



THE IMPACT OF POPULATION GROWTH ON INTERNATIONAL TRADE IN EUROPE

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ABSTRACT

This study investigates the relationship between population growth and international trade components (exports, imports, and trade volume) across European countries, employing fixed effects models to adjust for unobserved heterogeneity. Contrary to some existing literature which suggests that population growth facilitates an increase in international trade, our findings indicate a negative correlation between population growth and trade dynamics. Specifically, population growth appears to depress exports by boosting local demand for goods and services, while simultaneously reducing imports because of weakened economic conditions and diminished purchasing power. This adverse effect is potentially exacerbated by demographic shifts towards a higher proportion of non-active population segments, which do not contribute to productivity and economic development. Our results underscore the complexity of the relationship between demographic changes and trade patterns, suggesting a focus on the qualitative aspects of population growth as a key factor.

I. INTRODUCTION

The rapid growth of the global population has been a topic of significant concern in recent decades, with its far-reaching implications for various aspects of society, including international trade. Population growth has a great impact on international trade in countries. In the context of Europe, the impact of population growth on international trade has been a subject of growing interest among scholars and policymakers. This research paper aims to explore the relationship between population growth and international trade in the European region.

Population trends have far-reaching consequences that extend into all facets of economic and social life. As the sizes and distributions of populations change over time, this directly impacts patterns of production and consumption within and between countries. Nowhere is this relationship between demography and trade more evident than in Europe, where population dynamics have fluctuated significantly in recent decades with important ramifications for cross-border commerce. After experiencing sustained population increases throughout most of the 20th century, many European nations have seen slower or even negative rates of growth since the 1990s. Low fertility rates combined with increased life expectancy have led to aging populations in places like Germany, Italy, and Spain. Meanwhile, immigration flows have altered demographics in other countries. These shifts are altering the demand levels and workforce availability within European markets. At the same time, rapid expansion occurred in East-Central European states following the end of the Soviet era. This has stimulated substantial intra-European trade as emerging economies experience urbanization and a burgeoning middle class. Youthful populations in Ireland and Luxembourg also present opportunities as export destinations.

How governments and businesses respond to demography's challenges and opportunities will significantly affect Europe's trade relations going forward. Research suggests that in non-industrial nations, gains from trade primarily lead to population growth, while in industrial nations, these gains are directed towards investment in education and output per capita growth. The specialization in unskilled intensive goods production due to international trade in non-industrial economies reduces the demand for skilled labor and limits incentives for investing in population quality, further delaying the demographic transition and enhancing the abundance of unskilled labor. This asymmetrical effect of population growth on trade dynamics plays a crucial role in shaping the economic development trajectories of different countries, influencing their comparative advantages and income per capita distributions over time.

This paper aims to analyze how population changes are impacting trading patterns and dependencies between European states. In assessing these issues, this discussion contributes insights into trade's sensitivity to underlying



socioeconomic conditions on both national and regional scales. The European experience provides lessons for managing population change's influence on economic linkages in an increasingly interconnected world.

II. LITERATURE REVUE

A study of Copeland & Taylor, (1994) have found that population growth can harm the environment (pollution), which can result in decreasing international trade. If for Copeland and Taylor (1994), population growth contributes in pollution, on the contrary, Peterson and Welch (2006) argues that the growing population can contribute in developing trade in the agricultural sector through the increase in demand and supply for food.

The economic activity by which local businesses sell their products and services to customers in other nations is referred as export. An exporter is a local business that sells products and services outside of the country. The economic activity by which businesses in one nation buy products and services made by businesses in another nation is also called reciprocal imports. On the other hand, the importer is the business that makes purchases of products and services from countries other than its own. Products are often imported when there is a surplus of supply or and over demand in the nation of origin. When demand exceeds supply in the country of destination, products are exported. The gap between import and export is an essential metric for monitoring the financial health of economic entities. The trade balance is as follows. It shows the differential value between a nation's or an economic entity's imports and exports of products during a specific time period.

In general, population growth increases the amount of demand and supply for goods and services in areas experiencing population growth (Hertel and Keeney, 2006). Population expansion has been linked to a decrease in commerce, according to Galor and Weil (1996). This means that an increasing population might make resources more competitive. However, a high population increase might result in a reduction in per capita income, which can have a detrimental influence on trade, according to Kelley and Schmidt (1995).

Population trends have far-reaching consequences that extend into all facets of economic and social life. As the sizes and distributions of populations change over time, this directly impacts patterns of production and consumption within and between countries. Summing this, the relationship between demography and trade is more complex in Europe, where population dynamics have fluctuated significantly in recent decades with important ramifications on its cross-border commerce.

According to Peterson, (2017) who investigate on the relationship between population and economic growth, population expansion appears to be a key determinant of economic growth. Thus, its consequences change according to the type of population growth. Therefore, this study stresses two aspects of population increase: the phenomena of migration (populations who are moving) and the phenomena of natural demographic growth which is the difference between birth and death. Short-term economic development would be harmed by a high natural population increase due to the large concentration of children and other nonproductive individuals. Long-term economic growth will benefit from this population expansion as the children who have grown up will contribute to production. In terms of immigration, productivity and income growth are often enhanced by immigration. This advantageous feature is frequently associated with the political and social aspects of immigration. Lastly, restricted immigration and low natural population increase might exacerbate wealth disparity both domestically and internationally.

III. METHODOLOGY

The purpose of this study is to examine how population growth affects the two main components of international trade exports and imports within European countries. We analyze data from 21 European countries over the period from 2001 to 2021. The variables used in this study are described as follows:

- a) Dependent Variables:
 - Export (Exp) - Import (Imp)
- b) Independent Variable:
 - Population Growth (popG)
- c) Control Variables:
 - Unemployment (Unemp)
 - Inflation (Inf)
 - Foreign Direct Investment Net Inflow (Fdi)
 - GDP per Capita (gdppc)



The data for this analysis are coming from the World Bank Database. The models are described in the following sections.

$$EXP_{it} = \alpha_i + \beta_1 POPG_{it} + \beta_2 FDI_{it} + \beta_3 UNEMP_{it} + \beta_4 INF_{it} + \beta_5 GDPPC_{it} + \epsilon_{it} + \mu_{it}. \quad (1)$$

$$IMPI_{it} = \alpha_i + \beta_1 POPG_{it} + \beta_2 FDI_{it} + \beta_3 UNEMP_{it} + \beta_4 INF_{it} + \beta_5 GDPPC_{it} + \epsilon_{it} + \mu_{it}. \quad (2)$$

$$TradeV_{it} = \alpha_i + \beta_1 POPG_{it} + \beta_2 FDI_{it} + \beta_3 UNEMP_{it} + \beta_4 INF_{it} + \beta_5 GDPPC_{it} + \epsilon_{it} + \mu_{it}. \quad (3)$$

In all models (1), (2) and (3) fixed effects for all times invariants will be used to capture the effect of population growth on income inequality.

IV. RESULTS AND DISCUSSIONS

1) Descriptive Statistics

Sample: 2001 2020								
	EXP01	IMP	TRADEV	POPG	GDPPC	FDINI	UNEMP	INF
Mean	62.95699	58.78137	123.3834	0.334724	33767.48	2.37E+10	8.851614	1.941192
Median	53.82015	49.33825	104.9388	0.337081	28389.08	4.74E+09	7.750000	1.791208
Maximum	205.4821	174.6221	380.1042	3.931356	123678.7	7.34E+11	27.47000	15.40232
Minimum	18.54458	22.84665	45.41876	-3.847671	3525.794	-3.45E+11	2.120000	-4.478103
Std. Dev.	37.24985	32.22649	68.45984	0.878632	21899.03	6.48E+10	4.513015	1.863455
Skewness	1.604474	1.444552	1.527251	0.118036	1.727643	4.334914	1.495158	1.789970
Kurtosis	5.526996	4.821141	5.198270	5.392622	7.037009	45.07702	5.460715	12.18396
Jarque-Bera	288.4778	201.6810	244.8909	99.95220	488.2553	31914.21	259.3250	1680.076
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	26127.15	24394.27	51204.11	138.9104	14013505	9.84E+12	3673.420	805.5947
Sum Sq. Dev.	574446.3	429958.3	1940314.	319.6057	1.99E+11	1.74E+24	8432.063	1437.601
Observations	415	415	415	415	415	415	415	415

This table gives us the overall details of the data. It provides an insight of the basic characteristics of the data. Here, we can observe the mean, maximum, minimum, and standard deviation. Those details are very important because they tell us how the data are composed and allow us to get familiar with the data before more advanced quantitative analysis.

2) Correlation matrix

	EXP	IMP	TRADEV	POPG	GDPPC	FDINI	UNEMP	INF
EXP	1.000000	0.946921	0.995791	0.465213	0.510835	0.010508	-0.322676	-0.047424
IMP	0.946921	1.000000	0.960588	0.392512	0.396281	-0.012613	-0.275080	0.025876
TRADEV	0.995791	0.960588	1.000000	0.436378	0.452918	-0.008651	-0.315486	-0.013895
POPG	0.465213	0.392512	0.436378	1.000000	0.569998	0.077243	-0.363116	-0.080497
GDPPC	0.510835	0.396281	0.452918	0.569998	1.000000	0.164354	-0.372309	-0.169815
FDINI	0.010508	-0.012613	-0.008651	0.077243	0.164354	1.000000	-0.088783	-0.060761
UNEMP	-0.322676	-0.275080	-0.315486	-0.363116	-0.372309	-0.088783	1.000000	-0.141867
INF	-0.047424	0.025876	-0.013895	-0.080497	-0.169815	-0.060761	-0.141867	1.000000

The correlation matrix shows that there is no high correlation between our variables.



3) Fixed effect regression with Export as dependent variable

exp	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]	
popG	-1.947167	.8559946	-2.27	0.023*	-3.628893	.2654422
unemp	-.2105523	.1212868	-1.74	0.083	-.4488377	.0277331
inf	-1.149381	.1450974	-7.92	0.000*	-1.434445	.8643158
gdppc	.0006665	.0000474	14.05	0.000*	.0005733	.0007597
Fdi	-.005328	.0023232	-2.29	0.022*	-.0098922	.0007637
_cons	47.10902	2.094788	22.49	0.000*	42.9935	51.22453
sigma_u	29.898071					
sigma_e	7.998999					
rho	.93320241					

Table 3 presents the fixed effects of population growth on exports for European countries, illustrating that population growth has a negative and significant impact on exports. This negative relationship can be attributed to the increased local consumption needs of a growing population, which consumes goods and services that would otherwise be exported. Additionally, Foreign Direct Investment (FDI) shows a negative and significant coefficient, suggesting that when European countries receive more foreign investment, their exports decrease. This trend is likely due to the rising local demand for goods and services fueled by such investments. Furthermore, inflation also presents a negative and significant coefficient, indicating that when the price of products from Europe increases, their likelihood of being sold abroad decreases. GDP per capita (Gdppc) is significantly and positively linked to exports, suggesting that higher economic output per capita fosters greater export activity.

4) Fixed effect regression with Import as dependent variable

Imp	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]	
popG	-8.300345	5.267889	-1.58	0.116	-18.64988	2.049186
unemp	-2.097309	.7464127	-2.81	0.005*	-3.563745	-.6308733
inf	-3.295842	.8929459	-3.69	0.000*	-5.050164	-1.541521
gdppc	.0011764	.000292	4.03	0.000*	.0006028	.0017501
Fdi	-.001978	.0142973	-0.14	0.890	-.0300671	.026111
_cons	242.4254	12.89157	18.80	0.000*	217.098	267.7527
sigma_u	148.17792					
sigma_e	49.226761					
rho	.9006039					

Table 4 provides insight of the effect of population growth on the import sector. It reveals that the coefficient associated to the impact of population growth on imports is negative, although not significant. Additionally, the control variables, such as unemployment and inflation, present a negative and significant coefficient, indicating they are harmful to imports in Europe. The negative relationship between unemployment and imports can be attributed to reduced production when fewer people are employed, consequently leading to a decrease in imports. Furthermore, Foreign Direct Investment (FDI) shows a negative but non-significant coefficient.



5- Fixed effect regression with Trade volume as dependent variable

TradeV	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]	
popG	-4.305618	1.489005	-2.89	0.004*	-7.230983	-1.380252
unemp	-.463192	.2109786	-2.20	0.029*	-.8776901	-.0486939
inf	-1.59436	.2523972	-6.32	0.000*	-2.09023	-1.098489
gdppc	.0012181	.0000825	14.76	0.000*	.001056	.0013803
Fdi	-.0095497	.0040412	-2.36	0.018*	-.0174893	-.0016102
_cons	93.76796	3.643889	25.73	0.000*	86.60901	100.9269
sigma_u	57.017516					
sigma_e	13.914279					
rho	.94379408					

V. CONCLUSION

We observed the fixed effects of population growth on international trade components, controlling for various variables. Our findings indicate that population growth contributes to slowing down international trade for European countries, which contrasts with some research suggesting that population growth can increase international trade. Population growth increases local demand for goods and services, thereby reducing exports. Additionally, population growth contributes to reducing imports due to its potentially harmful effects on the economic situation, which in turn diminishes purchasing power. This effect is particularly pronounced when most of the demographic changes involve non-active individuals who do not contribute to production or economic development.

While population growth can sometimes aid in boosting international trade, it can also be harmful. Therefore, it is crucial to analyze population growth more intricately. Future research should consider categorizing population growth into segments such as non-productive, less skilled workers, and skilled workers, and then analyze their respective impacts on trade. This approach could provide valuable insights into managing population dynamics to foster more beneficial trade outcomes.

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