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Growth Acceleration and Demographic Structure: The Case of ECOWAS Countries

Büyüme İvmelenmesi ve Demografik Yapı: ECOWAS Ülkeleri Örneği

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Abstract

The demographic structure of countries has significant effects on economic growth. Most developing countries are passing through a demographic transition. Although African countries still have higher fertility rates than other developing countries, fertility rates show a decreasing trend, which leads to a window of opportunity for potential demographic dividend for African countries. Within this context, this paper investigates the relationship between growth accelerations and demographic structure in ECOWAS (Economic Community of West African States) countries over the period 1961-2019. To do so, first, we identify the growth acceleration episodes using the growth acceleration methodology developed by Hausmann et al. (2005). Then, we test the demographic determinants of growth accelerations employing the panel probit regression method. The results show that while urban population and life expectancy have a significant and positive impact on the likelihood of growth accelerations, the fertility rate has a negative and significant impact on the probability of growth accelerations. In other words, an increase in urban population and life expectancy at birth increases the likelihood of growth accelerations, whereas an increase in fertility rate decreases the probability. However, the results show a negative but statistically insignificant relationship between age dependency, young-age dependency, and old-age dependency ratios and the likelihood of growth accelerations.

Jel Codes: *E0, J11, O47*
Keywords: *Economic Growth, Growth Accelerations, Demographics, Probit Model.*

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Öz

Ülkelerin demografik yapısı ekonomik büyüme üzerinde önemli etkilere sahiptir. Gelişmekte olan ülkelerin çoğu demografik geçiş sürecini deneyimlemektedir. Afrika ülkeleri diğer gelişmekte olan ülkelere oranla hala daha yüksek doğurganlık oranlarına sahip olsalar da doğurganlık oranları azalan bir eğilim göstermektedir. Bu durum Afrika ülkelerinde potansiyel bir demografik temettü için bir fırsat penceresine yol açmaktadır. Bu çerçevede, bu çalışmada, 1961-2019 döneminde, ECOWAS (Batı Afrika Ülkeleri Ekonomik Topluluğu) ülkelerinde demografik yapı ile büyüme ivmelenmesi arasındaki ilişki incelenmektedir. Bu doğrultuda, öncelikle Hausmann vd. (2005) tarafından geliştirilen büyüme ivmelenmesi metodolojisi kullanılarak büyüme ivmelenmesi gerçekleşen dönemler belirlenmektedir. Daha sonra büyüme ivmelenmesinin demografik belirleyicileri panel probit yöntemi aracılığıyla incelenmektedir. Elde edilen sonuçlar, kentsel nüfus ve doğumda beklenen yaşam süresinin büyüme ivmelenmesi olasılığı üzerinde pozitif ve anlamlı etkisi olduğunu gösterirken; doğurganlık oranının ise büyüme ivmelenmesi olasılığı üzerinde negatif ve anlamlı bir etkiye sahip olduğunu göstermektedir. Diğer bir deyişle kentsel nüfus ve doğumda beklenen yaşam süresindeki artış büyüme ivmelenmesi olasılığını artırırken, doğurganlık oranındaki artış ise büyüme ivmelenmesi olasılığını azaltmaktadır. Bununla birlikte, bağımlılık oranı, yaşlı bağımlılık oranı ve genç bağımlılık oranı ile büyüme ivmelenmesi olasılığı arasında negatif yönlü ancak istatistiksel olarak anlamsız bir ilişki tespit edilmiştir.

Jel Kodları: *: E0, J11, O47*
Anahtar Kelimeler: *Ekonomik Büyüme, Büyüme İvmelenmesi, Demografi, Probit Model.*

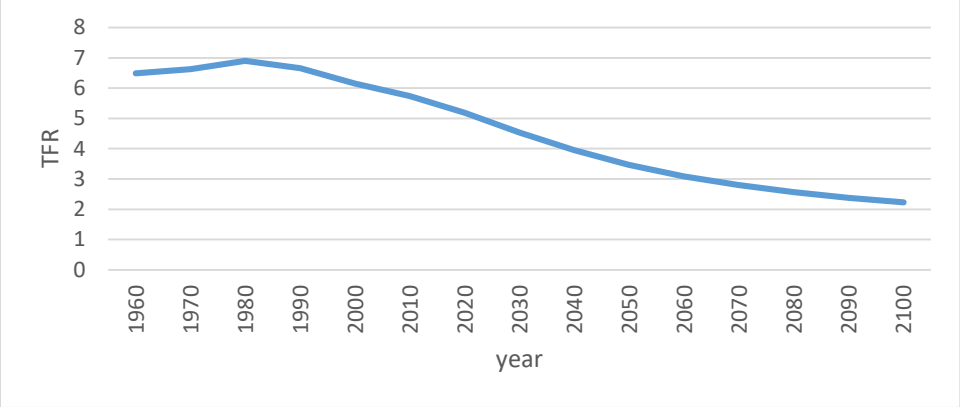
1. Introduction

The demographic profile of countries has significant effects on economic growth (Bloom et al., 2001; Mason, 2003; Bloom et al., 2003; Kelley & Schmidt, 2005; Hoşgör & Tansel, 2010; Aiyar et al., 2016). Numerous studies have studied the link between demographic conditions and economic growth, mainly population growth and economic growth. However, in recent years, studies on demographic structure (change) and economic growth have emphasized the importance of age structure instead of the size and growth of the population. Age groups do not have common similar behaviors, which leads to different economic outcomes. For instance, while the working-age population tends to save more and consume less, the older population requires health care and retirement benefits, and the youth population requires more investment in education and health (Bloom et al., 2001; Bloom et al., 2003). The working-age population is increasing as countries pass through the demographic transition from high fertility (mortality) rates to low fertility (mortality), which creates a "demographic window of opportunity" for countries and promotes economic growth, commonly referred to as the "demographic dividend" (Bloom et al., 2007:2). Most developing countries are passing through the demographic transition; however, the demographic dividend is time-limited, and taking advantage of a higher working-age population requires the right policies.

Within this context, this paper investigates the demographic factors affecting the growth accelerations for ECOWAS (Economic Community of West African States) countries over 1961-2019. ECOWAS, which has 15 members, was established on 28 May 1975. The main objectives

of the organization are to promote cooperation and integration with a view to creating a West African Economic Union to increase the living standards of the people in the region, strengthen the relationship among member countries, improve economic stability, and support the economic development of the continent (ECOWREX, 2008:1). Though most countries in the world are experiencing the demographic transition, Africa is an outlier. (Bloom et al., 2007). African countries still have higher fertility rates compared to other developing countries. Figure 1 shows the total fertility rate (TFR) for ECOWAS countries according to United Nations (2019) actual data and projections from 1960 to the end of the 21st century. Figure 1 clearly shows that West African countries still have higher fertility rates; however, it also indicates that TFR has started to decline. A decrease in fertility is accompanied by a window of opportunity for potential demographic dividend for African countries (Bloom et al., 2007; Karra et al., 2017).

Figure 1: TFR for ECOWAS Countries (United Nations (2019) Projection)



This paper contributes literature in the following ways. First, this study is one of the few that focuses on the link between demographics and economic growth for ECOWAS countries. Second, to our best knowledge, this is the first study testing the demographic determinants of growth accelerations in ECOWAS countries using the growth acceleration methodology developed by Hausmann et al. (2005). The rest of this paper is organized as follows. Section 2 reviews the related literature. Section 3 presents the data and methodological approach of the paper. Section 4 presents the empirical results. Finally, section 5 concludes.

2. Literature Review

The literature on the link between demographics and economic growth is extensive (Ehrlich & Lui, 1997; Headey & Hodge, 2009; Menike, 2018). Within this context, numerous studies have analyzed the link between economic growth and several demographic indicators, such as the age profile (Bloom & Williamson, 1998; Kelley & Schmidt, 1995, 2005; Bloom & Finlay, 2009; Hu et al., 2021), the fertility rate (Bloom et al., 2009; Lee & Mason, 2010; Ashraf et al., 2013; Karre et al., 2017), life expectancy (Bloom & Canning, 2004; Cervellati & Sunde, 2011, Kunze, 2014), etc.

Bloom et al. (1999) analyzes the relationship between demographic change and economic growth for Asian countries over 1965-90. The results indicate a significant relationship between population density, age structure, life expectancy, and economic growth. Kelley & Schmidt (2005) study the impact of demographic change on economic growth for 86 countries over the period 1960-1995. The results indicate that nearly 20% of per capita output growth arises from demographic change, which is higher for Europe and Asia. Bloom et al. (2009) investigates the relationship between fertility rate and female labor force participation over 1960- 2000 in 97 countries. The results indicate that the fertility rate negatively affects female labor force participation for different age groups. Minh (2009) studies the link between demographic factors and economic growth for provinces in Vietnam over 2002-2006. The results show that while the working-age population increases economic growth, the youth population leads the opposite. Iqbal et al. (2015) study the link between demographic factors and economic growth in Pakistan over 1974-2011. The results show that the working-age population and life expectancy are significantly and positively related to economic growth in Pakistan. Li (2016) study the link between 120 developing countries over 1970-2014. The results show that the fertility rate negatively affects economic growth. Rosado & Alvarado (2017) show that an increase in dependency ratio decreases economic growth in Ecuador over 1975-2015. Cruz & Ahmed (2018) study the impact of demographic change on economic growth and poverty for 180 countries over 1950-2010. Panel regression results indicate that the working-age population increases the economic growth, whereas an increase in the child dependency ratio decreases the economic growth and poverty. Hu et al. (2021) show that aging has a negative and significant impact on economic growth for 172 countries over the period 1960-2019.

In the context of the link between demographics and economic growth in African countries, Yasin (2008) investigates the impact of demographic structure on savings for emerging countries in the North African and Middle East regions over 1960-2001. The results show that while the working-age population increases national savings, the young population is negatively related to savings. Bloom et al. (2010) argue that low-quality human capital, low productivity, and unemployment are major challenges for Nigeria to benefit from the demographic dividend. Olanipekun & Akeju (2017) study the demographic determinants of saving for six ECOWAS countries over 1981-2014. The results show a negative relationship between the working-age population, the young age dependency ratio, and economic growth. Using the macrosimulation model, Karra et al. (2017) estimates the impact of a decrease in fertility rate on economic growth in Nigeria. Simulation results show that a one child per woman decrease in fertility rate doubles per capita income by 2060.

3. Data and Methodology

In this paper, we use six demographic indicators, the fertility rate (births per woman), the age dependency ratio, the young-age dependency ratio, the old-age dependency ratio, life expectancy at birth (years), and urban population (% of the total population). We also include GDP per capita (constant 2017 national prices, 2017 US$) as a control variable. All variables are compiled from the World Development Indicators database, except for GDP per capita which is taken from Penn World Table (PWT 10.0). The dataset covers the period 1961-2019.

Our sample consists of 14 ECOWAS countries: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Ghana, Guinea, Gambia, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Table 1 shows the descriptive statistics.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
GDP per capita	2069.645	1054.147	246.8565	6602.699
Age dependency ratio	92.29	8.32	54.75	114.47
Old-age dependency ratio	5.99	1.37	3.01	10.78
Young-age dependency ratio	86.29	8.21	47.41	106.53
Fertility rate	6.31	0.96	2.46	7.94
Life expectancy at birth	49.80	7.98	30.50	71.66
Urban population	30.20	11.68	5.41	63.32

In this paper, we use the growth acceleration methodology developed by Hausmann et al. (2005). Year *t* is defined as a growth acceleration period; the following conditions are fulfilled:

1) $g_{t,t+n} \geq 0.035$ Growth is rapid
2) $\Delta g_t \geq 0.02,$ Growth accelerates
3) $y_{t+n} \geq \mathrm{m}\ \{y_i\}, i \leq t$, Post-growth output exceeds the pre-episode peak

$\Delta g_t = g_{t,t+n} - g_{t-n,t}$

$g_{t,t+n}$ and $g_{t,t-n}$ represent the average growth rate between year *t* and *t* + *n* and the average growth rate between *t* – *n* and *t*, respectively. *n* is set as 7 following Hausmann et al. (2005). After identifying growth acceleration periods, we use the probit regression methodology to determine the demographic factors affecting the likelihood of growth accelerations. The probit model is as follows:

$$P = (Y = 1|X) = \int_{-\infty}^{x'\beta} \phi(t)dt = \phi(x'\beta)$$

The function $\phi(.)$represents the standard normal distribution. (Greene, 2003). Following Hausmann et al. (2005), we set a dummy for the dependent variable which is 1 around a growth acceleration (and 0 otherwise). That is, we set a 1 to the three years centered on the year of the growth acceleration episode.

4. Results

After determining the episodes of rapid growth for ECOWAS countries[2], we investigate the demographic determinants of growth accelerations. Table 2 shows the results of the panel probit regressions. As expected, GDP per capita is an important determinant for growth accelerations. For all models, an increase in GDP per capita decreases the probability of growth accelerations in ECOWAS countries. This result is consistent with the studies of Eichengreen et al. (2011, 2013), which show that an increase in GDP per capita increases the likelihood of the growth slowdown. This result may be explained within the framework of the neoclassical growth model. One can say that the probability of a growth slowdown (acceleration) increases (decreases) as a country approaches the steady-state equilibrium. Model (1) shows that the urban population has a positive impact on the likelihood of growth accelerations. Urbanization can promote economic growth through various channels. First, urbanization may lead to the migration of highly-skilled and qualified workers to big cities. Second, big cities provide better education and health services, increasing human capital and allowing us to adapt existing technologies and develop new ones. Third, the agglomeration of people and firms decreases production costs (Nguyen & Nguyen, 2018).

Table 2: Demographic Determinants of Growth Accelerations in ECOWAS Countries

Variable	**1**	**2**	**3**	**4**	**5**
GDP per capita	-2.165*** (0.671)	-1.046** (0.509)	-1.098** (0.506)	-1.878** (0.845)	-2.583*** (0.552)
Urban population	1.917** (0.933)				
Age dependency ratio		-1.594 (2.080)			
Old-age dependency ratio			-1.329 (2.291)		
Young-age dependency ratio			-0.889 (1.744)		
Fertility rate				-3.583** (1.829)	
Life expectancy at birth					6.468** (2.614)
Log-likelihood	-213.983	-230.909	-229.763	-208.164	-212.124
Pseudo R-square	0.046	0.021	0.036	0.035	0.072

The symbols *** and ** indicate statistically significance at 1 and 5 percent, respectively. Robust standard errors in parentheses.

[2] The episodes of rapid growth are in the Appendix.

As mentioned above, the age profile is a significant determinant of economic growth. According to models (2) and (3), there is a negative but insignificant relationship between dependency ratios and the likelihood of growth accelerations. The negative link between age dependency ratios and economic growth is consistent with the theory and previous studies (Bloom et al., 1999; Yasin, 2008; Minh, 2009; Iqbal, 2015; Olanipekun & Akeju, 2017; Ursavaş & Sarıbaş, 2020). The working-age population tends to consume less and save a larger share of their income than the younger and older population. Besides, while younger dependents require more investment in education and health, more investment and health expenditure are needed for younger dependents. The fertility rate is another key factor for economic growth. The results in model (4) show that an increase in fertility rate decreases the probability of growth accelerations in ECOWAS countries. This result is consistent with the theory. A decrease in the fertility rate reduces the dependency burden. Hence, savings increase which in turn accelerates economic growth. Besides, a decrease in the fertility rate increases the share of the working-age population, which promotes economic growth if the labor force is absorbed (Abu-Ghaida & Klasen, 2004). Finally, model (5) indicates that life expectancy increases the likelihood of growth accelerations in ECOWAS countries. The life expectancy at birth may affect economic growth through various channels. First of all, a healthier workforce is expected to be more productive. Besides, an increase in life expectancy at birth may affect the age structure of the population, which in turn increases economic growth (Bloom et al., 1999; Isaksson, 2007).

5. Conclusion and Discussion

This paper analyzes the relationship between demographic factors and growth accelerations for ECOWAS (Economic Community of West African States) countries. The dataset covers the period 1961-2019. To do so, first, we identify rapid acceleration episodes in economic growth using the methodology developed by Hausmann et al. (2005). Then, we analyze the demographic determinants of growth accelerations in ECOWAS countries using the panel probit regression method.

Our results show that the age dependency ratios have a negative (but insignificant) impact on the likelihood of growth acceleration. The results indicate that the urban population and life expectancy at birth positively and significantly affect the probability of growth acceleration. In other words, an increase in urban population and life expectancy at birth increases the likelihood of growth acceleration in ECOWAS countries. The results also reveal that the fertility rate is negatively and significantly related to the likelihood of growth acceleration. An increase in fertility rate decreases the likelihood of growth accelerations in ECOWAS countries.

West African countries still have higher fertility rates; however, they have started to decline, which implies that demographic dividend may emerge and promote economic growth. However, reaping a demographic dividend is no guarantee and requires the right policy environment (Bloom et al., 2003; Lee et al., 2006). A transparent and consistent economic and political environment, and higher institutional quality are required for the working-age population to be productive. Without sound policies, countries may struggle to adapt to their

changing age structure and miss the chance to reap the demographic dividend (Bloom et al., 2007; Bloom et al., 2017).

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Ethics Statement: The author declares that ethical rules are followed in all preparation processes of this study. In case of detection of a contrary situation, Fiscaoeconomia has no responsibility, and all responsibility belongs to the authors of the study.

Etik Beyanı: Bu çalışmanın tüm hazırlanma süreçlerinde etik kurallara uyulduğunu yazarlar beyan eder. Aksi bir durumun tespiti halinde Fiscaoeconomia Dergisinin hiçbir sorumluluğu olmayıp, tüm sorumluluk çalışmanın yazarlarına aittir.

APPENDIX

Appendix 1

Table 1: Episodes of Rapid Growth

Country	Year	Growth before	Growth after	Difference in growth
Benin	2006	1.1%	3.9%	2.8%
Benin	2007	1.1%	4.8%	3.7%
Benin	2008	1.1%	5.9%	4.8%
Benin	2009	0.8%	6.0%	5.2%
Benin	2010	0.7%	6.5%	5.9%
Benin	2011	1.4%	6.2%	4.9%
Benin	2012	2.6%	5.7%	3.0%
Burkina Faso	1971	0.8%	3.8%	3.0%
Côte d'Ivoire	2006	-2.3%	4.1%	6.5%
Côte d'Ivoire	2007	-1.7%	5.8%	7.5%
Côte d'Ivoire	2008	-1.4%	7.4%	8.7%
Côte d'Ivoire	2009	-0.7%	7.9%	8.6%
Côte d'Ivoire	2010	0.6%	7.8%	7.3%
Côte d'Ivoire	2011	0.5%	8.6%	8.1%
Côte d'Ivoire	2012	2.4%	7.3%	4.9%
Cabo Verde	1977	-1.7%	4.3%	6.0%
Cabo Verde	1978	-1.1%	4.0%	5.2%
Cabo Verde	1979	-1.2%	3.9%	5.1%
Cabo Verde	1980	-0.9%	3.8%	4.7%
Cabo Verde	1981	-0.4%	3.5%	3.9%
Cabo Verde	1992	1.5%	5.3%	3.9%
Cabo Verde	1993	1.9%	5.5%	3.6%
Cabo Verde	1994	2.0%	5.5%	3.5%
Cabo Verde	1995	2.1%	5.4%	3.3%
Cabo Verde	1996	2.1%	5.2%	3.1%
Ghana	2004	2.2%	4.5%	2.3%
Ghana	2005	2.4%	4.9%	2.5%
Ghana	2006	2.4%	5.3%	2.9%
Ghana	2007	2.4%	5.1%	2.8%
Guinea	2010	0.6%	3.7%	3.1%
Guinea	2011	1.0%	3.7%	2.7%
Guinea	2012	1.4%	3.5%	2.2%
Mali	1969	-1.7%	3.6%	5.3%
Mali	1974	1.1%	3.6%	2.5%
Mali	1984	-0.6%	4.7%	5.3%
Mali	1988	1.5%	6.9%	5.5%
Mali	1989	1.7%	8.4%	6.7%

Mali	1990	2.8%	9.5%	6.6%
Mali	1991	4.7%	8.4%	3.7%
Mali	1992	3.2%	10.4%	7.2%
Mali	1993	1.5%	10.4%	8.9%
Mali	1994	2.6%	11.3%	8.7%
Mali	2004	4.3%	6.4%	2.1%
Nigeria	1968	-4.5%	7.6%	12.1%
Nigeria	1969	-2.7%	6.3%	9.0%
Nigeria	1970	-1.3%	4.8%	6.1%
Nigeria	1997	-1.4%	3.8%	5.1%
Nigeria	1998	-1.1%	4.3%	5.3%
Nigeria	1999	-1.6%	5.0%	6.6%
Nigeria	2000	-0.6%	5.2%	5.8%
Nigeria	2001	0.5%	5.3%	4.8%
Sierra Leone	1997	-10.5%	3.9%	14.4%
Sierra Leone	1998	-9.5%	4.3%	13.8%
Sierra Leone	1999	-9.5%	5.9%	15.4%
Sierra Leone	2000	-9.5%	6.4%	15.9%
Sierra Leone	2001	-8.2%	5.0%	13.1%
Togo	2006	-1.7%	4.1%	5.8%
Togo	2007	-1.7%	5.8%	7.5%
Togo	2008	-1.2%	6.7%	8.0%
Togo	2009	-1.0%	7.5%	8.5%
Togo	2010	-1.1%	7.3%	8.4%
Togo	2011	0.6%	6.4%	5.8%
Togo	2012	2.9%	5.6%	2.7%