated with the common pool problem.

We seek to contribute empirical backing to the growing literature on budgetary and fiscal institutions in Nigeria. Moreover, institutional factors and their setups can be country-specific. For instance, apart from the apparent effects of poor governance and corruption on economic performance in Nigeria, other institutional factors like the federal system, resource allocations, budgetary institutions, and the arms of government exert strong effects on fiscal and economic behaviour (Olomola, 1999, 2012; Wantchekon and Asadurian, 2002; Eifert, Gelb and Tallroth, 2002; and Jimoh 2003).

3. Budgets and Budgetary Allocations in Nigeria

A major institutional issue that governs budgets and fiscal allocations in Nigeria is Fiscal Federalism that has been enshrined into the constitution. According to Kalu (2011), Fiscal Federalism in Nigeria is synonymous with revenue allocation and "resource control". Indeed, the methods, procedures and formula for dividing resources among the various segments of the country in Nigeria has always been an issue of controversy. From the onset, various commissions have been set up to work out acceptable and equitable revenue allocation formula for the country. The commissions include:

- The Phillipson commission of 1946
- The Chicks -Phillipson commission of 1951
- The Chicks commission of 1953
- The Raisman Commission of 1958
- The Binns Commission of 1964

- The Dina Interim Revenue Allocation committee of 1968
- The Aboyade Technical Committee of 1977
- The Okigbo Presidential Commission of 1979
- The T.Y Danjuma Fiscal Commission of 1988

In perspective, there has been many insinuations about undue influences by political factors on the position of the various commissions with the tendencies to suit particular constituencies and that their analyses are not informed by logic but preconceived self or sectional interests rationalized and justified by theories (Kalu, 2011).
Essentially, state governments in Nigeria rely mainly on federal allocation, grants and proceeds from excess crude account as their major sources of funding. As shown in Table 1, this dependence also affects the structure of local government allocations. This could, in effect, influence the vested interest of state and local governments, either through representations at the National Assembly or direct fiscal relations with the centre, in distorting the budgetary system to favour their cause. The fiscal unitarism, in the Nigerian polity, brought about by the above, provided incentive to abandon internal revenue generation drive, macroeconomic mismanagement and instability in the states. It is also an open license for uneconomical competitiveness in the federal government's provision of public services and public goods across the states, the so called 'federal presence' (Ojo, 2010).

Table 1: Vertical allocation of the federation account, 1981-Till Date

	Initial 1981 Act 1/	Revised 1981 Act	1990	January 1992	June 1992 to April 2002	May 2002 (1st Executive Order) *	July 2002 (2nd Executive Order) *	March 2004 (Modified)/ 2*
Federal Government	55	55	50	50	48.5	56	54.68	52.68
State Government	26.5	30.5	30	25	24	24	24.72	26.72
Local Government	10	10	15	20	20	20	20.6	20.6
Special Funds	8.5	4.5	5	5	7.5			
Derivation (Oil Producing States)*	2	2	1	1	1	0	0	0
Dev. Of Mineral Producing Areas	3	1.5	1.5	1.5	3	0	0	0
Initial development of FCT Abuja	2.5	0	1	1	1	0	0	0
General Ecological problems	1	1	1	1	2	0	0	0
Stabilisation	0	0	0.5	0.5	0.5	0	0	0
Savings	0	0	0	0	0	0	0	0
other Special Projects	0	0	0	0	0	0	0	0
TOTAL	100	100	100	100	100	100	100	100

Source: Adapted from Ojo, 2010

Note: 1. Nullified by Supreme Court in October 1981

* From the 1999 Constitution, the 13% Derivation provision is accounted for before the revenue is allocated into the federation account.

2. The current revenue formula is based on the modified grant from the Federal Ministry of Finance, which came to effect in March, 2004

Empirical Analysis

The main issue investigated in the empirical analysis is to show that fiscal outcomes respond effectively to the effects of poor budgetary and political institutional setups in Nigeria. Fiscal institutions are basically mechanisms that are intended to permanently shape fiscal policy design and implementation (IMF, 2010). The institutions are categorized into two sets for the purpose of this study: the first involves the special fiscal institutional set-up in managing fiscal policy over the last few years. The budgetary oil price benchmark and deficit ceiling are included for the analysis. The second primarily focuses on the roles of budget-making institutions measured as the outcomes of their influences with respect to time taken to pass the annual budget (as in Lienert, 2005).

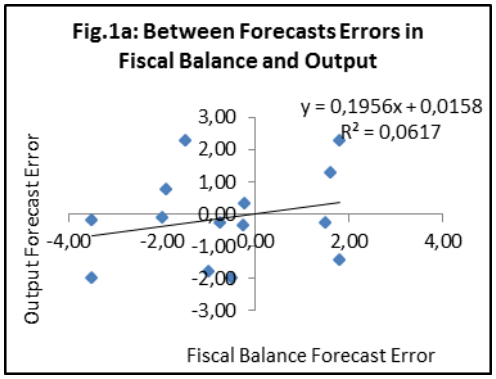
These measurements particularly follow Tornell and Lane (1998) voracity arguments to fiscal procyclicality in resource-rich countries. They argued that economic and fiscal performance could be reduced when there are powerful groups, especially in a system with weak institutional barriers to discretionary redistribution. This is because the 'non-cooperative powerful groups generate a redistribution struggle' which often ends up in wasteful and inefficient use of the resources. In the same analysis, the researchers showed that a reduction in power concentration through increasing the number of powerful groups would ensure better economic performance. We intend to provide empirical tests for these arguments for the Nigerian case. In Table 2, the descriptive statistics for out-turns and budgetary forecast errors in output and fiscal deficit between 2003 and 2012 are reported. The errors are computed as the difference between forecast values and actual out-turns. The standard deviations for forecast errors are higher than those of actual outcomes in both deficits and output; errors appear to be rife in budgetary forecasts. This suggests weakness in fiscal or budgetary applications in the country.

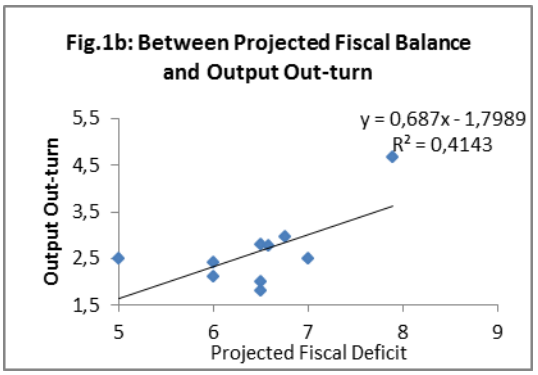
Table 2: Errors in Forecasting Budget Deficits expressed as % of GDP and Output Growth Rate for 2003 to 2012

	Actual Outcomes		**Budget Forecast Error**	
	Budget Deficit (% of GDP)	Output Growth (%)	Budget Deficit (% of GDP)	Output Growth (%)
Mean	1.86	6.47	-0.27	-0.76
Max	3.3	7.9	-2.0	-3.50
Min	0.5	5	2.30	1.80
Std.	1.19	0.75	1.28	1.61

Source: Federal Government of Nigeria, Annual Budget Reports

The place of budgetary institutions in affecting budgetary stance is initially presented in figure 1 below. In this place, we show how effective the annual forecasts about the fiscal balance and output needed for each budget year have been. We do this by examining the relationship between errors in forecasts and output for the budget years. In figure 1a, the relationship between budgetary forecast errors in fiscal deficits and output indicates a positive slope. If there are errors in fiscal balance benchmarking, there is a relatively high chance that errors will occur for output forecasts. The second chart shows that when fiscal balance is projected high, output tends to turn out high too. These results indicate that if budgetary rules are weak and ill-planned, the results in output will follow the same pattern.





Source: Underlying Data from Federal Government of Nigeria, Annual Budget Reports

4.1 Budget Institutions and Fiscal Cycles

The effects of the budgetary institutions in budget outcomes in Nigeria are particularly lucid from the perspective of actors in budgetary administration. Here, we consider the rules set-up by the system to monitor the federal budget for it to function within a medium term expenditure framework, and the influences exerted by key budget actors (the legislators cum executive arms of government). In table 3 below, a simple correlation matrix is reported showing the relationship that fiscal rules and budgetary preparation efficiency have on fiscal outcomes in the country since 2003. Error in fiscal balance forecast has a negative relationship with actual output level, suggesting that when the fiscal balance is unduly and inefficiently fixed, output growth tends to reduce. However, when projected balance is high, output growth may rise for the period (as shown by the positive correlation coefficient) since spending is expected to rise along with the projected balance. Oil price forecast error is negatively correlated with actual fiscal balance but positively correlated with balance error. This shows that weak oil benchmarking tends to reflect in balance error. Hence, it is shown that oil price movement reflects on the eventual fiscal balance in Nigeria. This is an indication that fiscal institutions are still not effectively isolated from oil price vagaries in the international market.

Table 3: Fiscal Institutions and Budget Effects Correlation, 2003-2012

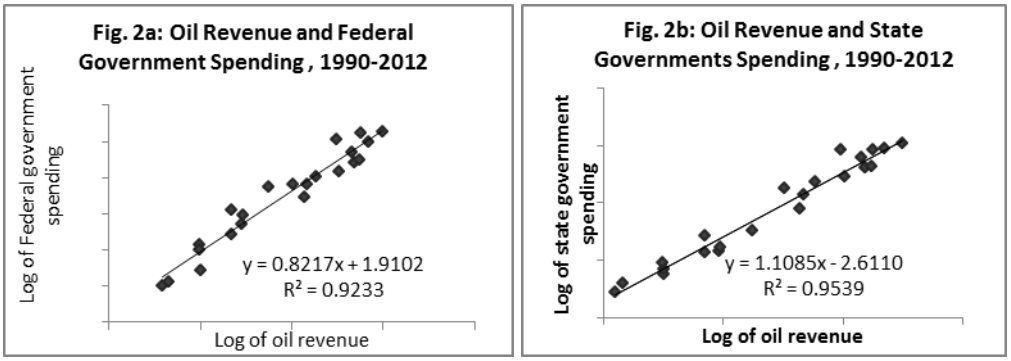
	Actual output	Actual fiscal balance	Balance error	Budget making period	Early passage of budget
Actual fiscal balance	0.439				
Balance error	-0.196	0.087			
Projected balance	0.644	-	-		
Budget making period	-0.088	0.317	0.317		
Early passage of budget	0.183	0.496	0.178	0.736	
Oil price forecast error	-	-0.065	0.284	0.158	-0.035

Source: Federal Government of Nigeria, Annual Budget Reports

In terms of the budget process, influence of budget institutions are viewed from the time taken to complete the budget processes. In table 3, a negative correlation is reported between length of time taken to complete the budget process and output growth for the period, but early budget passage is positively related with output growth. It can also be seen that a positive relationship exists between period of time taken to complete the budget process and the difference between actual fiscal balance and budget benchmark. The general indication of these results is that fiscal institutions in Nigeria are not as strong as should be and there influences tends to exacerbate fiscal procylicality in Nigeria. Perhaps, the reason for this weak performance may be linked with the political institutions effect as shown in the next analysis.

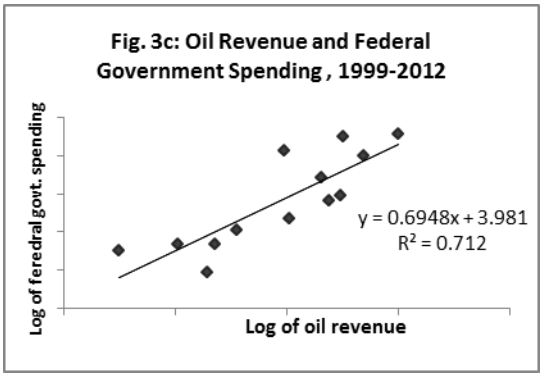
4.2 Political Institutions and Budget

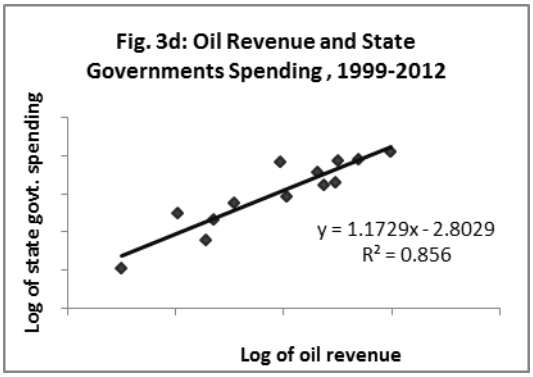
An analytical position on the voracity view may also be shown by examining the role of political influences on the budget outcomes. In this section, we show that spending patterns based on oil revenues is heavily influenced by state and federal government relationships. In Figure 2 the scatter plot for the relationship between oil revenue and both federal and state governments spending for the period 1990 – 2012 are plotted along with the regression line and equation. It can be seen that the slopes for each of the charts is rather steep and positive showing that as oil revenue rises, spending automatically rises too. It should be noted that oil boom episodes that witness less than proportionate increase in government spending reflects the success of fiscal policy management restraint or fiscal institution success. However, periods that witness more than proportionate increase in spending as a result of an oil boom is a sign of existence of voracity effect in which the government is under pressure to increase spending (Dabla-Norris et al, 2010).



Source: Underlying Data from Central Bank of Nigeria, Statistical Bulletin

In comparison, the R squared for the 1999-2012 period is lower than that of the entire period suggesting that more factors, other than federal allocations, now explain government spending at both tiers. However, the slope coefficient for the states relationship is greater than one, indicating that the states tend to increase spending more than proportionately to the rise in oil revenue inflow. Also, even though the R squared has reduced after 1999 the slope coefficient has actually increased, indicating that state governments have mounted higher pressure on the pool resources of government since democracy was restored. This phenomenon can actually prevail when a nation transits into democracy but the institutions are not strengthened (Tornell and Lane, 1998).





Source: Underlying Data from Central Bank of Nigeria, Statistical Bulletin

Conclusions

In this study, the role of budget and political institutions in promoting the efficiency of the budget process in Nigeria was examined. Efficient budget process, it is argued, should aid fiscal policy that responds asymmetrically to the business cycle by contracting during booms and expanding during recession. In a natural resource dependent economy like Nigeria, this fiscal policy stance can be difficult to pursue or attain because of the peculiar nature of the supply side elements – revenue is highly unpredictable, and the political structure paves way for extensive influences. Because of this, budget processes have been found to be inefficient and fiscal policy is often procyclical (fiscal balance tends to rise during booms and fall in recession). We sought to investigate the role of the main players in fiscal institutions in either fostering or ameliorating this pattern of fiscal policy in Nigeria. The results showed that fiscal institutions were rather weak (they do not provide the expected formidable guard against procyclical fiscal management) and still react based on oil price development in directing fiscal policy in Nigeria. The influence of political factors in fiscal operation may be blamed for these inefficient budget institutions.

The results in our study are compare well with those for more advanced economies. Hallerberg et al. (2006) used econometric analysis to demonstrate the budgetary impact of both budgetary and political institutions for the European Union and showed that the 'effectiveness of centralising budgetary decision-making varies with the form of fiscal governance' in place. They noted that budgetary institutions would contribute less to fiscal sustainability when the political system is loose (such as a federal state) in which the stringency of multi-annual targets seems to be more important. However, the budget institutions would be more effective in attaining effective budget process 'more stringent budgetary targets seem to operate as disciplining devices' Hallerberg et al. (2006).

The results from our study therefore implies that the federal system in Nigeria would provide stronger impetus for weakening the budget institutions and maintaining fiscal discipline over time.

Within the context of other studies, this paper confirms the findings by Gollwitzer (2010) who conducted an Africa-specific composite indicator for the quality of budgetary institutions which represents an indicator of inter-temporal fiscal discipline for each of the African countries. The results also showed that Nigeria did not perform well in terms quality of budgetary institutions, especially in comprehensiveness and transparency. In addition, Gollwitzer (2010) results (also using correlation analysis) showed that for the entire African region, good budgetary institutions lead to less deficits in government, especially when budgetary transapency is used as the measure of quality.

In order to ensure improved countercyclical fiscal performance of the budgetary process therefore, the institutional framework of budget processes has to be strengthened. For

instance, the enactment Sovereign Wealth Fund Act is a good starting point to ensuring this purpose. Also, elements of budgetary management should be improved by granting strong powers to the Ministry of Finance and other professional contributors to the budget on legal initiatives with budgetary impact and in budget decisions, especially regarding the process of budget passage. Also, budgetary planning should command a high technical capacity in order to limit benchmarking and forecasting errors.

6. Acknowledgement
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Bio-note

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MISCELLANEOUS:
DOCTORAL THESES IN ECONOMICS DEFENDED AT UNIVERSITY OF ORADEA DURING THE ACADEMIC YEAR 2015-2016

In this issue we commence an initiative which we wish to become yearly, every second number of *Oradea Journal of Business and Economics*, namely a presentation of all doctoral theses defended during the academic year at the Doctoral School of Economics of the University of Oradea, Romania. Consistent with the journal's objective "*to promote the research results of young doctoral students and researchers.…*", we hope this presentation to be equally an appreciation of the efforts of the Ph.D. students, their supervisors, the advisory committee, as well as an additional dissemination of these accomplishments in the academic environment.
Today's economic context offers a variety of research topics and reflection. The approach to these issues exceeds the rigorous barriers of a single domain and a multi-disciplinary approach is necessary in order to explain and understand economic phenomena. In this challenging context, at the Doctoral School of Economics, five Ph.D. students defended their theses during the academic year 2015-2016. The topics were varied and approached current events, generating numerous published articles in prestigious research journals, covering subjects as: tax evasion, youth on the labour market, youth entrepreneurship, governance or state aid.
These theses were developed under the coordination of the following professors of the Faculty of Economics: 3 theses were supervised by Prof. Alina BĂDULESCU and 2 theses were supervised by Prof. Mihai BERINDE. Subsequently, we shall present the theses' titles, the Ph.D students and supervisors, as well as a short presentation of the theses.

1. ANALYSIS AND IMPROVEMENT OF THE METHODS TO FIGHT AGAINST CROSS-BORDER TAX EVASION
Ph.D. Student: Dorică STANCIU, Coordinator: Prof. Mihai BERINDE
The purpose of this thesis is to present and analyse various issues of conceptual and methodological taxation and tax evasion in a national and European context and highlight the policies and strategies needed to prevent and combat tax evasion and eliminate conflicting interpretations of the provisions law. Tax evasion is an economic and social phenomenon which is extremely harmful, especially for a country in transition to an authentic market economy, and can lead to creating a favourable environment for the development of illicit practices. In this sense, a profound reform of the administration of taxes in Romania targeted towards increasing tax collection is absolutely necessary, being liable to create the fiscal space needed to reduce the tax burden on wage labour, which is still at a very high level.

2. YOUTH ON THE LABOUR MARKET. OPPORTUNITIES AND CHALLENGES OF INSERTION
Ph.D. Student: Roxana HATOS, Coordinator: Prof. Alina BĂDULESCU
The purpose of the paper is to provide an analysis of the youth labour market in terms of opportunities and challenges for integration. Due to the lack of experience and a small number of professional skills, compared to most adults who are already integrated into the labour market, young people often face difficulties finding jobs. Looking ahead, the recommendations for better employability of young people involve addressing the problem from several perspectives. These recommendations can be found in policies both at a European and national level. Concrete recommendations may refer to: continuing the act of identifying the youth category NEETs and their integration into support programs for further

insertion into the labour market, assurance of the quality training and the development of the training market, or correlation of educational offer to the requirements of employers.

3. YOUTH ENTREPRENEURSHIP. MOTIVATIONS, DIMENSIONS AND INFLUENCES

Ph.D. Student: Sebastian ȘIPOȘ-GUG, Coordinator: Prof. Alina BĂDULESCU

Entrepreneurship is a phenomenon with a significant spread. In its general form, the establishment of companies, it generally leads to the emergence of a large number of small and medium enterprises. Entrepreneurship is an important factor of economic growth that is analysed in depth in the thesis, both for explanatory and predictive purposes. The obtained results suggest that stimulating creativity, encouraging youth to act when necessary (pro-activity), increasing their confidence regarding the opportunity to influence their own economic future, increasing their capacity to bear unpleasant events (tolerance regarding frustration associated with distress) and a lower anticipated impact of failure (fear of failure) could be as many ways of intervention to stimulate youths' entrepreneurial intentions. The thesis concludes with an analysis of future prospects of entrepreneurship in Romania. Entrepreneurship in Romania shows a strong seasonal component, which can be blamed on patterns of economic activity present in Romania.

4. RESEARCHES ON PUBLIC ECONOMICS AND GOVERNANCE IN ROMANIA

Ph.D. Student: Lucia KOLOZSI, Coordinator: Prof. Alina BĂDULESCU

This paper aims at a complex analysis of public governance from different perspectives, its structural relationships with corporate governance, examining in detail the challenges of its application in public administration, with special attention to Romania. After a theoretically synthesis, the paper approaches the concrete situation of local governance in Romania. The conclusions of the research "on the ground" following the objectives undertaken at the beginning of the research, aim to be equally critical of and practical to the state of the local government in terms of meeting the requirements of modern governance, but is also an analysis of evolutionary transformations occurring in this sector over the past 10-15 years, the accomplishments and failures, with progress, stagnation and even regress..

5. EUROPEAN STATE AID POLICY APPLIED IN ROMANIA AND GERMANY

Ph.D. Student: Adelina VENIG UNGUR, Coordinator: Prof. Mihai BERINDE

The overall objective of this paper is to discuss state aid policy as an essential component of the EU competition policy by benchmarking Romania and Germany. It appears that, overall, the level of state aid for Germany is seven times higher than in Romania. Not only the difference in size between the economies of the two countries led to such a result, but rather the lack of administrative capacity and training in Romania, which could attract more aid for its level of economic development. The research conducted reveals that in the analysed period, state aid in Germany focused particularly on horizontal objectives, considered at EU level to have less of an effect of distorting competition.

Details regarding the content of these PH.D. theses can be accessed at: https://www.uoradea.ro/Doctoranzi+care+au+sus%C8%9Binut+teza+de+doctorat+%C3%AEn+anul+2015?structure=7 and https://www.uoradea.ro/tiki-index.php?page_ref_id=814.

Compiled by Roxana HATOS

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