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Evaluation of the Financial Inclusion's Effect on Economic Growth: Evidence From Selected European Countries

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Abstract *This research investigates the impact of financial inclusion on economic growth in European countries over the period 2008-2020. The variables used to measure the financial inclusion in this study are number of automated teller machines, number of commercial bank branches, population, carbon dioxide emissions, and mobile cellular subscriptions as we explore their effect on GDP growth. Findings revealed that in the short run, number of ATMs have a positive insignificant impact on economic growth while number of commercial banks and mobile cellular subscriptions have a positive insignificant impact on economic growth. Also, CO2 emissions have positive significant impact on economic growth. However, in the long run, number of ATMs, number of commercial banks and mobile cellular subscriptions have positive significant impact on GDP growth. Meanwhile, CO2 emissions have a negative significant impact on GDP growth in the six selected European countries.*

Keywords: *Financial inclusion, Economic growth, Environment, Population*

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Introduction

Lately, many individuals have been relying on access to financial services as their means of living. This is where financial inclusion steps in; it is the provision of financial services, whether in urban or rural areas, to members of the population who were previously excluded. Many governments have been attempting to attain high levels of financial inclusion through minimising documentations required to open new bank accounts, granting access to debit cards at low or no costs, implementation of mobile technology to access online banking services and through the provision of free insurance policies (Ozili, 2020).

Financial inclusion plays a vital role in achieving macroeconomic stability through generating various employment opportunities, poverty reduction by providing a wide variety of financial services at low costs and including marginalised communities in the formal banking sector, in addition to achieving sustained economic growth. Furthermore, it has been evident that financial inclusion is a strong enabler of social inclusion through convenience, accessibility and availability to vulnerable individuals such as women, low-income families and rural dwellers. Financial inclusion assists in filling the social gap by providing households access to the resources required to finance their consumption and investments; therefore, boosting economic activities (Omar & Inaba, 2020).

A financial zone that covers all the steps of life creates a convenient and manageable environment through the tracing of carbon dioxide emissions. Informal financial transactions will be minimised through the constant tracing of all financial services as financial inclusion is believed to diminish the underground economy such as money laundering (Babych, Grigolia, & Keshelava, 2018).

The impact of financial inclusion on economic growth in a number of European countries from 2008 to 2020 will be conducted. In addition, we will investigate the impact of financial inclusion on economic growth, as reflected in previous economic theories. Then, in order to formulate our econometric model, we will discuss the variables used to evaluate the relationship, namely the number of ATMs, commercial bank branches, mobile cellular subscriptions, CO2 emissions, and population growth as a percentage of GDP. Finally, the findings will show whether financial inclusion in European countries has a direct proportional relationship with growth or an inverse relationship with growth.

Literature Review:

Schumpeter (1942) was considered one of the earliest influential economists through the formulation of his Theory of Business Cycles and Creative Destruction, where he established the relationship between entrepreneurs' innovations and the business cycle. Schumpeter examined the recurring shifts of the business cycle which were driven by the rate at which innovations were introduced into the economy. Economies enter the boom phase of the business cycle when innovative breakthroughs transfer existing technologies into more updated versions. As a result, new investors enter the market, and a new economic equilibrium is established. Stagnation occurs until a new set of innovations flood the market. Schumpeter refers to this process as "creative destruction". Therefore, innovations are needed to create constant technological changes in order for the economy to enter the boom phase (Parker, 2012).

Nelson, Winter & Dosi analysed the creation and diffusion of changes in technology in 1982. The theory was developed based on the Theory of Innovation by Schumpeter which emphasized the significance of technological change and innovations as the key drivers to economic growth. This model criticizes the Neoclassicals regarding achieving a market equilibrium as the Evolutionists believe that profits based on innovation are the key indication that a steady-state equilibrium level does not exist. Instead, it is believed that innovation opposes routine; therefore, unpredictability is innovation's main feature. The only certainty innovation entails is that it will lead to technological changes in the business.

Furthermore, the theory establishes the importance of companies to adapt to the constant market changes through continuous innovations, while comparing the significance of innovation in the economy to genetic mutation in biology which lead to evolution (Sredojevic, Cvetanovic, & Boskovic, 2016).

Empirical Framework:

The Relationship Between ATMs and Economic Growth:

To begin with, Younes (2018) demonstrated the positive relationship between financial inclusion and economic growth in a study conducted in a sample of 23 countries from the Middle East and North Africa (MENA) region using a panel data analysis and a multi-dimensional index from 2004 to 2016. Data was derived from the World Bank. The study tested the variables based on access, usage and availability of banking services.

Another study by Rajagukguk (2020) emphasised the importance of the presence of ATMs, and mobile cellular subscriptions on improving the

economic welfare through measuring GDP per capita. The study was conducted in 82 countries from 2009 to 2019 using data from World Bank. A random effects regression model panel data analysis was employed, with a bivariate analysis to evaluate the relationship between the independent and dependent variables. The study concluded that there is a positive relationship between the number of ATMs and mobile cellular subscriptions and GDP per capita.

The Relationship Between Commercial Bank Branches and Economic Growth:

Further studies on the relationship between the efficiency of the banking sector and a stable economic growth by Rushchyshyn et al. (2021) have been carried out in Ukraine and several European Union countries during 2000 to 2019. This was done through tracking the growth of the banking sector and determining the link between bank growth and economic growth. This research implemented a principal component analysis and a vector regression modelling to test the impact the banking sector has. One of the indicators used to represent the banking sector's development is the number of commercial bank branches (per 100,000 people). The causal analysis found a positive association between the development of the Ukrainian banking sector and per capita GDP. It has been established that a banking sector's quality and stable functioning is a major component for achieving sustainable economic growth.

The Relationship Between Mobile Cellular Subscriptions and Economic Growth:

To further assess the impact of financial inclusion on economic growth, Bayar, Gavriletea and Paun (2021) have investigated the impact of mobile cellular subscriptions on economic development as they enable the access to financial services digitally. The study was conducted in 11 post-communist EU countries from 1997 to 2017 using panel cointegration and causality analyses. Indicators included mobile cellular subscriptions (per 100 people) and individuals using the Internet (% of the population), derived from the World Bank. Financial services have adopted to new technologies in order to fit the innovative criteria and improve financial inclusion by enabling easier access, secure transactions and lower transaction costs. Results included that mobile cellular subscriptions have a positive impact on financial inclusion therefore accelerating economic development.

The Relationship Between Population and Economic Growth:

Population has been one of the factors proven to impact the effectiveness of financial inclusion and its ability to reach large segments of population.

This has been discussed by Neaime and Gaysset (2018) in their study to examine the impact of population on financial inclusion and poverty. The research was performed on a sample of 8 MENA countries during the years of 2002 to 2015. The econometric method the models were based on were the Generalized Method of Moments (GMM) and Generalized Least Squares (GLS) method. Results displayed that higher populations slow down the ability of banking systems to reach many segments of the population.

The Relationship Between CO2 emissions and Economic Growth:

It has been argued that CO2 emissions and financial inclusion impact economic growth. This has been evident in the study conducted by Liu, Xie, Hafeez and Usman (2022) to examine the impact financial inclusion has on the environmental and economic performance of the five largest emerging economies in Asia from 1995 to 2019. Indicators used to represent financial inclusion are bank credit and branches and insurance premiums. The panel Autoregressive Distributed Lag (ARDL) approach has been employed to analyze the results. The investigation has revealed the positive correlation between CO2 emissions and economic growth and established the relationship between the higher degree of financial inclusion leading to higher CO2 emissions. Economic growth is strongly affected by CO2 emissions and energy consumption and vice versa, as they share a unidirectional relationship. The main contributors to CO2 emissions are economic growth and energy intensity. This suggests that economic growth policies based on high fossil fuel consumption are not aligned with sustainable development goals. However, investing in renewable energy projects can help limit CO2 emissions and improve environmental quality. Openness to trade can also reduce carbon emissions by encouraging investment in less polluting industries and eco-friendly technologies. Inclusive digital finance and environmental sustainability are complementary policies, with digitalization improving environmental quality and a digitalized financial system being necessary to achieve CO2 reduction. The financial sector plays a critical role in addressing environmental challenges, and renewable energy can further enhance environmental quality.

Methodology

This study will be employing panel data as it is more detailed and informative, instead of time series analysis. It is the most suitable because it captures and explains the complex meanings of research and the dynamic changes in relationships. Panel data functions in relationships that don't function in the traditional cross-section data. One of the main reasons for choosing panel data is the low multicollinearity between independent

variables and the high degree of freedom. In addition, panel data also helped in increasing the number of observations in this study. Due to the lack of information and data, a sample of European countries was selected such as Germany, Denmark, Finland, France, Spain, and Italy. It also helped test more complex models than cross-sectional data analysis. Most of the data in this study is secondary data collected from the International Monetary Fund (IMF) and World Bank, and our econometric model is tested using E-views software. The proposed model for this thesis is as follows:

GDPG=f (ATMS, CBB, MCS, POP, CO2)

Data Description:

The purpose of this thesis is to analyze and the relationship between five independent variables and one dependent variable. The dataset consists of six European countries covering years from 2008 to 2020 in Germany, Denmark, Finland, France, Spain, and Italy, with 72 panel observations.

The dependent variable is the GDP growth rate, measured as a percentage on an annual basis in the six selected European countries, and the five independent variables are: ATMs (per 100,000 adults), commercial bank branches (per 100,000), mobile cellular subscriptions, population and CO2 emissions (metric tons per capita). All variables were measured on an annual basis. All variables were extracted primarily from the World Bank (World Development Indicators). However, in certain years, some data for certain variables was missing. The IMF and E-views interpolation methods were used to fill these gaps. The gaps were one a single year for some variables, while others had two-year gaps.

Data Analysis

Descriptive Statistics:

Table 1: Descriptive Statistics of the Variables

Table 1. Descriptive Statistics of the Variables

	ATMS	CBB	CO2	GDPG	MCS
MEAN	89.14852	36.21077	6.934898	0.14594	124.6886
MEDIAN	99.29326	36.585	6.332115	0.958031	124.6399
MAXIMUM	156.7066	103.97	11.65875	4.179882	172.1218
MINIMUM	31.6897	4.02	4.26	-10.82289	91.89795
STD. DEV.	35.03969	23.71809	1.809987	3.024716	18.18793
SKEWNESS	-0.254538	0.833885	0.501857	-1.623275	0.504852
KURTOSIS	1.931563	3.303528	2.125636	5.535891	2.926401

Source: Calculated by the Authors

Table 1. reveal that the average number of ATMs and CBBs in the countries under study are 89.15 and 36.21 per 100,000 respectively. This

indicates a high average as the European countries in assessment commit to providing wide access to financial services regardless the location through their sophisticated financial infrastructure which involve their commercial bank branches and the high average number of MCS as seen in table 1 (Zamora-Perez, 2022). As for the CO2 emissions, a relatively low average of 6.93 per metric ton per capita was reached, indicating that the high degree of financial infrastructure in the region has impacted the CO2 emissions. Finally, the average GDP Growth Rates, the dependent variable, of the sample countries was 0.15. This statistic is considered reasonable as it captures the fluctuations and crisis that those countries have undergone during the decade of study.

Correlation Analysis

Table 2. Correlation Analysis

	ATMS	CBB	CO2	GDPG	MCS
ATMS	1.000000				
CBB	0.595***	1.00			
CO2	-0.262**	-0.504***	1.00		
GDPG	-0.012	-0.134	0.065	1.00	
MCS	-0.424***	-0.214*	0.408***	-0.118	1.00

Source: Calculated by the Authors

(* - significant at 10% significance level) (** - significant at 5% significance level) (*** - significant at 1% significance level)

Table 2 reveals the positive significant relationship between CBB and ATMs as the presence of ATMs enhances financial integration into the market due to providing wider access to banking services at various convenient places (Mwai, Memba & Njeru, 2018). The negative significant relationship between CO2 emissions and ATMs and CBB has been established as the energy consumption resulting from these services are negatively associated with carbon emissions (Alharthi, Dogan & Taskin 2021). Furthermore, the negative significant relationship between MCS and both ATMs and CBB is largely because MCS negatively impacts access to those financial institutions as individuals would depend more on carrying transactions using their mobile phones rather than visiting those institutions (Bayar, Gavriletea & Paun, 2021). Finally, MCS and CO2 have displayed a positive significant relationship as an increase in MCS reflects an increase in CO2 emissions due to the high energy consumption resulting from their use (Edquist & Bergmark, 2022).

Panel unit root test

Unit root test was conducted for the dependent variable (GDPG) and all independent variables: ATMS, CBB, CO2 and MCS. Most of the results at level were non-stationary, accepting the null hypothesis; therefore, the variables were retested again at 1st difference in order to reduce the variations of the variables and to become stationary. After conducting the 1st difference, some results did not have unit root and rejected the null hypothesis, while others still failed to be stationary, so 2nd difference took place. Majority of the stationary results were in the 1st difference. Most significant unit root tests were LLC and PP, with most of the results being highly significant at 1% significance level. On the other hand, IPS and Breitung had majority insignificant results.

To begin with, ATMs variable was significant at 1% at 1st difference when none was added to the test equation in the LLC unit root test. 2nd difference was taken in the IPS and ADF in order to ensure that all variables have reached their stationarity. CBB was significant at 1st difference in all unit root tests, rejecting $H0$. CO2 was stationary at 1st difference except for the Breitung test. MCS was significant mainly at 1% significance level after retesting at 1st difference. Finally, GDPG was stationary at mixed significance levels throughout the testing process, leading to conducting all unit roots tests in order to be able to reach stationary.

Random & fixed effects model

Table 3. Random Effects model

Variable	Coefficient
C	3.355
CBB	-0.019
CO2	0.103
ATMS	0.002
MCS	-0.027
R-squared	0.044
F-statistic	0.832
Prob(F-statistic)	0.509

Durbin-Watson stat	1.643

Source: Calculated by the authors

Table 3 displays that CBB and MCS both have a negative impact on GDPG. When CBB and MCS increase by 1 branch per 100,000 people and 1 subscription per 100 people, GDPG decrease by 1.9% and 2.7%, respectively. Meanwhile, CO2 and ATMS have positively impacted GDPG. With every increase in CO2 by 1 metric ton per capita, GDPG increase by 10.3% while ATMS increase GDPG by 0.2%.

The R-squared reveals that only 4.4% of the variation in GDPG (dependent variable) is explained by the CBB, CO2, ATMS and MCS (independent variables). According to the F-statistic and its probability of 0.832 and 0.509 respectively. This model is insignificant as it is higher than 10% and the probability is further from zero point. Finally, the Durbin-Watson revealed that there is no autocorrelation as the value is closer to 2.

Table 4. Fixed effects Model

Variable	**Coefficient**
C	-2.190
CBB	-0.086
CO2	0.109
ATMS	0.078
MCS	-0.018
R-squared	0.086
F-statistic	0.706
Prob(F-statistic)	0.701
Durbin-Watson stat	1.70

Source: Conducted by the authors

Moving on to the fixed effects model, the MCS and CBB still exerted a negative impact on GDPG (as seen in table 5). For every increase in CBB by 1 branch per 100,000 people, GDPG decreased by 8.6%, while an increase in MCS by 1 subscription per 100 people also exerted a decrease in GDPG by 1.8%. On the other hand, CO2 and ATMS also displayed a positive relationship with GDPG similar to the previous model. For every increase in CO2 and ATMS by 1 metric ton per capita and 1 branch per 100,000 people, GDPG rose by 10.9% and 7.8%, respectively.

Furthermore, the R-squared has slightly increased from the previous model to 0.086, indicating that 8.6% of the variation in the GDPG is explained by the CBB, CO2, ATMS and MCS. This is still considered a significantly low variation in the regression model. The fixed effects model has also been proven to be insignificant according to the F-statistic of 0.706. Finally, the Durbin-Watson test has shown no autocorrelation.

Hausman Test

Table 5. Hausman Test

Chi-Square. Statistic	Probability
2.530	0.640

Source: Calculated by the Authors

Table 5 reveals that the Chi-Square is 2.530 with a probability of 0.640, which is higher than 0.5; therefore, we accept the null hypothesis. The Hausman test has concluded that despite both models being insignificant, the random effects are still better than the fixed effects model. This is because the random effects model assumes fixed relationships with the dependent variable, but such effects vary from one year to another. On the other hand, fixed effects model will have fixed relationships throughout all years, explaining why the random effects model is better.

1. **ARDL (Auto-regressive distributed lag) approach**

Table 6. ARDL (Auto-regressive distributed lag) approach

	Short Run	Long Run
CBB	0.374	0.289***
CO2	8.407***	-4.220***
MCS	0.278	0.077***
ATMS	0.698	0.205***

(*- significant at 10% significance level) (**- significant at 5% significance level)
(*** - significant at 1% significance level)
Source: *Calculated by the Authors*

This table reveals that a positive relationship exists between GDPG and CBB as an increase in CBB by 1 branch per 100,000 adults, the GDPG increases by 37.4% and 28.9% in the short-run and long-run, respectively. CBBs are considered the dominant channel of financial inclusion. Bank deposits comprise the biggest component of money supply that the public use so their increase in any country enhances growth (Musau et al., 2018). However, this relationship is only significant at 1% significance level in the long-run and insignificant in the short-run.

CO2 has a positive significant relationship with GDPG in the short-run at 1% significance level, but a negative significant one in the long-run. The short-run positive relationship is due to the rapid increase in production that is reached through intensive energy use by technologies that already exist. As a result, an increase in CO2 by 1 metric ton per capita increases GDPG by 840.7%. On the other hand, the long-run negative relationship established occurs as a result of new low-carbon technologies developed allowing in the long-run for the same production level to be reached at lower CO2 emissions, so an increase in CO2 by 1 metric ton per capita decreases GDPG by 422% (Kasperowicz, 2015).

Moreover, MCS also displayed a positive relationship with GDP both in the long-run and short-run, but only significant at 1% significance level in the long-run. For every increase in MCS by 1 subscription per 100 people, GDPG increases by 27.8% and 7.7% in the short and long-run respectively. Finally, ATMS have a positive relationship with GDPG in the short and long-run as the increase in ATMS facilitates access to financial intermediaries and boosts growth (Musau et al., 2018). This variable is also significant only in the long-run at 1% significance level.

2. Cross-Section Dependence Test

Table 7. Cross-Section Dependence Test

Test	Statistic	Prob.
Breusch-Pagan LM	115.8089	0.0000
Pesaran scaled LM	18.40510	0.0000
Bias-corrected scaled LM	18.15510	0.0000
Pesaran CD	10.56178	0.0000

Source: *Conducted by the authors*

The above table reveals that all the cross-section dependence tests conducted are significant at 1% significance level; therefore, the null hypothesis is not rejected, and the cross sectionals are not dependent. This

indicates that throughout the tests, the problem of autocorrelation was not faced between the cross-section variables.

3. **Normality Test**

Table 8. Normality Test

	Statistic	**Probability**	**Mean**
Jarque-Bera	69.13	0.000	0.000

Source: Conducted by the authors

According to the above table, the Jarque-Bera probability is less than 5%, so we reject the null hypothesis. The data is not normally distributed due to the large variations and fluctuations among the variables used throughout the years of study. In addition, the mean value is 0, satisfying the assumption of the zero mean of the error term.

Results

The ARDL model conducted revealed a positive relationship between ATMs and GDPG in both the short-run and long-run in the sample of European countries chosen. These results were supported by Younes (2018) in the empirical literature where the positive impact of the number of ATMs on economic growth was emphasized as it enables access to financial services through decreasing the cost of these services. In addition, the higher the number of ATMs the higher the volume of transactions for better allocation of resources which would lead to encouraging more productive investments. However, the decision that there is a significant relationship between ATMS and GDPG was not supported in the short-run as the ARDL concluded an insignificant effect, but a significant one in the long-run.

Discussion of the hypothesis

Table 9: Summary Analysis of the Hypothesis

		Decision	
	Hypothesis	**Short run**	**Long-run**
H1	Number of ATMs have a positive influence on economic growth	Supported– Insignificant	Supported

H2	The number of commercial bank branches have a positive impact on economic growth	Supported- Insignificant	Supported
H3	Mobile cellular subscriptions have a positive effect on economic growth.	Supported– Insignificant	Supported
H4	The amount of CO2 emissions has a positive effect on economic growth	Supported	Not Supported

ATMs per 100,000 Adults

The theoretical framework conducted also supported our results. Beginning with the New Classical Theory of money that shed light on the importance of money supply when it comes to economic growth as it causes an increase in production and employment which will boost the economic activities of the country. The Liquidity Preference Theory also discussed that the desire to get money is associated with the financial costs of obtaining it; therefore, reducing those financial costs increases the demand for money and encourages the increase in the supply of money.

Commercial Bank Branches per 100,000 Adults

A positive relationship between CBB and GDPG has been established in the short-run and long-run in the ARDL model. The empirical literature by Rushchyshyn et al. (2021) reinforces those results by tackling the importance of the banking sector in achieving sustainable economic growth. They are considered the core of a country's financial system as they allow for long-term, secure investments. The impact of CBB are significant in the long-term only as the expansion of the banking sector through the increase in the number of branches requires policies which exert an influence on the GDPG in the long run. The increase in the flow of funds must be directed towards productive investments; therefore, the short-run effect is insignificant as those investments require time for profits to be generated (Giovannini, Iacopetta & Minetti, 2013).

Mobile Cellular Subscriptions per 100 People

The ARDL model has revealed the positive relationship between MCS and GDPG in the short-run and the long run. These results were also supported by Bayar, Gavriletea and Paun (2021) as they highlighted their positive impact on financial inclusion through enabling access to financial services digitally. Providing secure transactions while reducing transaction costs boosts the traffic of economic activities, which in return positively influences economic growth. Moreover, the technological theories employed in this research also back up the findings as seen in the Neoclassical Theory of Growth which highlights the positive impact of technology on economic growth. Development is accelerated through technological breakthroughs and the employment of R&D in order to boost economic activities. On the other hand, the impact of MCS on GDPG was insignificant in the short but significant in the long run because access to financial services through mobile phones encourages savings over time; therefore, the amounts of savings increase due to the convenience and frequency of using mobile phones. The impact of these savings are measured through the long run, whether they are mobile savings or bank integrated savings on the phone (Ouma, Odongo & Were, 2017).

CO2 Emissions (metric tons per capita)

The empirical framework conducted in this research supports the results of the ARDL model as there is a positive significant relationship between CO2 emissions and GDPG in the short run. A higher degree of financial inclusion increases consumption and encourages business expansions, which increases CO2 emissions (Hussain, Ahmed and Shahzad, 2021). However, there is a negative relationship in the long-run as supported by the Environmental Kuznets Curve Theory due to the boost in economic activities initially increasing CO2 emissions in the short-run, but this effect gradually decreases over time. As a result, the long-run relationship between CO2 emissions and GDPG becomes negative due to the structural changes in the economy (Syed, 2019). The high values calculated are due to Germany and Italy, two of the countries under study, having the highest CO2 emissions in the European Union (Tiseo, 2021).

Conclusion & Recommendations

This research aimed to investigate the impact of financial inclusion on economic growth in a sample of European countries consisting of Germany, Denmark, Finland, France, Spain and Italy. The time period the study was conducted on was 2008 to 2020. The dependent variable was GDP growth rate while the independent variables were automated teller machines, commercial bank branches, mobile cellular subscriptions and CO2 emissions. The

population variable was dropped due to the existence of high multicollinearity when conducting the correlation analysis.

To sum up, the tests results revealed that there was a positive relationship between ATMs and GDP growth rates, both in the short and long-run as it enables easier access to financial services. However, the relationship was insignificant in the short-run but significant in the long-run. The impact of CBB and GDP growth rates was also positive in both, but only significant in the long run as they allow for long-term and secure investments. Furthermore, MCS exerted a positive impact on GDP growth rates with also an insignificant effect in the short run. Finally, CO2's relationship with GDP growth rates was significant in but negative in the long-run due to Kuznet's theory.

Policy Recommendations

This research has demonstrated financial inclusion's significant role on economic growth in European countries as it enhances their development. Based on our findings, it has been evident that European countries have to increase their efforts in the implementation of financial inclusion in order to boost their economies and improve their living standards. Therefore, the following policies are recommended:

1. This research has revealed the importance of ATMs in enhancing economic growth due to facilitating access to financial services, so it is recommended that European countries increase the number of ATMs throughout the region.
2. The banking sector is an important factor in achieving sustainable economic development and is the core of a country's financial system; therefore, it is recommended to increase the number of commercial banks in order to expand the banking sector and provide wider access to individuals in order to encourage the participation in the formal banking sector.
3. Mobile cellular subscriptions contribute to the technological aspect in achieving a financially included society as they provide secure transactions and allow for individuals to carry out financial services digitally. As a result, it is imminent for the government to increase the capacity of cellular subscriptions.
4. The results have revealed that CO2 emissions significantly increase with an increase in GDP in the short-run but are reduced in the long-run as countries become more developed. Governments should pass on policies to reduce CO2 emissions in the short run to avoid environmental degradation through the growth process. Meanwhile, high emission countries like Germany and Italy should work on more carbon reduction technologies to reduce the impact of CO2 emissions on GDP.

Limitations

Some limitations were faced while conducting this study, which include the lack of information on financial inclusion in European countries as most of the studies conducted were applied in the MENA region or Sub-Saharan Africa. In addition, interpolation of data was an issue that occurred due to missing data for some years in World Bank, with the lack of updated data to this year. The high multicollinearity of the population variable with other variables has led to dropping the variable, which reduced the number of independent factors in our study. Finally, the lack of analysis for some variables, namely mobile cellular subscriptions and CO2 emissions was also a problem faced.

Recommendations for Future Researchers

This study focused on only 6 European countries, so it is recommended for future researchers to increase the scope of their study and expand the countries the research will be conducted on. Furthermore, adding more variables to measure other factors such as number of depositors, domestic credit to private sector and Internet users will help in providing a stronger analysis and have a wider view on the various influences financial inclusion has on economic growth.

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