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France: A Regression Analysis 1970 – 2019

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Abstract*— The goal of the authors in this paper, is to do an economic analysis of the French economy by presenting and discussing economic data for a number of years. Some of this data includes but not limited to, the Gross Domestic Product, the Growth Rate, the Exports and Imports as well as the Unemployment rates. In order to have a better picture of the status of the French Economy, a number of regression models will be run in the appendix.

Keywords: France regression analysis.

I. HISTORICAL BACKGROUND

The history of a nation is very important, because it is the history that tells us what the future is going to be. In the next few pages, we are going to present som events in the French history that were instrumental of its development.

France is part of Western Europe, bordered by the English Channel, Luxembourg, Belgium, Germany and Switzerland, as well as the Mediterranean. Today it is one of the most modern nations in the world, and a leader in Europe. It is a permanent member of the United Nations, and by 2009 rejoined the NATO, after it was withdrawn in 1959 by De Gaulle.

France was the result of the breakup of the Carolingian Empire, and Hugh Capet became the king of West Francia during 987. During the early years there were a lot of wars with the English Monarchs over land, and these wars continued against the Habsburgs.

The best years of the French royal power were the years of the reign of Louis XIV, 1642 – 1715, during which time the French culture dominated Europe. This power collapsed fairly quickly after Louis XIV and was followed by the French Revolution in 1789. At that time the republic was formed, but it was taken over by Napoleon and his wars, which caused France to dominate Europe until it's defeat.

II. CURRENT LITERATURE/STATISTICAL ANALYSIS

In the section that follows, the authors will present and discuss the current economic conditions in France. Along with that, we are going to show a lot of economic data for about 50 years and that will help us reach a conclusion whether France is an economic superpower or not. Based on the data, we should be able to make some recommendations about the French economy.

Studies show that France has an economic freedom score of 66.0, and this score makes it the 64th freest economy in 2020. Having said that, it is important to say that economic freedom in France has increased by more than 2 points since 2011, and that included areas such as control of government spending, fiscal freedom as well as labor freedom. Overall, France remains one of the most modern countries in the world, and as far as European countries are concerned, it plays a leading role.

The French economy even though is considered to be "Socialist", the government has privatized many large companies such as Air France, France Telecom, and others. The French economy is not all that good. It also has its problems. It's GDP increased by 2.26% in 2017, a little higher than the previous year which was 1.2% and down to 1.75% during 2018. On the other hand, its unemployment rate rose from 7.8% in 2008 to 10.2% in 2015, and then down to 9.0% in 2017. Also, the budget deficit rose from 3.3% of GDP in 2008 to 7.5% of GDP in 2009, although it came back down to 2.2% in 2017. Finally, its public debt rose from 68% of the GDP to 95% in 2014 and up to 97% in 2017.

The authors are now going to present some current economic figures in order to get a better picture of France's economic status. In 2017 France had a GDP of $2.856 trillion, and a growth rate of around 2.3%, and 1.75% in 2018. The growth rate was higher than the previous 2 years, which was 1.1% in 2016 and 1.0% in 2015 and up to 1.75% during 2018, down from 2.26% in 2017 but not very promising. France is mostly a service-oriented economy, supported by the fact that approximately 79% of its GDP comes from services, 19.5% from industry and 1.7% from agriculture.

Our research has found that the biggest problem that France faces is unemployment. In 2017 the unemployment rate was 9.39%, and down to 8.42% in 2019, obviously a very high rate by any standards. On the other hand, inflation is a not a big problem, since during 2017 it was .46%, up to .79% in 2018. France is very active in trade, both exports and imports, and in fact it is ranked 7th in the world in both of them. In 2017 it exported a total of $903.5 billion, and in 2018 $934.8 billion Its exports included machinery, chemicals, and pharmaceutical products, just to name a few. In the same year France imported vehicles, crude oil, chemicals, etc., for a total of $957.9 billion and $969.5 billion in 2018.

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The table that follows, will show a number of years of economic data, including the GDP, Unemployment Rates, Inflation Rates, just to name a few. Also, we are going to show most of this data in graphs, which will be easier to see the direction of the French economy of the last 50 years.

Table 1: France data 1970 – 2019

	GDP TR.	EXPORTS	IMPORTS	NET EXP.	GROWTH	INFLAT.	UNEMPL.	LABOR	POPULAT.
YEAR	U.S. $	BIL. US $	BIL. US $	X - M	RATE %	%	%	FORCE MIL	MILLION
1970	1.04	95.7	103.4	-7.7	6.11	5.42			51.9
1971	1.09	104.9	110.9	-6	5.32	5.9			52.3
1972	1.14	116.4	127.3	-10.9	4.51	6.8			52.8
1973	1.22	131	146.3	-15.3	6.34	7.86			53.2
1974	1.27	146	154.4	-8.4	4.3	11.83			53.7
1975	1.26	141.3	140.7	0.6	-0.96	13.75			54
1976	1.31	153.4	166.8	-13.4	4.36	10.75			54.3
1977	1.36	165.5	169.8	-4.3	3.46	8.77			54.6
1978	1.41	176.4	177.3	-0.9	3.98	9.28			54.8
1979	1.46	188.2	192.9	-4.7	3.55	10.31			55
1980	1.48	193.4	202.9	-9.5	1.52	11.69			55.2
1981	1.5	202.8	200	2.8	1.07	11.69			55.5
1982	1.54	200.5	207.6	-7.1	2.51	12.1			55.8
1983	1.56	210.1	201.6	8.5	1.24	9.65			56.1
1984	1.58	224.3	208.4	15.9	1.51	7.07			56.5
1985	1.6	229	218.3	10.7	1.62	5.45			56.8
1986	1.64	226.8	232.9	-6.1	2.34	5.06			57.2
1987	1.68	233.1	250.7	-17.6	2.56	2.46			57.5
1988	1.76	252.9	271.9	-19	4.74	3.19			57.8
1989	1.84	277.6	293.8	-16.2	4.34	3.28			58.1
1990	1.89	289.1	308.7	-19.6	2.92	2.66		25.84	58.4
1991	1.91	307.3	317.8	-10.5	1.05	2.55	9.13	25.83	58.6
1992	1.94	325.5	323.4	2.1	1.6	1.97	10.2	26.04	58.8
1993	1.93	326.8	312.7	14.1	-0.63	1.62	11.32	26.17	59.1
1994	1.98	353.5	340.4	13.1	2.36	0.92	12.59	26.2	59.3
1995	2.02	384.8	365.9	18.9	2.11	1.12	11.84	26.4	59.5
1996	2.05	401.2	374.9	26.3	1.41	1.36	12.37	26.7	59.8
1997	2.1	453.5	404.8	48.7	2.34	0.88	12.56	26.7	59.9
1998	2.17	493.5	453	40.5	3.59	0.95	12.07	26.85	60.2
1999	2.25	518.7	484.5	34.2	3.42	0.2	11.98	27.16	60.5
2000	2.33	586.6	558.9	27.7	3.92	1.55	10.22	27.36	60.9
2001	2.38	603.6	572.2	31.4	1.98	2	8.61	27.43	61.4
2002	2.41	615.6	583.3	32.3	1.14	2.07	8.7	27.76	61.8
2003	2.43	609.7	588.5	21.2	0.82	1.86	8.31	28.32	62.2
2004	2.5	642.4	625	17.4	2.83	1.62	8.91	28.5	62.7
2005	2.54	667.9	664.5	3.4	1.67	1.94	8.49	28.78	63.2
2006	2.6	708	701.8	6.2	2.45	2.15	8.45	28.94	63.6

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2007	2.66	727.7	742.1	-14.4	2.42	2.56	7.66	29.19	64
2008	2.67	731	751.8	-20.8	0.25	2.37	7.06	29.4	64.4
2009	2.59	651.3	681.4	-30.1	-2.87	0.07	8.73	29.64	64.7
2010	2.64	709.9	742	-32.1	1.95	1.07	8.87	29.74	65
2011	2.7	753	785.3	-32.3	2.19	0.95	8.81	29.74	65.3
2012	2.71	774.4	786.9	-12.5	0.31	1.16	9.39	29.98	65.6
2013	2.72	791	805.9	-14.9	0.58	0.78	9.32	30.13	65.9
2014	2.75	816.8	845.4	-28.6	0.96	0.58	10.29	30.06	66.2
2015	2.78	854.8	895.2	-40.4	1.11	1.14	10.36	30.13	66.5
2016	2.81	869.9	921.5	-51.6	1.09	0.52	10.06	30.19	66.7
2017	2.88	903.5	957.9	-54.4	2.26	0.46	9.39	30.24	66.9
2018	2.92	934.8	969.5	-34.7	1.75	0.79	9.05	30.4	67
2019	3.06				1.3	1.3	8.42	30.45	67.1

SOURCE: DATA_EXTRACT_FROM_WIRKD_DEVELOPMENT_INDICATORS
THE WORLD BANK GROUP, HTTP://DATABANK.WORLDBANK.ORG

In Table 1, above, there are several things that we need to point out and briefly discuss. The first is the Growth Rate. From what can be seen on the table the Growth Rate over the last 50 years, ranged from a high of 6.11% in 1970, to a low of -2.9% in 2009. The last several years it has been positive, but barely over 0. The low Growth Rate can explain another thing on this table. We do not believe that it is by coincidence that the French total trade, (Xn =X – M), has been negative for 29 years during the last 50. In fact, only 21 years have been positive. The conclusion we derive from this table is that the Population increased by 27%, the minimal growth was not enough to keep up even though the GDP during the last 50 years grew by 180%, and that resulted in the negative total trade (Xn). Several of these findings will be presented in the figures that follow.

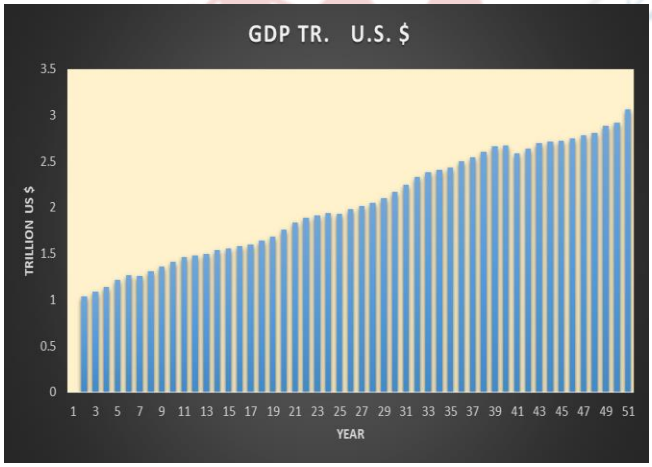

Figure 1

Figure 1 shows France's GDP in Constant 2010 Trillions of U. S. dollars. As can be seen, even though there are some ups and down for the most part the economy of France shows a steady growth over the last 50 years.

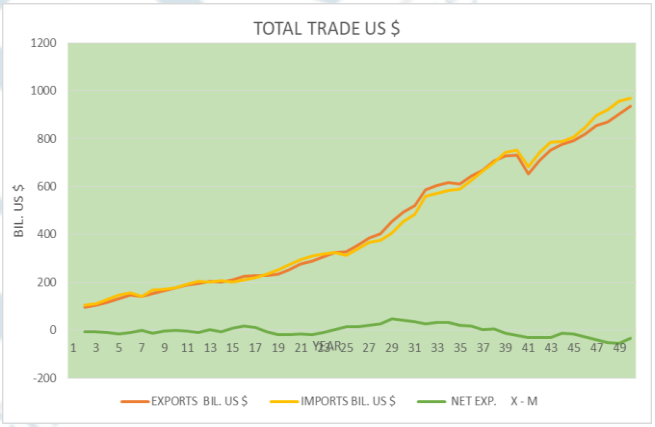

Figure 2

Figure 2 above, show France's total trade in U. S. billions of constant 2010 dollars. What we see here is that exports and imports are almost equal to each other, and that is why France has a balance of trade during *the last 50 years.*

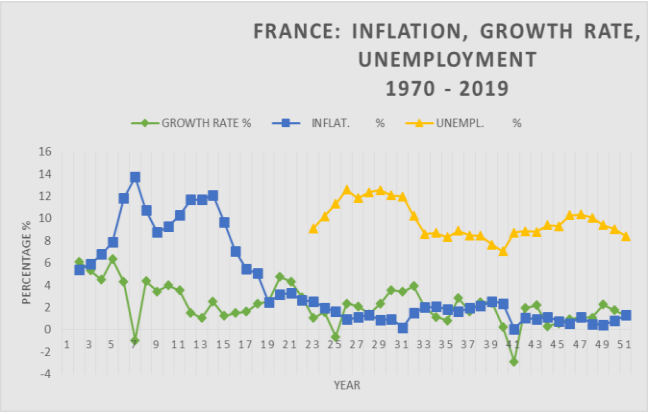

Figure 3

Figure 3 shows three of the most important economic indicators. Inflation, unemployment and the growth rate. We can see that the unemployment even though high, it has been declining during the last several years. The same is also true

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about the inflation rate. On the other hand the growth rate is fairly low during the last several years around 2%, even though about 5 or 6 years ago it was negative.

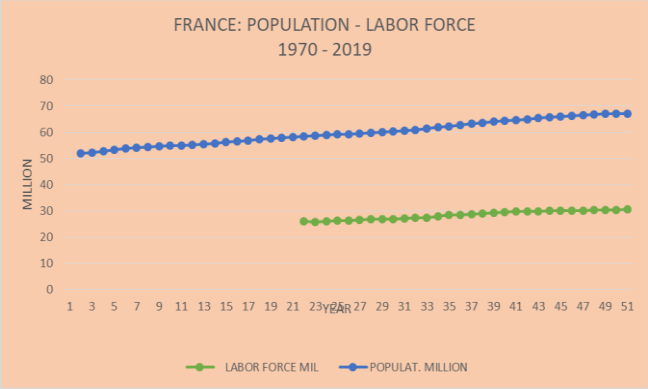

Figure 4

Figure 4 finally show the population and the labor force for France for the last 50 years, and as can be seen they both have a steady growth.

III. CONCLUSION

In concluding this paper, we are going to review some of our findings, and then based on those we will make some recommendations or suggestions that could eventually help the French economy.

One thing that we found through our research, and it is shown on Table 1 is that the Growth Rate of France during the last 50 years has been very weak. The highest it has ever been was 6.9% in 1970, but since then it has been in the very low single digits, even negative for a number of years. The growth rate during 2017 and 2018 is ok, and this is because of lower energy prices, and improving financial conditions. Our recommendation is that the French government should find ways to take advantage of the lower energy prices and build it into its economy for faster and stronger economic growth, as well as pursue structural reforms which will help boost growth. Another thing we found, is that the GDP has increased by 180% during the last 50 years, and even though population has increased by only 27%, it was not enough to meet the demands and needs of the French, and that resulted in having negative net exports and rising, meaning that imports have been increasing in order to meet their needs. Again, the government should find ways to increase its exports, by strengthening external demand for French products. Obviously, they have a lot to offer, but they need to create the demand. Finally, we found that inflation is not a problem, since it has been below 1% or close to it for a number of years, but unemployment is major problem since it has been in double digits for the majority of the last 50 years, although it has dropped below 10% during 2017 and 2018. The very high unemployment is contributed to the very weak business confidence, which is also weakening investment, and thus delaying hiring. The French government should promote business and investment in France because this is the only thing that will speed up employment, as well as growth.

Finally, our research has found that the French government has been pushing measures in order to lower the unemployment rate further, and at the same time improve how foreign investors see the French economic environment, as well as improve competitiveness and public finances. The results of these measures remain to be seen.

Obviously, our research does not include 2020 and the impact of Covid – 19. As we know and see, Covid – 19 has impacted heavily the world economy, and it will be very interesting to measure this impact when it is all over, but this will probably take several years.

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IV. APPENDIX

In this section of the paper, the authors ran several regressions using the data presented earlier in the paper. The regressions are an attempt to measure aspects of France’s economy. The hypothesis for each test is presented along with the findings and a graph illustrating the regression.

Model #1

The first model uses population as independent and GDP as dependent. The hypothesis is that GDP does not depend on population. The value of the R^2 is 0.988, so roughly 99% of GDP depends on its population. The P value for this hypothesis test is 2.39×10^{-47}. Since this value is smaller than 0.05, the hypothesis is rejected. These results are shown

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below in Figure 1. We are 95% confident that the slope of the regression line is between 0.122 and 0.130. This means that an additional million increase in France's population will cause a small increase in GDP.

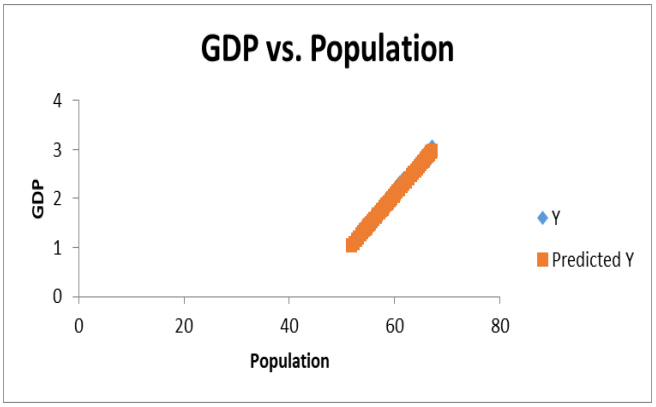

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Figure 1

Model #2

The second model uses Labor Force as independent and GDP as dependent. The hypothesis is that GDP does not depend on Labor Force. The value of the R^2 is 0963, so roughly 96% of GDP depends on Labor Force.. The P value for this hypothesis test is $1.41x10^{-21}$. Since this value is smaller than 0.05, the hypothesis is rejected. These results are shown in Figure 2 on the next page. We are 95% confident that the slope of the regression line is between 0.191 and 0.222. This means that an increase of 1 million in France's Labor Force will cause a small increase in GDP.

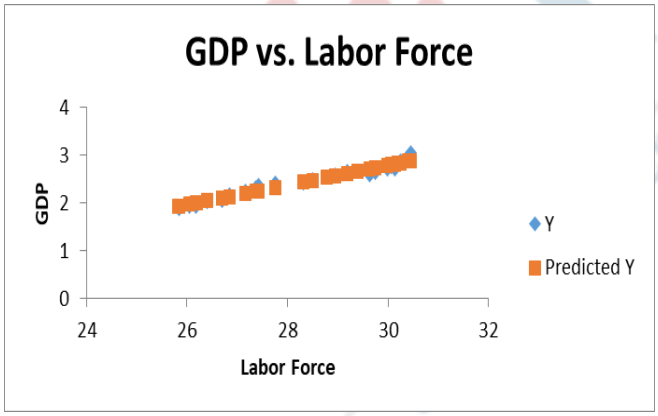

Figure 2

Model #3

The third model uses Population as independent and Inflation as dependent. The hypothesis is that Inflation does not depend on population. The value of the R^2 is 0.597, so roughly 60% of Chile's Inflation depends on its net exports. The P value for this hypothesis test is $4.8x10^{-11}$. Since this value is smaller than 0.05, the hypothesis is rejected. These results are shown below in Figure 3. We are 95% confident that the slope of the regression line is between -0.83 and -0.511. This means that an increase of 1 million in France's population will cause a slight decrease in the inflation rate.

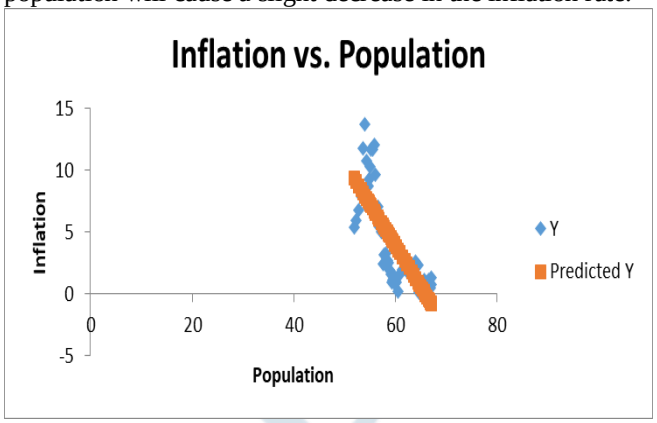

Figure 3

Model #4

The fourth model uses growth rate as independent and net exports as dependent. The hypothesis is that net exports does not depend on growth rate. The value of the R^2 is 0.004, so less than 1% of net exports depends on growth rate. The P value for this hypothesis test is 0.667. Since this value is larger than 0.05, the hypothesis is accepted. These results are shown in Figure 4 below. We are 95% confident that the slope of the regression line is between -3.02 and 4.679. This means that an increase of 1% in the growth rate will impact net exports. The impact could be a small decrease or a small increase.

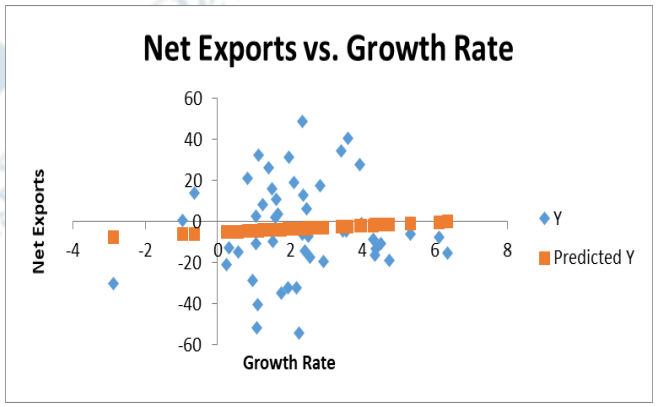

Figure 4

Model #5

The fifth model uses inflation as independent and net exports as dependent. The hypothesis is that net exports does not depend on inflation. The value of the R^2 is $6.81x10^{-5}$, so almost no part of net exports depends on inflation. The P value for this hypothesis test is 0.955. Since this value is larger than 0.05, the hypothesis is accepted. These results are shown in Figure 5 on the next page. We are 95% confident that the slope of the regression line is between -1.66 and 1.75. This means that an increase of 1% in inflation will impact net exports. The impact could be a small decrease or a small increase.

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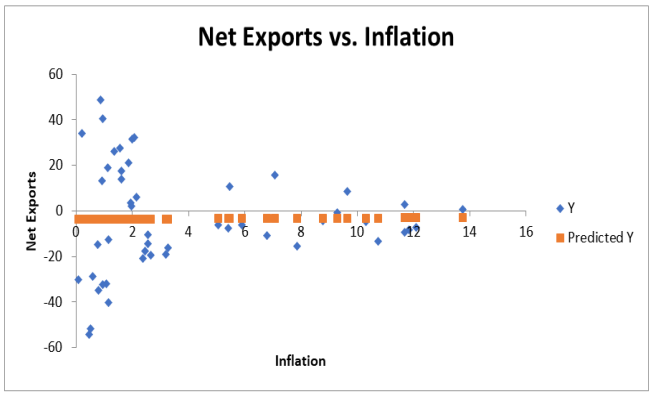

Figure 5

In this appendix, we tried to measure different aspects of France's economy. Some of our models indicate that several aspects of France's economy might be strongly related to each other. Others have graphs in which the data is very scattered, so determining the relationship between those aspects might be difficult to determine. Even though the results are interesting, they are not 100% conclusive. More work is needed before we can say that the results are solid. To that end, any suggestions or recommendations that can improve and can take this paper a step further will be appreciated.