

## Economic Impact of the COVID-19 Pandemic in Puerto Rico

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**Abstract:** This project focuses on the economic impact of the COVID-19 pandemic on the Island of Puerto Rico analyzing past, current, and future economic conditions. The analysis includes the following economic indicators: Gross Domestic Product (GDP), Gross National Product (GNP), Unemployment Rate, Population, and Labor Force. Additionally, using data provided by a manufacturing plant, the impact on businesses by expenditures on personal protective equipment (PPE), and a rise of the cost in operations caused by governmental measures and social restrictions to prevent the spread of the COVID-19 pandemic were explored. GDP annual growth in Puerto Rico is the most significant indicator of the economic depression the Island is suffering. Having a weak economy, after the COVID-19, if Puerto Rico faces a similar decline percentage in GDP as the United States, Puerto Rico is going to lose more than ten years of economic advantage just in the year 2020. GNP annual growth has been mostly negative from 2007 to 2018. The population went from 3.73 million to 3.15 million between 2010 and 2020. The unemployment rate went from 17% in 2010 to 9% in early 2020, but labor force participation decreased from 50% to 39.9% between 2007 and 2019. After the pandemic, the unemployment rate is projected to remain over 17% between March 2020 and June 2021. Because of the government social distancing measures, the manufacturing plant studied showed an increase in transportation costs and operating expenses related to the purchase of PPE and rearrangements of the manufacturing floor operations. Puerto Rico's economy shows signs of a depression that has endured for more than a decade. Indeed, Puerto Rico's Government's poor management, outmigration, the cost of importing goods and energy, hurricanes, earthquakes, and now the COVID-19 pandemic have jeopardized future economic growth for the next several years.

**Keywords:** COVID-19, Pandemic, Puerto Rico, Economic Indicators, Personal Protective Equipment, Economic Depression, Gross Domestic Product, Gross National Product, Unemployment Rate, Population, Labor Force

### 1. Introduction

The purpose of this article is to inform on past, current, and future economic conditions of Puerto Rico, using economic and demographic data. Firstly, this report focuses on the economic impact of the COVID-19 pandemic on the Island on a macroeconomic scale using available historical data on economic indicators. Secondly, using data provided by a manufacturing plant, we explored the impact on businesses by expenditures on personal protective equipment (PPE) and a rise in cost in operations caused by government measures and social restrictions to prevent the spread of the COVID-19 pandemic. Finally, we conclude and discuss key areas for future research that are needed to understand the current and future health of the economy.

Puerto Ricans sense that the conditions in the Island are not favorable, but there is no clear idea of how bad the situation is. When the head of a family struggle financially, the option is to leave the Island and relocate to the United States in search of a better lifestyle, which has caused a massive migration for the last decade. In 2016, there were about 5.4 million Hispanics of Puerto Rican origin living in the fifty states or D.C., while in Puerto Rico, population was about 3.4 million people (Sutter

and Hernandez, 2018). Even before suffering a series of natural disasters in the form of hurricanes, earthquakes, and the COVID-19 pandemic from 2017-2020, Puerto Rico’s economy had been in an acute structural decline for over a decade. The government had defaulted on much of its debt, and nearly half of Puerto Ricans live below the national poverty line (Financial Oversight & Management Board for Puerto Rico, 2020).

The Senate and House of Representatives of the United States of America in Congress assembled the Puerto Rico Oversight, Management, and Economic Stability Act or “PROMESA” on June 30, 2016, with the purpose to provide a method for Puerto Rico to achieve fiscal responsibility and access the capital markets (Senate and House of Representatives of the United States of America, 2016). This act created the Financial Oversight & Management Board for Puerto Rico (FOMB) entity, which mission is to work with the people and the government of Puerto Rico to create a foundation to re-establish a sustainable economic growth and opportunities for the people of Puerto Rico. On May 27, 2020, the FOMB certified the 2020 Fiscal Plan for Puerto Rico called Restoring Growth and Prosperity, which resulted in the collaboration between the FOMB and the government of Puerto Rico (Financial Oversight & Management Board for Puerto Rico, 2020). This is important because the future outcomes in the economy will be affected by this Fiscal Plan. The Fiscal Plan is a crucial source of information for this report because it includes long-term economic and demographic trajectories.

## 2. Data Analysis

We initialize with a macroeconomic view of the economic conditions in Puerto Rico to have a base of comparison before and after the COVID-19 pandemic on how it is affecting and what effects it will have in long-term. Then, we analyze the economic data provided by an electrification products manufacturing plant and the impact of the pandemic on this company. Also, we extrapolate the collective effect of purchasing personal protective equipment and health products for other businesses, now that all businesses have to incur these expenses, and this imposes an increase in operational costs.

### 2.1 Macroeconomic Analysis

The importance of looking at economic indicators is to assess the current economy’s health and draw expectations on where the economy is heading. Over the last decade GDP annual growth in Puerto Rico has slowed down and contracted in 2017 and 2018 preceding a recovery in 2019 (World Bank, 2020); this is one of the greatest indicators of the economic recession the Island is suffering. The U.S. Congressional Budget Office (CBO) released on April 24, 2020, a forecast for 2020 US GDP annual growth rate showing a GDP decline for the U.S. of -5.6% (Swagel, 2020). In this report, it is assumed that Puerto Rico is going to have a similar impact on GDP as the United States. Assuming this decline in GDP is accurate for Puerto Rico, the country is going to lose more than ten years of economic advantage just in this year 2020, as we can see in Figure 1.

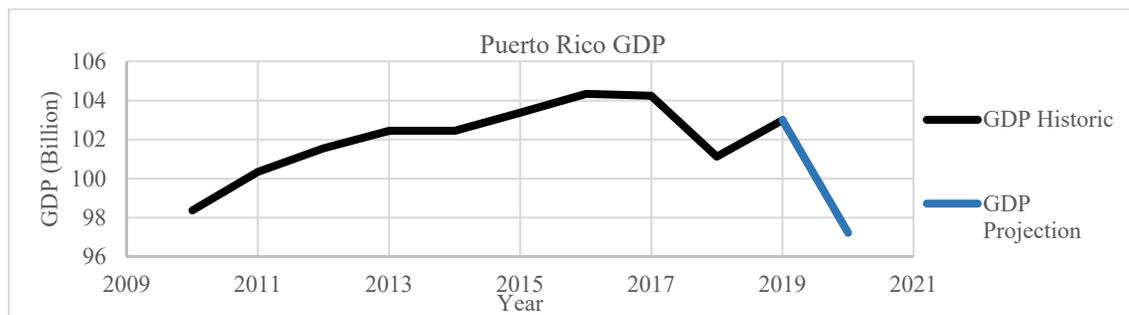


Figure 1. Puerto Rico Gross Domestic Product

Figure 2 illustrates the nominal GNP, which is adjusted for inflation and the constant 1954 dollars GNP, which is inflation-free (Financial Oversight & Management Board for Puerto Rico, 2020). Using the constant 1954 dollars GNP we see that GNP annual growth has been negative for the most part from 2007 to 2019 except in 2012 and 2019, and the projections show a contraction from 2020 to 2025, which indicates that the production within the country and abroad by country’s citizens is decreasing since 2007, which implies a reduction in the country’s real income between 2007 and 2019.

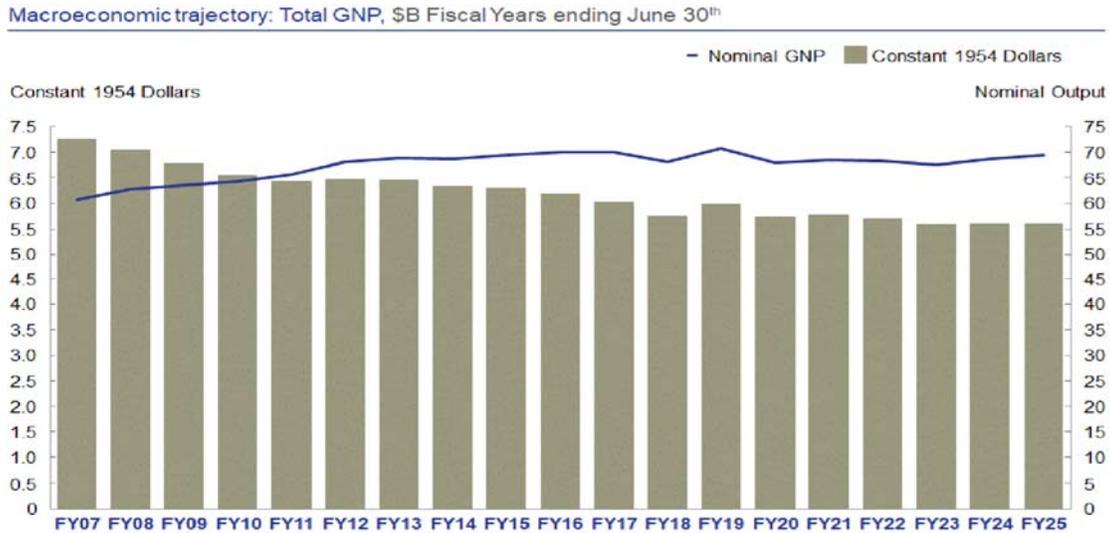


Figure 2. Puerto Rico Total Gross National Product (GNP)

The unemployment rate showed a significant drop from about 17% in 2010 to about 9% early in 2020 (Department of Labor and Human Resources of PR, 2020). This rose concerns on population growth and labor participation rate since GDP and GNP show an economic contraction; therefore, these two factors were analyzed. Unfortunately, our concerns were right; the labor participation rate has been decreasing, along with the population for more than a decade. The population went from 3.73 million in 2010 to 3.15 million in 2019, representing a reduction of 580,000 people or -15.55% (Government Development Bank for Puerto Rico, 2020), and is expected to decrease by another -10.7% between 2019 and 2025 (Financial Oversight & Management Board for Puerto Rico, 2020), being outmigration from Puerto Ricans to the United States a major factor in the reduction of the population (Federal Reserve Bank of New York, 2014). In 2007 labor force participation was around 50% and declined at a fast pace to around 39% in late 2015. From there, it has been bouncing between 38 and 42%, and the last recording was 39.9% in December 2019 (Department of Labor and Human Resources of PR, 2020). As economic conditions in the Island worsen, and the population continues to decline, labor force participation is expected to continue to reduce, and this is fatal to the economy. Although labor force participation is expected to decrease, FOMB projections suggest that because of the COVID-19 impact, the unemployment rate is expected to go up to about 39% in June 2020 and gradually go down to about 17% in June 2021, illustrated in Figure 3 (Financial Oversight & Management Board for Puerto Rico, 2020). Overall, Puerto Rico’s economy shows signs of a recession for several years, and there are signs of worsening economic conditions in the future if government policies do not address the problem as they should. Most experts agree that the economy shrinkage started when in 2006 the tax incentive for manufacturers -Section 936 Tax Credit- was phased out which caused plant closures and a huge amount of job losses including 40% of manufacturing job base, and the economic indicators analyzed in this report might be proof for those assumptions (Schoen, 2017).

## 2.2 Economic Impact on the Operations of an Electrification Products Manufacturing Plant

On March 15, 2020, the Governor of Puerto Rico ordered a curfew in the Island taking effect immediately to safeguard people’s health due to the threatening COVID-19 global pandemic. This executive order closed operations of governmental operations and other private operations except for some specific government and private operations. In general, this executive order limited economic activities imposed on social distancing measures and ordered people to stay home with the exemptions of emergencies and job obligations (Gobierno de Puerto Rico La Fortaleza, 2020).

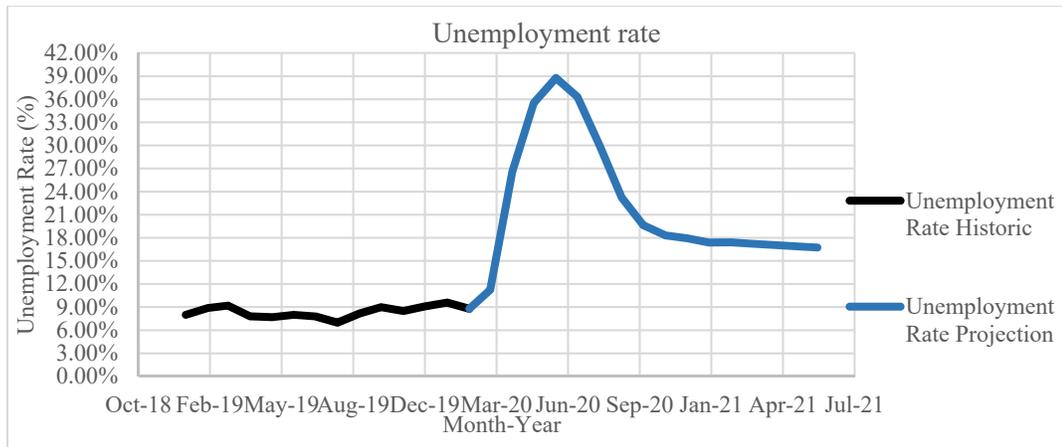


Figure 3. Puerto Rico Unemployment Rate

An electrification product manufacturing plant agreed to collaborate with this effort by providing data that could help measure the impact this manufacturing plant had because of the effects of the Government restrictions and social distancing measures to control COVID-19 spreads in the country. This plant has about 600 employees, and the products they manufacture are to ensure safe and reliable power in industrial and commercial operations.

The manufacturing plant was not directly affected by the curfew because it continued operating during normal business days and hours. As specified in the executive order, manufacturing plans were able to continue operations, but the plant was affected by the social distancing measures. In three months, the plant had an increase of more than \$300k in operating costs related to equipment to prevent the spread of the disease. This equipment includes personal protective equipment like facemasks and gloves, health products like hand sanitizer, and cleaning and disinfection products. Assuming twenty (20) working days per month and 600 employees, an estimated cost per day would be \$5,000 and a cost per employee per day of \$8.33. Extrapolating to small businesses assuming twenty (20) working days per month and five (5) employees, an estimated cost per day would be \$41.67, a total additional cost of \$2,500 for three (3) months period. For small businesses, the cost is expected to be much higher because the purchase quantities for this equipment will be significantly lower compared to much bigger companies, and that affects the price to acquire these goods. To have an idea of the cost differences, accessible prices from retail stores were used, although retail store product quantities are limited with fixed prices, while medium and large companies that use more of the same products have suppliers that can offer better prices depending on the ordered quantities. For hand sanitizer purchases, one package of 12 bottles of 7 ounces can cost \$49.98 or \$4.17 per bottle, in the other hand one package of 24 bottles of 8 ounces can cost \$89.98 or \$3.75 per bottle, so buying the package of 12 bottles would lead to an 11% higher price per bottle of hand sanitizer (Sams Club, 2020). Face masks costs have a greater gap, one package of 10 face masks can cost \$8.79 or \$0.88 per face mask, while a package of 50 masks can cost \$34.99 or \$0.70 per face mask, hence buying the smaller package of face masks will be 26% more expensive (Walgreens, 2020). A package of 40 gloves can cost \$3.59 or \$0.09 per glove, and a package of 100 gloves can cost \$7.49 or \$0.075 per glove, therefore buying the package of 40 gloves is 20% more expensive than buying a package of 100 gloves (Walgreens, 2020).

Once the executive order went into effect, this manufacturing plant halted operations for five (5) days, and when operations were re-started, they began with 30% of the workforce, and it took them three (3) weeks to recover to complete workforce. This situation plus the social restrictions factor provoked a \$3 million delay on orders when a normal week delay was between \$600-700K, representing a 328-400% increase in delays, affecting external and internal clients. To recover to normal service levels, they were on a recovery plan for six (6) weeks.

Due to embarking delays related to difficulties caused by COVID-19, transportation costs increased by an additional \$200k in the first three (3) months the Government executive order took place. New orders for the plant have been reduced by 20%, and at the division level, it has been reported 40% fewer sales than expected. Because of the social distancing measures, the plant had to rearrange the manufacturing floor operations to maintain capacity levels as normal as possible. Without the arrangements, they would have had to reduce capacity by 50%. After adjustments, three (3) out of their fifty (50) production lines had to be reduced by 50% of their capacity.

### 3. Conclusion

The biggest challenge in trying to measure the economic performance of Puerto Rico has been unreliable and insufficient data. In a report written by the U.S. Government Accountability Office (GAO) published in June 2018, the GAO explained that Puerto Rico has unreliable economic and limited labor data, and that makes conditions in Puerto Rico difficult to evaluate (U.S. Government Accountability Office, 2018). It is important to emphasize that the projections and analysis were made with the data available at the time the report was written, but the pandemic has not receded yet, and there is not a clear idea on how the COVID-19 has really impacted the global economy and what are the repercussions in the long term. Puerto Rico has been in a recession for several years, and certainly, Puerto Rico's government poor management, hurricanes, earthquakes, and now the COVID-19 pandemic has worsened the conditions and has jeopardized future economic growth for the next several years. According to a report written by the GAO in May 2018, the Island's constant deficits are the result of the commonwealth government's "inadequate" management and practices. It also mentions that outmigration and the cost of importing goods and energy contributed to the Island's long-running economic contraction (Caribbean Business, 2018).

After COVID-19 impact, Puerto Rico's GNP is not expected to grow over the next five (5) years. The unemployment rate is expected to be over 17% until June 2021, and the population is expected to decrease by -10.7% between 2019 and 2025. And although the labor force participation rate was about 39.9% in December 2019, it is expected to continue to decline (Financial Oversight & Management Board for Puerto Rico, 2020).

To explore the economic impact on businesses during the pandemic, it will vary depending on its products and/or services. Additional costs on PPE, hand sanitizer, and cleaning and disinfection products for employees and clients must be considered. Also, the capacity of people allowed in a facility, hours and days of operation, and the change of the business operations to satisfy social distancing measures can hurt sales and have additional costs. These are just some considerations, but every business may have specific needs. These new challenges in business operations have many industrial engineering applications in terms of engineering economic analysis, process improvement, operations research, and more.

### 4. Future Research

On December 28, 2019, a sequence of earthquakes on the southern coast of Puerto Rico began and included one of a magnitude of 6.4 on January 7, 2020. Scientists expect aftershocks to continue for years, including relatively strong ones like magnitude 5.4 earthquakes (U.S. Geological Survey, 2020). These earthquakes have had tremendous effects on structural damage to many government buildings and crucial infrastructure, and roughly 8,300 homes were damaged in the January earthquake, of which 2,500 are uninhabitable (Robles, 2020). These earthquakes, combined with the COVID-19 pandemic, have affected tourism, which accounted for 10% of the Island's GDP in 2018 (Talty, 2018). It is necessary to conduct a study on the losses the economy is having in tourism after the combined impact of the pandemic and the earthquakes.

In September 2017, Hurricanes María and Irma struck the Island causing unprecedented humanitarian, economic, and infrastructure-related damages. Thousands of residents were left homeless, and basic utilities were completely shut down, schools, hospitals, and businesses were destroyed. Because of this, tens of thousands of Puerto Ricans fled from the Island and relocated to the United States (Financial Oversight & Management Board for Puerto Rico, 2020), causing an economic impact on the island of about \$42.32 billion (CyberNews, 2018). This year, the National Oceanic and Atmospheric Administration (NOAA) expects an above-normal 2020 Atlantic hurricane season (National Oceanic and Atmospheric Administration, 2020). On an already weak economy and current events like COVID-19 and the earthquakes, having a similar or worse hurricane season can deepen the economic conditions. For this reason, an analysis should be conducted on how this hurricane season can affect economic conditions. Finally, in future analyses, Government policies such as the continual raise of utility tariffs, COVID fees, new contracts, expenditures, new laws, new taxes, and the effects of the 2020 Fiscal Plan implementations should be considered.

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