Chapter 9

Relationship Between Non-Performing Loans, Industry, and Economic Growth of the African Economies and Policy Recommendations for Global Growth

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ABSTRACT

The main purpose of this chapter is to evaluate the causality relationship between non-performing loans, industry volume, and economic growth and to provide some policy recommendations for global growth. Within this context, annual data of 16 African countries for the periods between 2001 and 2015 was taken into the consideration. Additionally, Dumitrescu Hurlin panel causality test was used to reach the objective. According to the result of this analysis, it was identified that there is a causality relationship between industry volume and economic growth.

In addition to this situation, it was also defined that a decrease in economic growth is the main cause of the non-performing loans ratio in African countries. This chapter makes an important contribution to the literature. While considering these results, it can be said that to increase global trade economies of the countries should be improved and banking sectors should work more effectively. As a result, it will be possible to increase the living standards of the people and provide global growth.

INTRODUCTION

Africa is the second biggest continent of the world with respect to population density. There are 54 different countries and more than 1 billion people in this continent which is correspond to 15% of the world population (Toenniessen et. al., 2008). On the other side, Africa combats many different problems at the same time for a long period. Starvation, unfavorable health conditions, migration and civil wars are accepted as the most important problems for Africa (Watts, 1991).

In addition to them, economic problems play a very significant role for this continent. Africa is one of the poorest regions in the world in spite of the fact that it has many natural resources (Kownacki, 2000). According to the World Bank report, most of the people in Africa have less than 2.5 USD incomes per day. This situation underlines the importance of economic problems in this continent. Owing to this condition, it can be said that studies, which focus on economic development in Africa, are essential in order to solve the problems in this continent.

Furthermore, Africa has also significant role in global trade. Especially after the effects of globalization, economic borders among the countries have been disappeared (Yüksel et. al., 2015). This condition gives a chance to all economies to reach new markets in the world. This issue can be accepted as a leading factor to develop global economy. In other words, when the economies of African countries are improved, this will make an important contribution to the global growth. This situation will increase the living standard of the people in the world.

Non-performing loans (NPL) of the banks, industry volume and economic growth are interrelated variables. When non-performing loans ratio of the banks in the country increases, this problem influences industry volume of this country negatively. The main reason behind this situation is that banks will be unwilling to give loans in this aspect (Elegbe, 2013), (Abadi et al., 2014), (Ahmad and Bashir, 2013). Furthermore, when banks reduce the amount of the loans due to the high NPL problem, it will decrease the investment and consumption amount that has a direct effect on economic growth (Balgova et. al., 2016), (Klein, 2013).

Moreover, decrease in industry volume mainly refers that companies have some financial problems. Because of this issue, these countries will face some difficulties

in order to pay their loans debt to the banks. This situation will have positive influence on non-performing loans ratio (Karahanoglu and Ercan, 2015), (Ersin and Duran, 2017). Also, these companies will try to decrease their costs to manage this financial problem. Within this context, they mostly prefer to lay off the employees and reduce their investments which lead to decrease in economic growth (Kaldor, 1966), (Drakopoulos and Theodossiou, 1991), (Diaz Bautista, 2003).

Additionally, economic growth has also influences on non-performing loans ratio and industry volume. If there is a decline in economic growth, this situation affects the financial aspects of the people in that country. Due to this issue, both people and countries have some difficulties to pay their debts to the banks that increases non-performing loans ratio (Khemraj and Pasha, 2009), (Louzis et. al., 2012). On the other side, when there is a recession in a country, it will have a negative effect on industry volume in that country (Balgova et. al., 2016).

Although the concepts of economic growth, industry production and nonperforming loans were analyzed in lots of studies separately, there is not a study in the literature which focuses on the relationship between these three different variables together. While considering these aspects, the main purpose of this study is to analyze the causality relationship between non-performing loans ratio, industry volume and economic growth in African countries. In order to reach this objective, annual data for the periods between 2001 and 2015 will be examined by using Dumitrescu Hurlin panel causality test. As a result of this analysis, it will be possible to make some recommendation in order to solve economic problems in Africa. Also, the results will show the ways to increase global growth. Therefore, it can be said that this study will make a significant contribution to the literature by helping to solve important problems.

This paper consists of four different parts. After the introduction, in the second part, similar studies in the literature will be detailed. In this part, the missing area in the literature related to this subject will be underlined. Moreover, in the third part, economic situation in Africa over the years is detailed. In the next part, research and methodology will be explained. Within this context, data and methodology used in the analysis will be detailed. After that, analysis results will be shared. Finally, in the last section, analysis results and the recommendations will be discussed.

BACKGROUND

Economic growth is an important indicator of the economies of the countries. Parallel to this aspect, industry production refers to the development in the industry of these countries. On the other side, nonperforming loans ratio is an important symptom of the financial crisis in banking sector. Economic growth, industry production and

Table 1. Similar studies in the literature

Author	Scope	Method	Result
Kaldor (1966)	UK	Descriptive Statistics	It was concluded that industry volume is the key factor of economic growth.
Drakopoulos and Theodossiou (1991)	Greece	Regression	It was identified that industry volume is the main indicator of economic growth.
Diaz Bautista (2003)	Mexico	Regression	It was determined that increase in industry volume has a positive influence on economic growth.
Fofack (2005)	Sub-Saharan Countries	Pseudo Panel-based Prediction Models	It was analyzed that economic growth is negatively associated with non-performing loans.
Millin and Nichola (2005)	South Africa	Vector Error Correction Model	They reached a conclusion that there is a relationship between industry production and economic growth.
Amediku (2006)	Ghana	VAR	It was determined that adverse output shock causes the NPL ratio to increase.
Arısoy (2008)	Turkey	Vector Error Correction Model	It was identified that there is a relationship between industry development and GDP growth.
Khemraj and Pasha (2009)	Guyana	Regression	It was concluded that GDP growth is adversely associated with non-performing loans.
Espinoza and Prasad (2010)	Gulf Cooperative Council	Regression	They identified that lower economic growth is the main reason of high NPL ratio.
Greenidge and Grosvenor (2010)	Barbados	ARDL	It was defined that GDP growth has an important influence on NPL ratio.
Nkusu (2011)	26 Developed Countries	VAR	It was concluded that a decrease in GDP growth leads to higher NPL ratio.
Terzi and Oltulular (2011)	Turkey	Granger Causality Analysis	It was determined that there is a causality relationship between industry volume and GDP growth.
Adebola et. al. (2011)	Malaysia	Granger Causality Analysis	They reached a conclusion that there is not a significant relationship between industrial production index and NPL ratio.
Louzis et. al. (2012)	Greece	Regression	It was identified that the GDP growth has a powerful impact on NPL ratio.
Saba et. al. (2012)	US	Regression	It was determined that there is a relationship between GDP growth and NPL ratio.
Messai and Jouini (2013)	Italy, Greece and Spain	Regression	It was concluded that higher GDP growth has a decreasing effect on NPL ratio.
Ahmad and Bashir (2013)	Pakistan	Regression	They reached a conclusion that both GDP growth and industry volume in the country lead to decrease NPL ratio.
Elegbe (2013)	Nigeria	Regression	It was defined that there is a negative relationship between industry volume and NPL ratio.
Skarica (2013)	Central and Eastern European Countries	Regression	It was identified that decrease in economic growth is main indicator of high NPL ratio.
Beck et. al. (2013)	75 Different Countries	Regression	It was defined that lower GDP growth is the main determinant of NPL ratio.
Venancio (2013)	17 Developed Countries	Regression	It was concluded that there is a significant relationship between NPL ratio and economic growth.
Vatansever and Hepşen (2013)	Turkey	Engle-Granger Co-integration Analysis	It was determined that industrial production index has negative impact on NPL ratio.
Klein (2013)	Europe	GMM	It was identified that high NPL ratio affects economic growth negatively.
Abadi et al. (2014)	Indonesia	Vector Error Correction Model	They determined that industrial production index influences NPL ratio negatively.
Ghosh (2015)	US	GMM	It was defined that high GDP growth causes NPL ratio to reduce.

Table 1. Continued

Author	Scope	Method	Result
Sheefeni (2015)	Namibia	Granger Causality Analysis	It was determined that there is a causality relationship between economic growth and NPL ratio.
Karahanoglu and Ercan (2015)	Turkey	VAR	It was identified that there is a long run relationship between industrial production index and NPL ratio.
Haniifah (2015)	Uganda	Regression	It was defined that there is a negative relationship between GDP growth and NPL ratio.
Erdogdu (2016)	Turkey	Regression	It was concluded that there is a relationship between NPL ratio and economic growth.
Balgova et. al. (2016)	100 Different Countries	Probit	It was determined that NPL ratio is the most important indicator of economic growth.

nonperforming loans are the subjects that attracted the attention of many different researchers. Because of this situation, there are lots of studies in the literature which focused on these concepts. Some of these studies were detailed on Table 1.

As it can be seen from Table 1, most of the studies focused on the relationship between nonperforming loans and GDP growth. Messai and Jouini (2013) made a study to analyze this relationship in Italy, Greece and Spain. They used regression analysis in order to reach this objective. As a result, it was identified that higher GDP growth has a decreasing effect on NPL ratio. Khemraj and Pasha (2009), Espinoza and Prasad (2010), Louzis et. al. (2012), Saba et. al. (2012), Skarica (2013), Beck et. al. (2013), Venancio (2013), Haniifah (2015) and Erdogdu (2016) also reached the similar conclusion by using the same method.

In addition to those studies, Balgova et. al. (2016) tried to evaluate the determinants of economic growth. Within this context, they analyzed 100 different countries in their study. According to the results of the probit analysis, it was defined that NPL ratio is the most important indicator of economic growth. Also, Klein (2013) and Ghosh (2015) used GMM analysis and emphasized the same conclusion. Furthermore, Amediku (2006) and Nkusu (2011) determined that decrease in GDP growth leads to higher NPL ratio by using GMM approach.

Moreover, it can also be understood that there are also some studies which evaluated the relationship between industry volume and economic growth. Kaldor (1966) concluded that industry volume is the key factor of economic growth in his study. Terzi and Oltulular (2011) also made a study to analyze this relationship in Turkey. As a result of Granger causality analysis, it was identified that there is a causality relationship between industry volume and GDP growth. Additionally, Drakopoulos and Theodossiou (1991) and Diaz Bautista (2003) defined that increase in industry volume has a positive influence on economic growth with the help of regression analysis. Also, Arısoy (2008) and Millin and Nichola (2005) reached the same conclusion with the help of vector error correction method.

Furthermore, some studies in the literature focused on the relationship between industry volume and nonperforming loans. Elegbe (2013) tried to determine this relationship in Nigeria. According to the results of the regression analysis, it was identified that there is a negative relationship between industry volume and NPL ratio. Ahmad and Bashir (2013) emphasized the similar conclusion for Pakistan with the help of similar method. Additionally, Vatansever and Hepşen (2013) and Karahanoglu and Ercan (2015) underlined the same aspect for Turkey. Moreover, Abadi et al. (2014) determined that industrial production index influences NPL ratio negatively. In spite of these studies, Adebola et. al. (2011) analyzed this issue for Malaysia and defined that there is not a significant relationship between industrial production index and NPL ratio.

While considering these studies, it was understood that there are lots of studies in which the relationship between nonperforming loans and economic growth was analyzed. Additionally, it was also seen that the relationship between industry volume and economic growth was also taken into the consideration in many different studies. Similarly, the effect of industry volume on nonperforming loans was also examined. However, it was understood that there is not a study in the literature that considers the causality relationship between these three variables together. In addition to this situation, it was also identified that Africa region was not examined very much in these studies.

MAIN FOCUS OF THE CHAPTER

Socio-Economic Outlook of Africa

Social Conditions of Africa

Regarding the population density, Africa is the second biggest continent in the world. More than 1 billion people live in this continent. This number forms 15% of total population in the world. On the other side, there are 54 different countries in Africa. These countries are listed on Table 2.

On the other side, Table 3 details the information related to the population of African countries in 2015.

Table 3 gives information about the population of African countries in 2015. As seen in this table, Nigeria has the highest population in Africa. In addition to Nigeria, Ethiopia, Egypt and Congo Democratic Republic are the other important countries with respect to the population. On the other hand, Djibouti, Equatorial Guinea, Comoros, Cape Verde, São Tomé & Príncipe and Seychelles are African

Table 2. African countries

Algeria	Angola	Benin	Botswana	Burkina Faso	Burundi	Cabo Verde	Cameroon
Central African Republic	Chad	Comoros	Congo	Cote d'Ivoire	Djibouti	Egypt	Equatorial Guinea
Eritrea	Ethiopia	Gabon	Gambia	Ghana	Guinea	Guinea-Bissau	Kenya
Lesotho	Liberia	Libya	Madagascar	Malawi	Mali	Mauritania	Mauritius
Morocco	Mozambique	Namibia	Niger	Nigeria	Rwanda	Sao Tome and Principe	Senegal
Seychelles	Sierra Leone	Somalia	South Africa	South Sudan	Sudan	Swaziland	Tanzania
Togo	Tunisia	Uganda	Zambia	Zimbabwe			

Table 3. Population of African countries

Country Name	Population (Thousands) in 2015	Country Name	Population (Thousands) in 2015	Country Name	Population (Thousands) in 2015
Nigeria	182,201.96	Burkina Faso	18,105.57	Congo	4,620.33
Ethiopia	99,390.75	Mali	17,599.69	Liberia	4,503.44
Egypt	91,508.08	Malawi	17,215.23	Mauritania	4,067.56
Congo Dem. Rep.	77,266.81	Zambia	16,211.77	Namibia	2,458.83
South Africa	54,490.41	Zimbabwe	15,602.75	Botswana	2,262.49
Tanzania	53,470.42	Senegal	15,129.27	Lesotho	2,135.02
Kenya	46,050.30	Chad	14,037.47	Gambia	1,990.92
Sudan	40,234.88	Guinea	12,608.59	Guinea-Bissau	1,844.33
Algeria	39,666.52	South Sudan	12,339.81	Gabon	1,725.29
Uganda	39,032.38	Rwanda	11,609.67	Swaziland	1,286.97
Morocco	34,377.51	Tunisia	11,253.55	Mauritius	1,273.21
Mozambique	27,977.86	Burundi	11,178.92	Djibouti	887.86
Ghana	27,409.89	Benin	10,879.83	Equatorial Guinea	845.06
Angola	25,021.97	Somalia	10,787.10	Comoros	788.47
Madagascar	24,235.39	Togo	7,304.58	Cape Verde	520.50
Cameroon	23,344.18	Sierra Leone	6,453.18	São Tomé & Príncipe	190.34
Côte d'Ivoire	22,701.56	Libya	6,278.44	Seychelles	96.47
Niger	19,899.12	Eritrea	5,227.79		

Source: African Development Bank.

countries which have low population. Table 4 gives information about the ratio of males to the females of African countries in 2015.

Table 4 shows that in 21 African countries (out of 53), the numbers of males are higher than female people. Within this scope, Equatorial Guinea is the country where the ratio of males to the females is the highest. Nigeria, Côte d'Ivoire and Seychelles are the other significant countries for this situation. Furthermore, Rwanda is also an African country in which the ratio of females to the males is the highest. Mozambique and Namibia are also important African countries where much more males live in comparison with females. Additionally, Table 5 demonstrates the distribution of featured African countries by age.

Table 4. The ratio of males/females African countries in 2015

Country Name	Sex Ratio (Males per 100 Females) in 2015	Country Name	Sex Ratio (Males per 100 Females) in 2015	Country Name	Sex Ratio (Males per 100 Females) in 2015
Equatorial Guinea	105.13	Chad	100.25	Burkina Faso	98.50
Nigeria	103.78	Congo	100.08	Gambia	98.02
Côte d'Ivoire	103.50	Cameroon	100.00	Lesotho	98.01
Seychelles	102.65	Kenya	99.93	Sierra Leone	97.95
Gabon	102.29	Uganda	99.91	Swaziland	97.83
Egypt	102.15	Botswana	99.85	Morocco	97.71
Mali	101.95	Zambia	99.70	Burundi	97.69
Comoros	101.77	Malawi	99.66	Tunisia	97.69
Liberia	101.62	Ethiopia	99.65	Togo	97.66
Niger	101.61	Benin	99.49	Mauritius	97.59
Mauritania	101.29	Congo Dem. Rep.	99.48	Cape Verde	97.40
Algeria	101.26	Madagascar	99.42	Zimbabwe	97.12
Libya	101.12	São Tomé & Príncipe	99.14	South Africa	96.76
Djibouti	100.86	Somalia	99.05	Senegal	96.47
Sudan	100.79	Ghana	98.99	Mozambique	95.49
Guinea	100.57	Tanzania	98.80	Namibia	94.83
Eritrea	100.38	Guinea-Bissau	98.57	Rwanda	91.89
South Sudan	100.30	Angola	98.50		

Source: African Development Bank.

Table 5. Distribution of the population by age in 2015

Country Name	0-14	15-64	65+
Niger	50.47	46.95	2.58
Uganda	48.09	49.42	2.49
Chad	47.72	49.83	2.45
Angola	47.65	50.04	2.31
Mali	47.53	49.95	2.52
Somalia	46.71	50.47	2.82
Gambia	46.18	51.50	2.31
Congo Dem. Rep.	45.99	51.04	2.96
Zambia	45.91	51.18	2.91
Burkina Faso	45.57	52.03	2.39
Gabon	37.13	57.77	5.10
Egypt	33.16	61.62	5.22
Libya	29.83	65.63	4.54
Cape Verde	29.65	65.77	4.58
South Africa	29.24	65.73	5.03
Algeria	28.54	65.52	5.94
Morocco	27.22	66.61	6.17
Seychelles	23.45	69.68	6.88
Tunisia	23.36	69.05	7.59
Mauritius	19.32	71.11	9.56

Source: African Development Bank.

Table 5 shows that 50.47% of the population in Niger is less than 14 years old. This ratio is 48.09% in Uganda, 47.72% in Chad and 57.65% in Angola. This situation identifies that young population is very high in those countries. It can also be understood from Table 5 that the percentage of people who are more than 65 is very low. On the other side, Mauritius is an African country where the percentage of people who are less than 14 years old is 19.32%. However, it can also be understood that 9.56% of people is more than 65 years old. In other words, old population is very high in Mauritius whereas there is very small young population. This situation is also very similar in Tunisia, Seychelles, Morocco and Algeria. As a result, it can be said that countries, which have high young population, are an important opportunity for investment. In other words, they may have a significant contribution to global trade (Fogel, 1994), (Coale and Hoover, 2015), (Bloom et. al., 1998).

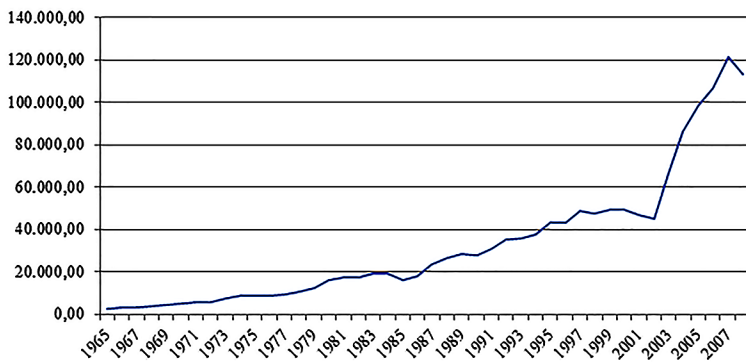*Figure 1. Economic growth of Africa*
Source: World Bank.
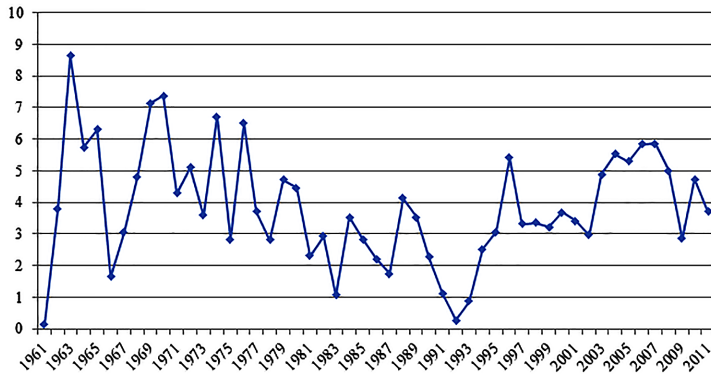
Macroeconomic Conditions of Africa Continent

The importance of Africa with respect to the economic aspect is increasing. Figure 1 gives information about economic growth of Africa over the years.

Figure 1 shows that economic growth is very volatile in Africa. In other words, there are sharp increases and decreases in this ratio over the years. For example, although it was only 0.12% in 1961, it exceeded 8.5% in 1963. However, it decreased dramatically to 1.63% in 1966. Additionally, there was a decreasing trend in economic growth for the periods between 1970 and 1992. In 1970, annual economic growth was 7.37% whereas it declined to 0.26% in 1992. On the other side, it can also be seen that there was a small increasing trend after 1992. From 1997 to 2012, this ratio had values between 3% and 5.89%. In summary, it is understood that economic

Figure 2. Banking sector in Africa (million USD)
Source: World Bank.

growth in Africa can be changed very fast. Figure 2 shows the amounts of banking sector in Africa.

As it can be seen Figure 2, the importance of banking sector is significantly increasing over the years. In 1965, the amount of banking sector was 2,551 million USD whereas it dramatically increased to 46,769 million USD in 2001. It can also be seen that there was a significant increasing trend after 2001. For example, in 2002 the amount of banking sector was 44,732 million USD, but in went up to 113,554 million USD in 2008. It can be understood that the power of the banks in Africa rises. This situation shows that trade volume in African countries is increasing. Figure 3 gives information about the export volume in Africa over the years.

As it can be seen from Figure 3, there is an important increase in export amount of Africa over the years. In 1962, African countries made 9,245 million USD amount of export. Nonetheless, this amount exceeded to 700 billion USD in 2011. Another important point is that radical increase in the export amount of Africa was mostly stated after 2002. While the export amount was 177 billion USD in 2002, this amount increased to 711 billion USD in 2011. Additionally, it is also understood that there is a decrease in this amount in 2008. The main reason behind this condition is that global mortgage crisis affected the export volume of African countries. These results give information that African countries increased export amount very much especially in the last years. This situation contributes to economic growth of these countries and increase in global trade as well (Kavoussi, 1984), (Yüksel and Zengin, 2016a). Figure 4 shows industry volume in Africa over the years.

As it can be seen from Figure 4, industry volume is significantly increasing in Africa over the years. In 1965, the industry volume in this continent was only 17,763 million USD. However, it is seen that this amount increased to 759 billion USD in 2011. In addition to this aspect, it is also identified that this increase was

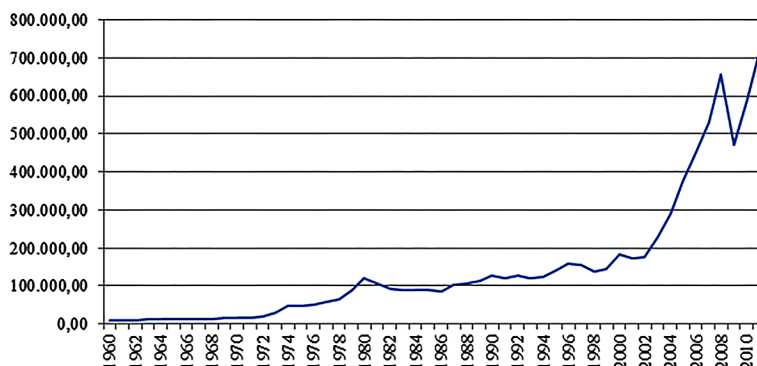*Figure 3. Export volume in Africa (million USD)*
Source: World Bank.

Figure 4. Industry volume in Africa (million USD)
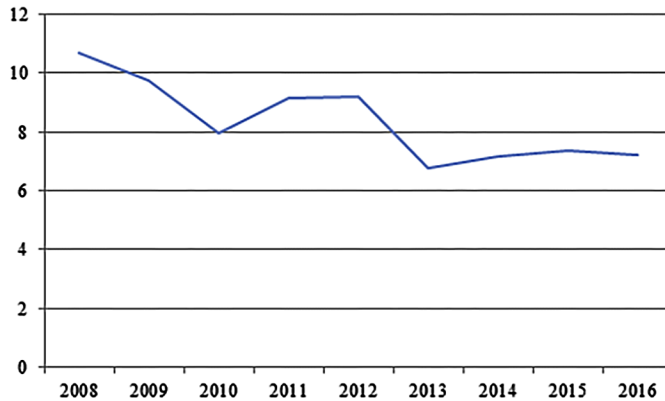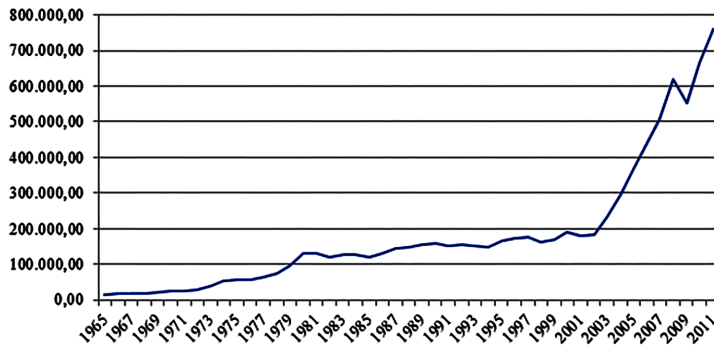*Source: World Bank.*

Figure 5. Inflation rates in Africa
Source: African Development Bank.

mostly occurred after 2001. While industry volume of Africa was 183 billion USD in 2002, it increased more than 4 times in 2012. It can also be understood that industry volume of Africa was affected negatively form 2008 global mortgage crisis. Figure 5 shows inflation rates of Africa between the years of 2008 and 2016.

As seen in Figure 5, inflation rates have a declining trend in Africa after 2008. For instance, inflation rate was 10.71% in 2008 whereas it decreased to 7.24% in 2016. This decreasing trend in inflation rates shows that economies in African countries started to become more stable. The main reason is that low inflation rates decrease uncertainty in the market. Because of this situation, investors in those countries will be willing to make new investments. This situation will also contribute to trade volume and global growth (Sarel, 1996).

While considering macroeconomic indicators of Africa, it is identified that this continent has a very weak performance in comparison with other continents. It is also understood that the importance of Africa is increasing over the years. In spite of this situation, it can be seen that the economies of African countries had a significant improvement after 2001. This situation makes an important contribution to global growth by increasing the trade volume in the world.

Economic Conditions of Featured African Countries

Table 6 gives information about 15 African countries which have highest GDP amount.

Table 6 shows that Nigeria is the African country which has the highest GDP in 2016. It has 415.080 billion USD amount GDP in this year. On the other hand, Egypt has the second highest GDP with the amount of 346.565 billion USD. In addition to them, South Africa has 280.367 billion USD amount of GDP which is the third highest amount in Africa in 2016. It can also be understood from Table 6 that the rank of Nigeria is 26 in spite of the fact that it has the highest GDP amount in Africa. Moreover, the rank of Egypt is 32 while it has the second highest GDP in Africa. This situation shows that African countries are not successful in the world

Table 6. 15 African countries which have highest GDP (2016)

Country	GDP Amount (Billion USD)	Rank in the World
Nigeria	415.080	26
Egypt	346.565	32
South Africa	280.367	42
Algeria	168.318	54
Morocco	104.908	60
Sudan	94.297	63
Angola	91.939	64
Ethiopia	69.218	69
Kenya	69.170	70
Tanzania	46.695	83
Ghana	42.761	87
Tunisia	42.388	88
Congo	39.820	89
Libya	39.389	91
Côte d'Ivoire	34.649	96

Source: African Development Bank.

with respect to the GDP amount. In other words, Africa has a very weak role in comparison with other countries in the world. Table 7 gives information about the 15 African countries that have highest GDP per capita amount in 2016.

As it can be seen from Table 7, Seychelles is the African country which has the highest GDP per capita amount in 2016 with the amount of 20,804 USD. In addition to Seychelles, Equatorial Guinea is the second best country with the amount of 18,014 USD. Furthermore, Mauritius has 10,699 USD amount of GDP per capita which is the third highest amount. It can be understood from Table 7 that the best countries with respect to GDP per capita are very different than the best countries regarding GDP amount. Table 8 gives information about 10 African countries which have highest inflation rate in 2016.

As it can be understood from Table 8, Sudan is the country which has the highest inflation rate (21.34%) in 2016. On the other side, inflation rate in South Sudan is 14.39% in 2016 which is the second highest rate. In addition to those countries, Eritrea is in the third rank with 12.25% inflation rate. This situation shows that there is high level of uncertainty in these countries. This problem has also negative effect on global trade and global growth. Table 9 gives information about the countries which have the highest real percentage growth of exports.

Table 7. 15 African countries which have highest GDP per capita (2016)

Country	GDP per Capita Amount (USD)
Seychelles	20,804
Equatorial Guinea	18,014
Mauritius	10,699
Gabon	8,296
Libya	6,161
Botswana	5,593
South Africa	4,674
Angola	4,532
Algeria	4,300
Egypt	4,061
Tunisia	3,695
Namibia	3,569
Cape Verde	3,462
Morocco	3,343
Nigeria	2,840

Source: African Development Bank.

Table 8. 10 African countries which have highest inflation rate (2016)

Country	Inflation Rate
Sudan	21.34
South Sudan	14.39
Eritrea	12.25
Malawi	10.08
Zambia	10.75
Egypt	10.05
Ethiopia	9.00
Ghana	8.69
Angola	8.67
Sierra Leone	8.35

Source: African Development Bank.

Table 9. 10 African countries which have the highest export growth (2016)

Country	Real Percentage Export Growth
Niger	16.83
Chad	14.84
Guinea-Bissau	14.51
Namibia	12.59
Liberia	10.27
Seychelles	9.81
Libya	8.63
Senegal	8.44
Democratic Republic of Congo	7.37
Cape Verde	7.18

Source: African Development Bank.

As it can be seen from Table 9, Niger has the highest growth rate (16.83%) of export in 2016. Moreover, Chad has the second highest rate for this aspect. Export amount in this country increased about 14.84% in 2016. In addition to these two countries, Guinea-Bissau and Namibia are other important African countries regarding export growth. Increase in export amount is a very significant factor to contribute global trade. Table 10 shows the ratio of current account balance to GDP amount of African countries in 2016.

Table 10. Current account balance of African in 2016

Country Name	2016	Country Name	2016	Country Name	2016
Botswana	5.61	Tunisia	-5.86	Togo	-11.00
Swaziland	1.64	Burundi	-5.95	Namibia	-11.30
South Sudan	0.90	Senegal	-6.04	Rwanda	-11.87
Morocco	-0.67	Malawi	-6.06	Congo	-12.40
Zambia	-1.09	Kenya	-6.26	Sao Tomé & Príncipe	-13.80
Egypt	-1.12	Sudan	-6.40	Djibouti	-13.96
Madagascar	-1.67	Lesotho	-6.49	Cameroon	-14.58
Equatorial Guinea	-2.33	Comoros	-6.89	Gambia	-14.98
Guinea-Bissau	-2.41	Benin	-7.12	Seychelles	-15.41
Côte d'Ivoire	-3.04	Ghana	-7.66	Algeria	-17.10
Nigeria	-3.16	Tanzania	-8.18	Zimbabwe	-19.78
Mali	-4.07	Sierra Leone	-8.38	Mauritania	-20.26
South Africa	-4.09	Ethiopia	-8.41	Niger	-21.90
Eritrea	-4.10	Chad	-8.60	Guinea	-28.36
Mauritius	-4.71	Uganda	-9.10	Liberia	-31.97
Central Afr. Rep.	-5.08	Gabon	-9.64	Libya	-44.54
Burkina Faso	-5.31	Cape Verde	-9.82	Mozambique	-46.10
Angola	-5.39	Congo Dem. Rep.	-10.85		

Source: African Development Bank.

Table 10 explains current account balance of African countries in 2016. The most important point of this table is that only 3 countries out of 53 have current account surplus. The ratio of current account balance to GDP is 5.61% in Botswana, 1.64% in Swaziland and 0.90% in South Sudan. However, there is current account deficit in other 50 countries. The ratio of current account deficit to GDP amount is less than 5% in 12 different countries.

On the other side, other 37 countries have current account deficit/GDP ratio which is higher than 5%. For example, this ratio is 31.97% in Liberia, 44.54% in Libya and 46.10%. When the ratio of current account deficit to GDP is higher than 5%, it is accepted as a significant indicator of a financial recession in the country (Yüksel and Zengin, 2016b). Because of this situation, these 37 countries are subject to important risks.

In addition to them, Table 11 gives information about trade relationship between Africa and European Union. As it can be seen in this table, there was an increasing trend in the import amount of EU from Africa for the periods between 2006 and

Table 11. Africa and European Union trade relationship

Year	Import of EU From Africa (Million EUR)	Export of EU to Africa (Million EUR)
2006	17,187	15,734
2007	17,210	18,538
2008	22,367	22,436
2009	16,863	19,467
2010	21,759	23,140
2011	34,080	28,891
2012	42,422	28,856
2013	38,257	30,278
2014	37,044	31,133
2015	28,437	29,060
2016	20,412	24,915

Source: European Commission.

2012. Nevertheless, there was a reduce in the amount import form African countries from this year. On the other hand, the export amount of EU to African countries went up until 2014. However, there was a decreasing in this amount in 2015 and 2016.

Issues, Controversies, Problems

Data Set and Variables

In this study, 16 African countries were taken into the consideration because the data for other African countries was not available. In the analysis process, annual data of these 16 African countries for the periods between 2001 and 2015 was used. All data was provided from the website of World Bank. With respect to the "NPL" variable, the ratio of non-performing loans to total loans was considered. Additionally, regarding the variable on "Industry", the ratio of industry volume in GDP amount was used. Moreover, as for the variable of "Economic Growth", annual GDP growth was taken into the consideration. The names of these countries were given on Table 12.

The details of economic growth, industry volume and nonperforming loans data of these countries in 2015 are given on Table 13.

As it can be seen from Table 13, in 2015, Rwanda has the highest GDP growth rate (6.90%) whereas the economy of Sierra Leone is downsizing by 20%. On the

Table 12. 16 African countries analyzed in the study

Egypt	Mauritius	Nigeria	South Africa
Gabon	Morocco	Rwanda	Swaziland
Ghana	Mozambique	Senegal	Tunisia
Kenya	Namibia	Sierra Leone	Uganda

Table 13. The data of economic growth, industry volume and nonperforming loans for selected countries in 2015

Country	NPL (%)	GDP Growth Rate (%)	Industry (%)
Egypt	7.2	4.2	36.3195
Gabon	3.8	3.85668	52.8165
Ghana	14.6736	3.8827	26.3476
Kenya	5.98876	5.6492	19.5245
Mauritius	7.02514	3.50001	22.7061
Morocco	6.53333	4.4	29.1991
Mozambique	4.3	6.26654	20.0823
Namibia	1.55169	5.66377	30.4034
Nigeria	5.32419	2.65269	20.3819
Rwanda	5.83738	6.9042	14.2368
Senegal	21.1733	6.48519	23.5929
Sierra Leone	31.73	-20.301	7.56926
South Africa	3.12083	1.2833	28.7195
Swaziland	7.54107	1.65739	44.2457
Tunisia	16.2	0.8	28.9269
Uganda	5.12696	5.04298	20.4321

other side, industry volume in Gabon is increasing 52% which is the highest ratio among the selected countries. After Gabon, Swaziland is the second country with 44% increase in the industry volume. Furthermore, Sierra Leone has the weakest performance with respect to this concept. In addition to them, Namibia has the lowest nonperforming loans ratio (1.55%) among all selected countries. After Namibia, South Africa is the second successful African country regarding nonperforming loans ratio. On the other hand, Sierra Leone is the worst country for this issue because nonperforming loans ratio of this country is 31.73. It can be understood from Table 12 that Sierra Leone is the worst country for each three variables. However, the best countries are different for each concept.

Dumitrescu Hurlin Panel Causality Tests

Dumitrescu and Hurlin panel causality test is accepted as an advanced form of Granger causality analysis. It tests causality relationship between the variables. The main requisite of this analysis is that the variables, which will be used in the causality analysis, should be stationary. Because of this situation, stationary analysis of the variables should be performed by using panel unit root tests before starting Dumitrescu Hurlin panel causality test. The details of this test were explained below (Dumitrescu and Hurlin, 2012).

$$Y_{i,t} = a_i + \sum_{k=1}^{K} Y_i^k Y_{i,t-k} + \sum_{k=1}^{K} B_i^k X_{i,t-k} + \varepsilon_{i,t} \tag{1}$$

In this equation, K explains optimum lag interval. On the other side, Y and X represents the variables of which causality analysis will be examined. That is to say, the purpose of this analysis is to determine whether X is the cause of Y or not. Because the methodology considered in the analysis is essential (Eti and İnel, 2016), it can be said that Dumitrescu Hurlin panel causality analysis is very helpful in order to achieve the purpose of this study.

Analysis Results

Stationary analysis of the variables is the first step to evaluate the relationship between non-performing loans, industry volume and economic growth. For this purpose, Levin, Lin and Chu (LLC) panel unit root test was used. The results of this test were given on Table 14.

As it can be understood from Table 14, as a result of Levin, Lin and Chu panel unit root test, the probability values of all three variables are less than 0.05. This situation shows that these variables do not have unit root. In other words, they are stationary at their level values. Owing to this situation, these variables were used in the analysis with their original forms. In addition to this condition, to achieve

Table 14. LLC panel unit root test results

Variables	Levin, Lin and Chu Test (p Value)
NPL	0.0000
Industry	0.0002
Economic Growth	0.0000

the objective of the study, Dumitrescu Hurlin panel causality test was taken into the consideration. The results of this test were given on Table 15.

As it can be seen from Table 15, the probability values for the null hypothesis of "Industry volume does not cause economic growth" for 1 lag and 2 lags are less than 0.05. Because of this situation, it was defined that this null hypothesis can be rejected. This result demonstrates that there is a causality relationship between industry volume and economic growth. That is to say, in order for African countries to provide economic growth, increase in industry volume should be provided. It can also be said that when industry is improved in Africa, this will contribute to global trade. Additionally, this situation has a positive influence on global growth.

Another important result of this analysis is that the null hypothesis of "Economic growth does not cause NPL" was rejected since the probability value of this hypothesis is less than 0.05. This result explains that decrease in economic growth is the main cause of the non-performing loans ratio in African countries. This condition shows that when there is a decline in economic growth of these countries, customers started to face some difficulties in order to pay their debts to the banks. Due to this aspect, the non-performing loans ratio increases. Because economic recession has an increasing effect on nonperforming loans, economic growth should be provided to contribute global trade.

In addition to these aspects, the null hypothesis of "Industry volume does not cause NPL" can be rejected as well because the probability values of this hypothesis for 1 lag and 3 lags are less than 0.05. This situation refers that decrease in the industry volume is the key reason of high non-performing loans ratio. This issue explains that when there is decrease in industry volume in African countries, the companies will have lower trade volume and the profitability of them will decline.

Table 15. Dumitrescu Hurlin panel causality test results

Null Hypothesis	Probability Values (lag=1)	Probability Values (lag=2)	Probability Values (lag=3)
"Industry" does not cause *"Economic Growth"*	0.5335	**0.0000**	**0.0003**
"Economic Growth" does not cause *"Industry"*	0.5887	0.4413	0.2233
"NPL" does not cause *"Economic Growth"*	0.8687	0.3226	0.5211
"Economic Growth" does not cause *"NPL"*	**0.0096**	0.8637	0.5078
"NPL" does not cause *"Industry"*	0.6106	0.4218	0.9599
"Industry" does not cause "NPL"	0.0004	0.1482	0.0000

As a result of this aspect, these parties have problems regarding the repayment of the loans taken by the banks. In other words, global trade possibilities should be taken into the consideration to improve the industry. Therefore, it can be possible to minimize the ratio of nonperforming loans.

SOLUTIONS AND RECOMMENDATIONS

In this study, it is concluded that industry growth is the main cause of economic growth which has a decreasing effect on nonperforming loans ratio. As it can be understood these three variables are connected to each other for African countries. Therefore, it is obvious that African countries should focus on improving their industry levels in order to minimize the negative ways of lower economic growth and higher nonperforming loans.

FUTURE RESEARCH DIRECTIONS

In this study, the relationship between nonperforming loans, industry development and economic growth is evaluated for African countries. In addition to this aspect, another study, which makes a comparison developed countries with developing countries with respect to this relationship, will be also very beneficial to the literature.

CONCLUSION

In this paper, it was aimed to identify the causality relationship between non-performing loans, industry volume and economic growth. Within this scope, 16 African countries were analyzed in this study. Because there is not necessary data for other African countries, they had to be eliminated in the analysis. Furthermore, annual data of these 16 African countries for the periods between 2001 and 2015 were taken into the consideration. Additionally, Dumitrescu Hurlin panel causality test was considered in order to reach this objective.

In the analysis process, first of all, unit root test was made to understand whether the variables are stationary or not. Within this context, Levin, Lin and Chu (LLC) panel unit root test was used. As a result of this test, it was defined that probability values of all three variables are less than 0.05. This situation shows that these variables do not have unit roots. In other words, it was seen that they are stationary on their level values. Owing to this situation, it was identified that there are appropriate for Dumitrescu Hurlin panel causality analysis.

According to the results of the panel causality analysis, it was determined that there is a causality relationship between industry volume and economic growth. In other words, it was understood that decrease in the industry volume is the main reason of economic recession. The main reason behind this situation is that when there is a problem in the industry, companies will face financial problems and this issue results in decreasing economic growth. Due to this aspect, it was recommended that African countries should focus on industry development in order to provide economic growth. It can also be understood that when industry is developed in Africa, this will contribute to global trade has an increasing effect on global growth.

In addition to this situation, it was also concluded that decrease in economic growth is the main cause of the non-performing loans ratio in African countries. This condition demonstrates that when economic growth of these countries is declined, customers started to face some financial difficulties in order to pay their debts to the banks. Owing to this situation, the non-performing loans ratio of these banks increases. Therefore, it can be said that when economies of African countries are developed, the problem of high non-performing loans ratios will be minimized. To enhance global growth, banking sector should work effectively. Hence, as it can be understood from the result of the analysis, economies of the countries should be improved to enhance effective banking sector and provide global growth.

Another important result of this study is that decrease in the industry volume is the key reason of high non-performing loans ratio. This issue explains that when industry volume in African countries is decreased, the companies will have lower trade volume. Because of this situation, the profitability of these countries will decline. As a result of this aspect, these parties have problems regarding the repayment of the loans taken by the banks. Thus, it was understood that these countries should also improve their industries to reduce non-performing loans ratio. While considering this result, it can be said that global trade should be developed to have effective banking system and increase life standards of the people. Owing to this situation, it can be possible to reach global growth.

REFERENCES

Abadi, S., Achsan, N. A. I., & Rachmina, D. (2014). The Dynamics of Non-Performing Loan in Indonesian Banking Industry: A Sensitivity Analysis using VECM Approach. *International Journal of Education and Research*, *2*(8).

Adebola, S. S., Sulaiman, W., Yusoff, W., & Dahalan, J. (2011). An ARDL approach to the determinants of nonperforming loans in Islamic banking system in Malaysia. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *1*(2), 20–30.

Ahmad, F., & Bashir, T. (2013). Explanatory Power of Macroeconomic Variables as Determinants of Non-Performing Loans: Evidence form Pakistan. *World Applied Sciences Journal*, *22*(2), 243–255.

Amediku, S. (2006). *Stress tests of the Ghanaian Banking Sector: A VAR Approach.* Working Paper of Bank of Ghana, WP/BOG-2006/02.

Arisoy, I. (2008). *Türkiye'de Sanayi Sektörü-Iktisadi Büyüme Ilişkisinin Kaldor Hipotezi Çerçevesinde Test Edilmesi* (No. 2008/1). Discussion Paper, Turkish Economic Association.

Balgova, M., Nies, M., & Plekhanov, A. (n.d.). *The economic impact of reducing non-performing loans.* EBRD Working Paper No. 193.

Beck, R., Jakubik, P., & Piloiu, A. (2013). *Non-performing loans: What matters in addition to the economic cycle?* Working Paper Series, 1515.

Bloom, D. E., Sachs, J. D., Collier, P., & Udry, C. (1998). Geography, demography, and economic growth in Africa. *Brookings Papers on Economic Activity*, *1998*(2), 207–295. doi:10.2307/2534695 PMID:12295931

Coale, A. J., & Hoover, E. M. (2015). *Population growth and economic development*. Princeton University Press.

Diaz Bautista, A. (2003). México´s Industrial Engine of Growth: Cointegration and Causality. *Revista Momento Economico*, (126).

Drakopoulos, S. A., & Theodossiou, I. (1991). Kaldorian Approach to Greek Economic Growth. *Applied Economics*, *23*(10), 1683–1689. doi:10.1080/00036849100000133

Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, *29*(4), 1450–1460. doi:10.1016/j.econmod.2012.02.014

Elegbe, A. (2013). Bank failure and economic development in Nigeria: An empirical approach. *British Journal of Economics. Finance and Management Sciences*, *8*(1), 46–63.

Erdogdu, A. (2016). Assessing the Impact of Non-Performing Loans on Economic Growth in Turkey. *Economic and Social Development: Book of Proceedings*, 309.

Ersin, İ., & Duran, S. (2017). Faizsiz Finans Döngüsünü Oluşturma Açısından Adil Ekonomik Düzen Söyleminin Kredileşme İlkeleri Ve Uygulanabilirliğinin Değerlendirilmesi. *Turkish Studies*, *12*(8), 109–132. doi:10.7827/TurkishStudies.11928

Espinoza, R., & Ananthakri, P. (2010). *Nonperforming Loans in the GCC Banking System and their macroeconomic effects.* IMF Working Paper WP/10/224.

Eti, S., & İnel, M. N. (2016). A Research on Comparison of Regression Models Explaining the Profitability Base on Financial Data. *International Journal of Business and Management*, *4*(10), 470–475.

Fofack, H. (2005). *Nonperforming loans in Sub-Saharan Africa: causal analysis and macroeconomic implications.* World Bank Policy Research Working Paper, 3769.

Fogel, R. W. (1994). *Economic growth, population theory, and physiology: the bearing of long-term processes on the making of economic policy (No. w4638).* National Bureau of Economic Research. doi:10.3386/w4638

Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability*, *20*, 93–104. doi:10.1016/j.jfs.2015.08.004

Greenidge, K., & Grosvenor, T. (2010). Forecasting non-performing loans in Barbados. *Journal of Business*. *Finance and Economics in Emerging Economies*, *5*(1), 79–108.

Haniifah, N. (2015). Economic Determinants of Non-performing Loans (NPLs) in Ugandan Commercial Banks. Taylor's. *Business Review (Federal Reserve Bank of Philadelphia)*, *5*(2), 137–153.

Kaldor, N. (1966). *Causes of the Slow Rate of Economic Growth of the United Kingdom: An Inaugural Lecture*. Cambridge University Press.

Karahanoğlu, İ., & Ercan, H. (2015). The Effect of Macroeconomic Variables on Non-Performing Loans in Turkish Banking Sector. *Journal of International Social Research*, *8*(39), 883–892. doi:10.17719/jisr.20153913804

Kavoussi, R. M. (1984). Export expansion and economic growth: Further empirical evidence. *Journal of Development Economics*, *14*(1), 241–250. doi:10.1016/0304-3878(84)90052-X

Klein, N. (2013). *Non-Performing Loans in CESEE: Determinants and Macroeconomic Performance.* IMF Working Paper WP13/72.

Kownacki, P. (2000). Migration phenomena and current social and economic problems of the African countries. *Hemispheres: Studies on Cultures and Societies*, (15), 37-49.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, *36*(4), 1012–1027. doi:10.1016/j.jbankfin.2011.10.012

Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*, *3*(4), 852–860.

Millin, M., & Nichola, T. (2005). Explaining economic growth in South Africa: A Kaldorian approach. *International Journal of Technology Management & Sustainable Development*, *4*(1), 47–62. doi:10.1386/ijtm.4.1.47/1

Nkusu, M. (2011). *Nonperforming loans and macrofinancial vulnerabilities in advanced economies*. IMF Working Paper, WP/11/161.

Saba, I., Kouser, R., & Azeem, M. (2012). Determinants of Non Performing Loans: Case of US Banking Sector. *The Romanian Economic Journal*, *44*(6), 125–136.

Sarel, M. (1996). Nonlinear effects of inflation on economic growth. *Staff Papers*, *43*(1), 199–215. doi:10.2307/3867357

Sheefeni, J. P. S. (2015). The Impact of Macroeconomic Determinants on Non-performing Loans in Namibia. *International Review of Research in Emerging Markets and the Global Economy*, *4*, 612–632.

Škarica, B. (2014). Determinants of non-performing loans in Central and Eastern European countries. *Financial Theory and Practice, 38*(1), 37-59.

Terzi, H., & Oltulular, S. (2011). Türkiye'deki Sanayileşme ve Ekonomik Büyüme Arasındaki Nedensel İlişki. *Doğuş Üniversitesi Dergisi*, *5*(2), 219–226.

Toenniessen, G., Adesina, A., & DeVries, J. (2008). Building an alliance for a green revolution in Africa. *Annals of the New York Academy of Sciences*, *1136*(1), 233–242. doi:10.1196/annals.1425.028 PMID:18579885

Vatansever, M., & Hepsen, A. (2013). Determining impacts on non-performing loan ratio in Turkey. *Journal of Finance and Investment Analysis*, *2*(4), 119–129.

Venâncio, S. F. M. (2013). *Does financial development promote economic growth?* (Doctoral dissertation). Instituto Superior de Economia e Gestão.

Watts, M. (1991). Entitlements or empowerment? Famine and starvation in Africa. *Review of African Political Economy*, *18*(51), 9–26. doi:10.1080/03056249108703903

Yüksel, S., Dincer, H., & Hacioglu, U. (2015). CAMELS-based Determinants for the Credit Rating of Turkish Deposit Banks. *International Journal of Finance & Banking Studies*, *4*(4), 1–17.

Yüksel, S., & Zengin, S. (2016a). Causality relationship between import, export and growth rate in developing countries. *International Journal of Commerce and Finance*, *2*(1), 147–156.

Yüksel, S., & Zengin, S. (2016b). Leading Indicators of 2008 Global Crisis: An Analysis with Logit and MARS Methods. *Finansal Araştırmalar ve Çalışmalar Dergisi*, *8*(15), 495–518.

KEY TERMS AND DEFINITIONS

Current Account Balance: Gives information about the difference between the incoming and outgoing amounts of foreign exchanges.

Economic Growth: The increase in GDP amount in comparison with the last period.

Export: Selling goods to other countries.

GDP: The first letters of gross domestic product. It gives information about the economic power of the country.

GDP Per Capita: Calculated as the total GDP value divided by the number of people in this country.

Industry Growth: Gives information about the improvement in the industry volume.

Inflation Rate: The increase in the price levels.

Nonperforming Loan: The loan which cannot be paid by the customers within 90 days period after the maturity.

Nonperforming Loans Ratio: Calculated by dividing nonperforming loans to total loans.