Could Austerity Collapse the Economy of Puerto Rico?

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September 2017

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September 12, 2017

Abstract

The inability of the Commonwealth of Puerto Rico to repay debt has prompted appointment of the Financial Oversight and Management Board for Puerto Rico which is implementing a program of fiscal austerity for the island. The current default by Puerto Rico is different in a number of ways from default by a state or municipal government or a sovereign debt default. These differences arise both because of the territorial status of Puerto Rico and the circumstances leading to its inability to service debt. Even in the case of sovereign defaults, there is a danger that austerity programs can have perverse results on economic outcomes. This study finds that the unique aspects of the Puerto Rican situation make it even more likely that the fiscal multiplier associated with austerity could be unusually large. Put another way, cutting government expenditure likely lowers operating deficits by less than half the amount of the cuts while lowering aggregate output by three times the amount of the cut. Furthermore, such cuts could result in substantial migration to the United States. If the fiscal situation of Puerto Rico is modeled ignoring its involvement in government enterprises so that it resembles a comparable US state, the current level of government employment, expenditure and deficit associated with basic government operations is not inconsistent with expectations. Following other studies in the literature, the situation of public enterprises in Puerto Rico is regarded as a separate issue, but the level of public employment and expenditure by the territory is consistent with expectations if Puerto Rico were a state.

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1 Introduction

The Commonwealth of Puerto Rico has entered a bankruptcy process that is governed by new legislation because of its territorial status. The Puerto Rico Oversight Management and Economic Stability Act (PROMESA) created the Financial Oversight and Management Board for Puerto Rico (FOMB) to establish financial discipline, restructure debt, and restore economic vitality to the island's economy. Essentially the FOMB is managing the bankruptcy process and faces extraordinary challenges given the status of the territory and the current state of its economy.

Some excellent analysis has been done regarding the circumstances that have led to the present situation[1]. This work has been supplemented by budget models that project the debt problem forward in time, assuming that current trends persist. There are also analyses of specific distortions in the island economy which result in inefficient resource allocation. A brief discussion of these issues or stylized facts will be noted in the next section because they provide useful background for the analysis conducted here.

Several new perspectives on the issues confronting the FOMB are presented in this paper. First, a review of the academic literature on fiscal multipliers suggests that the effects of expenditure cuts on output and employment in Puerto Rico will be substantial. There is convincing evidence that past estimates of expenditure multipliers that have been applied in other debt crises have been too low. Furthermore, the nature of the Puerto Rican territorial status – including free movement of natives to the US, the inability to conduct monetary policy, and the binding minimum wage – suggests that its fiscal multiplier may be very large [2].

Second, a model of government expenditure, revenue and deficits is estimated using panel data from US states. Estimates of expected expenditure, revenue, and deficit from this calibrated model are then compared with actual expenditure, revenue and deficit over time for Puerto Rico. This exercise allows a comparison of actual public fiscal balance with a counterfactual estimate of what would have happened if Puerto Rico had behaved as a similarly situated state government. The model separates regular government operations from those of public enterprises that have contributed a substantial portion of government debt obligations. Analysis of these other government enterprises is beyond the scope of this report. When the focus is confined to spending on regular government operation, it does not

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[1]See, for example, Bustillo and Velloso (2015), Gurtin Municipal Bond Management report (2014), Lafontain (2011), and the Working Group for the Fiscal and Economic Recovery of Puerto Rico (2016).

[2]Hanson and Hawley (2014) estimate that employment in Puerto Rico is extremely sensitive to increases in the minimum wage. This is consistent with the general problem that policies that might have modest effects on the economy of the typical state can have much larger effects on Puerto Rico.

appear to be excessive compared to expectations based on an econometric model of state expenditure.

Finally, models of the relation between government expenditure and employment and overall outcomes for the economy, including private employment and migration are estimated. These suggest the magnitude of the fiscal multiplier and the consequences for population and migration that may be associated with current plans for government austerity.

Overall, it appears that the current debt crisis is not due to basic government operations and that fiscal multipliers may be sufficiently large that substantial fiscal austerity imposed on government operations could collapse the economy and even have perverse implications for fiscal balance of the government. For those who cannot wait for the answer to the question "Could austerity collapse the economy of Puerto Rico?" the analysis presented here suggests that a perverse outcome is a serious possibility.

It's important to note that this study relies on data collected from published literature and publicly available data that is imperfect in some dimensions (please see appendix B for a discussion). Additional modeling of the type undertaken in this paper should be done in order to determine if the potentially harmful and dysfunctional effects of fiscal austerity noted here are robust to use of alternative data sources and econometric techniques.

2 Stylized Facts

Collins, Bosworth, and Soto-Class (2007) produced an entire volume dedicated to analyzing Puerto Rico's impediments to growth. However, a subsequent review by Weisskoff and Ruiz (2009) noted that while the analysis suggested many individual issues, there was no consensus on a general plan that would increase growth. Since publication of that volume, there has been little progress on the problems identified and the discussion has switched from restoring growth of the 1970's to avoiding economic collapse. Indeed, in its recent update on the competitiveness of the Puerto Rican economy, the Federal Reserve Bank of New York (2014) has echoed many of the points raised in the Brookings volume. It is important to remember the individual issues raised in previous studies because the path forward may require a number of small steps rather than a sweeping austerity strategy.

As the possibility of a debt crisis was recognized, a number of research papers analyzed the origins of and contributing factors to the current inability of Puerto Rico to service its debt burdens. A review of the major arguments is provided below, both because they are fundamental to appreciating the incremental contribution of this study to the debate about

future economic policies and because it is important to distinguish the approach taken in this research from that in previous work. In our view, the possibility that Puerto Rico has a very large fiscal multiplier has been ignored thus far.

In 1950, GDP per capita in Puerto Rico was 17% of that in the US and this prompted annual average net out-migration of 42,000 per year from the island (hereafter "migration" will be used to refer to net out-migration). The passage of the Puerto Rican Industrial Incentive Act in 1947 allowed firms locating in Puerto Rico to escape profit taxation. This provided a substantial tax incentive that attracted manufacturing firms to the island. Incentives were expanded under the Industrial Incentive Act of 1978. The result was a transformation of an agricultural economy to one with a substantial and growing manufacturing sector. By 1980, per capita GDP in Puerto Rico had risen to 36% of that in the US and migration had fallen to about 10,000 per year. What was labeled Operation Bootstrap appeared to have been a success. Exports as a share of Puerto Rican GDP doubled from about 33% to 66%.

After a significant increase in manufacturing employment and output during the 1950's and 60's, economic growth based on tax preferences for corporate profits stalled. This was predictable because Operation Bootstrap ignored principles of sound economic development. The growth generated was not related to the natural economic advantages of production in Puerto Rico. The multiplier effects associated with normal manufacturing growth were absent because input-output linkages with local suppliers or users of intermediate product did not develop as they would with normal development based on comparative advantage. Thus the growth was bound to be limited and extremely expensive in terms of tax concessions made. Between 1980 and 2000 the gap in output per capita between Puerto Rico and the US remained stagnant while migration rose. In 1996, US policy was reversed with the repeal of the tax advantages for entities producing in Puerto Rico[3]. Phase out was final in 2006. However, this phase out was not the primary reason for the decline in manufacturing employment from 120,000 in 2005 to 75,000 in 2015 as the sector was under pressure throughout the US[4].

Among the reasons for not expecting manufacturing employment to lead a recovery of the Puerto Rican economy is the sluggish performance of that sector throughout the US econ-

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[3]The reversal of Section 936 of the United States Internal Revenue Code.

[4]Feliciano and Green (2017) estimate that elimination of Section 936 reduced manufacturing establishments by 18.7% to 28.0% and wages by 16.7%. Perhaps because of the fall in wages, they do not find a significant employment effect and the 37% decline in manufacturing employment noted in the text is due to other causes. The differences in differences research design used by Feliciano and Green is very similar to the approach taken in this research to compare government expenditure and employment levels for basic public services with comparable states.

omy. As Figure 1 suggests, until 2010, changes in Puerto Rican manufacturing employment tracked those in the general US economy quite closely. During the post-recession period employment in Puerto Rico has recovered less vigorously. However, the gap in growth rates between the two has narrowed recently.

The Puerto Rican labor force is well educated. In 2015, 30% of Puerto Ricans aged 24-44 had a bachelor's degree or better compared to 33% for the entire United States. This parallels favorably to the 26% of Puerto Ricans and 30% for the entire US with comparable educational achievements in 2009. In spite of education, earnings for those over 25 and reporting some employment, were $18,200 in Puerto Rico compared to $36,000 for the entire US. However, both these figures are 10% higher than they were in 2009. When one observes such stability in rates of change in earnings and education of the labor force but large apparent differences in labor compensation, one possible explanation is differences in cost of living. While perfect measures of cost of living differences are not available, estimates place the US at 1.3 times the expense of Puerto Rico, which reduces the earnings gap from a factor of two ($18,200 versus $36,000) to 1.5 or $23,660 versus $36,000.

It is difficult to compare housing cost between Puerto Rico and the US because of the huge variation in cost within the US as well as differences in the nature of the stock. However, examination of rates of change in nominal house prices reveals changes in relative cost of living, because housing is 30% of household budgets. Over the 1995 to 2016 period, the Federal Housing Finance Agency (FHFA) house price index for Puerto Rico went from 100 to a peak of 209 in 2008, to 200 in 2010 and then fell to 152 in the fourth quarter of 2016. In contrast, the FHFA index for all US housing was 113 in 1995, hit an intermediate peak of 226 in 2007, and although it slumped during the recession, has fully recovered and stood at 238 at the end of 2016. Put another way, since 2008, the Puerto Rican house price index has fallen 25% while the US index is actually up modestly over the same period. Since 1995, the Puerto Rican house price index has increased 52% while the overall US house price index rose 110% for a difference in price change of 58%. The recent fall in housing price is particularly alarming because it indicates that households must be bribed with cheaper housing to stay in Puerto Rico. However, house price decline will only retain population for a moderate period of time because it eventually results in failure to maintain units, abandonment, and migration as discussed in Goodman (2013). It is clear that, if the rate of growth in earnings in Puerto Rico does not match that in the US, the result will be migration. Indeed, migration has accelerated in response to the recent difference in economic growth as evidenced by the fact that population declined by almost 3% between December 2014 and December 2016[5].

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[5]See discussion in Bustillo and Velloso (2015).

The share of government employment in Puerto Rico appears to be large by US standards. However, the differences depend on the base used for comparison. Puerto Rican government employment in December 2016 was 25.4% of total employment but only 8% of population. State and local government employment in the US is 10% of total employment but 4.5% of population. One reason that the government employment share in Puerto Rico appears large is that the labor force participation rate is low and unemployment is high. In response to the fiscal crisis, government employment has fallen from 29% of total employment to the current 25.4% – in other words, government employment has fallen at a faster rate than private sector employment. Subsequent analysis in this report will formally model the relation between economic activity and government expenditure, revenue, and employment in Puerto Rico versus the US. However, at this point, the consensus based on the stylized facts reported here is that public sector employment percentages in Puerto Rico are quite high compared to the US even if the direction of change appears favorable.

While government employment appears high, performance of government appears to be a problem for Puerto Rico. Bram, Martinez, and Steindel (2008) note that the World Bank index of the "ease of doing" business, which ranks countries based on conditions in their largest cities, had given high marks to Puerto Rico in the past. However, more recently, the index has shown some disturbing trends that appear to relate directly to the performance of the public sector. In 2006, Puerto Rico's overall rank for ease of doing business was 22nd. But the overall rank fell to 47th in 2015, and the most recent ranking for 2016 is 53rd. In terms of attracting business, relative rank is of primary importance. In examining the components that determine the rank of Puerto Rico, there is very wide variation in performance. The island gets very high marks – ranking 7th, overall – for both getting credit and resolving insolvency. However, it ranks low in terms of the public sector's role in facilitating a business-friendly atmosphere. Ranks for paying taxes, registering property, and dealing with construction permits, are all greater than 130, signaling major problems in these areas. Additionally, the rank for property registration is poor in spite of recent efforts to digitize property records. And lastly, enforcement of contracts is rated in a disappointing 97th place.

The fall in the ranks may not indicate a decline in economic efficiency. Puerto Rico's position for getting electricity was 18th when this was introduced as a separate ranking category in 2011. Since then the rank has fallen steadily and went from 32 in the 2015 report to 65th in the 2017 report. However, the primary reason for the fall in rank is the increase in prices paid for power, as the time to get power fell from 90 to 32 days over the same period. To the extent that the rise in price reflects a reduction in subsidies, the fall in ranking may reflect

a move toward greater economic efficiency. This illustrates the need to carefully consider what is behind rankings of the ease of doing business and to distinguish effects of subsidies from levels of government efficiency and transparency.

In considering Puerto Rico's current debt problems, the situation of US states and municipalities is often used as a reference point. The Census Bureau reports that states with the highest debt per capita are New York ($17,405), Massachusetts ($14,517), Alaska ($13,066), Connecticut ($11,928), and New Jersey ($11,623). Puerto Rico's debt per capita ($29,000) is more than twice that of any state except New York and, of course, the income per capita available to support that debt is far lower. However, there are significant differences between the situation of Puerto Rico and states or municipalities that make it problematic to draw comparisons between the two.

Interest paid by Puerto Rican debt is exempt from US local, state, and federal income taxes. This makes the debt particularly attractive to investors from around the US, and accounts, in part, for the ability to borrow the large amounts currently outstanding. While states cannot file for bankruptcy protection, municipalities can and have done so – Detroit being a recent example. Puerto Rico however is barred from seeking protection under the US bankruptcy code along with its municipalities. On June 27, 2014 the Puerto Rico Public Corporation Debt Enforcement and Recovery Act (Debt Act) was designed to protect the government from liabilities arising from default by its public corporations and give these institutions a framework for restructuring their debt. This action resulted in substantial downgrades of the debt being given protection. When the Federal District Court struck down the provisions of the Debt Act in February 2016, there was a further downgrade of all the island's debt issues. Under this ruling, the government of Puerto Rico has a potential liability for all debt issued by itself, and a number of large public corporations. This expanded legal liability for debts of public enterprises makes the financial situation of Puerto Rico unlike that of state governments.

Based on its audited financials from May 2015, only 22% of total public sector debt was backed directly by the Commonwealth of Puerto Rico. Adding another 6% of municipal debt, means that only 28% of the $29,000 per capita or only $8,120 per capita is comparable to state debt. Computed this way, the portion of debt per capital related to government operations (i.e. excluding public enterprises) for Puerto Rico is comparable to that of states like Maryland, Oregon, Minnesota, and Ohio which are certainly not in fiscal crisis.

Accordingly, the most important aspect of Puerto Rico's current debt problem is the liability for debt of a variety of public corporations. This is not only true when considering the levels

of debt but it is even more important if concern is based on rates of change in debt. Rates of change are of concern because, between 2006 and 2015, gross public debt as a percentage of GNP rose from 70% to over 100%. The Federal Reserve Bank of New York (2014) noted that "of the roughly 43-percentage point increase in the overall public sector debt-to-GNP ratio between 2000 and 2012, the public-sector corporations accounted for almost 85 percent, or about 37 percentage points while the central government and municipalities together accounted for about 15 percent" (p. 9). Thus, while the commonwealth does have budget deficits because current expenditures and interest expenditures exceed current revenues, this is a relatively small problem compared to the deficits from the public corporations. This concern no doubt prompted the failed effort in the Debt Act to remove the liabilities of the public corporations from the perceived balance sheet of the Commonwealth.

In considering remedies for the current debt problems, it is important to recognize the primary role of the public enterprises in creating and exacerbating the current crisis. Finding a way to untangle the government of Puerto Rico from its public enterprises should be a major objective of the FOMB, but this report will not attempt to deal with that aspect of the problem beyond noting the general agreement in the literature reviewed that the core of the debt problem lies outside the government budget except insofar as greater efficiency in provision of government services would likely spur economic growth.

3   Some New Perspectives

As noted in the discussion of stylized facts, there is substantial agreement on many aspects of Puerto Rican economic performance and the characteristics of current debt and deficit problems. However, some of these stylized facts are not well grounded in economic theory. In particular, the view that employment and expenditure by the Commonwealth is unusually high, as well as a significant source of the current financial crisis, is based on thin evidence. Even the stylized facts above recognize that, of all debt accumulated for which the government has been judged to have some liability, if only due to implicit guarantees, only a small fraction is due to accumulated deficits associated with regular government operations. Most is due to public enterprises whose credit has been viewed as backed by the government.

3.1   Are public employment, expenditure, and deficits in Puerto Rico really higher than expected?

The primary basis for judging that government employment is far larger than normal in the previous discussion of stylized facts is the observation that the ratio of government to total

employment in Puerto Rico is much higher than the US average. This approach implies that the primary reason for adding state and local employment is the need to provide public services to the employed population. Obviously this is absurd. It is likely that employed adults require fewer public services than any other group in society. The primary determinant of the demand and need for public services is the size and density of the population.

The problem is to find a group of states comparable to Puerto Rico based on criteria that should directly influence public employment per capita. Then stylized facts concerning the relative size of public employment in Puerto Rico versus comparable states can be developed based on meaningful comparisons. Note that this is a simple measure and more elaborate modeling will follow in this report. The statistical techniques used to measure comparability of two samples is to form a Jaccard-type index of similarity[6]. The index selected is easily constructed. Let P_j be a particular characteristic j of Puerto Rico that should influence the ratio of public employees to total population and let S_{ij} be the value of characteristic j for state i. Then the index of similarity between Puerto Rico and state i, assuming that there are a total of J individual characteristics in the index, is given by equation (1):

$$I_{PRi} = \frac{1}{J} \sum_{j=1}^{J} \frac{(P_j * S_{ij})}{[P_j^2 + S_{ij}^2]/2} \tag{1}$$

Note that if Puerto Rico and state i are identical in all characteristics, the index has a value of unity. When this index is computed using Gross National Product (GNP) per capita[7], and population density as the two characteristics that influence public employment per capita, the 5 states most closely matching Puerto Rico are: Rhode Island, New Jersey, Massachusetts, Maryland and Connecticut – Table A1 contains the results of the computation. These five states are used as reference states for comparison purposes in the remainder of this section.

The public employment to population ratios of these states can be compared to Puerto Rico to develop stylized facts regarding the relative size of public employment in the Commonwealth. The advantage of working with public employment measures is that data for US states and Puerto Rico are retrieved from the same source, the Bureau of Labor Statistics (BLS)[8], which measures state and local employment totals using a common method across

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[6]This type of index was first developed by Jaccard (1912) and has been modified by many other researchers.

[7]Gross National Product (GNP) is used for Puerto Rico and Gross Domestic Product (gross state product) is used for US states and Washington DC. GNP data for Puerto Rico is obtained from the Commonwealth's Comprehensive Annual Financial Reports (CAFR), published by the Government Development Bank for Puerto Rico. Data for gross state product is obtained from the US Bureau of Economic Analysis.

[8]BLS Current Employment Statistics survey. Public employment for the series includes all civilian federal

states and over time. Table 1 shows the results of performing this computation for 1992 through 2014. Throughout much of this period, Puerto Rico's public employment to population is notably higher that the comparison states with the exception of Maryland where the match was quite close. However, after 2009, the Puerto Rican ratio falls significantly so that, in 2014, it is at the median of the group of comparison states in a position well below Maryland and only significantly above Rhode Island which has the lowest ratio throughout the period.

This empirical exercise, particularly the results in Table 1, illustrates the danger of making simplistic inferences about the situation of Puerto Rico based on comparison of stylized facts between the island and the average US state. Puerto Rico has little in common with most US states and allowance for that fact, plus basing the index on a meaningful measure – public employment to total population rather than public employment to total employment[9] – changes Puerto Rico from a high public employment state to one whose current status is similar to comparable US states.

Given the contrast between the results in Table 1 and the prevailing view that the public sector in Puerto Rico is very large compared to US states, further analysis using a formal econometric model of state expenditure is warranted. The primary determinants of state expenditures are output or income and population. Another factor, population density is absorbed by including fixed effects in the regression model which is given below.

$$Ln(E_{it}) = \alpha + \beta \ Ln(GDP_{it}) + \sigma \ Ln(N_{it}) + \sum_i \gamma_i D_i + \sum_t \lambda_t H_t + \epsilon_{it} \qquad (2)$$

In equation (2), E_{it} is total state and local government expenditure for state i in year t, GDP is either state gross domestic product or aggregate state personal income, N is state population, D_i is a series of state dummy variables, H_t is a series of time dummies, α, β, σ, γ_i and λ_t are parameters and ϵ_{it} is an identically and independently distributed error term for state i in year t. Equation (2) was also estimated with total state revenue, state deficit and government employment as dependent variables.

It is necessary to explain total expenditure by both state and local government because the pattern of provision of public services between state and local responsibilities varies across states and over time. In some states, local expenditure is far more important than in other

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employees, as well as state and local government employees (not including military personnel and employees at the CIA, NSA, NIMA and DIA). It is comprised of all work sites in the state (or Puerto Rico) with a federal, state, or local government ownership regardless of business activity.

[9]Table 2A shows these results.

states.

The estimation results for equation (2), presented in Tables 2 and 3, agree well with expectations. The β coefficients of the logarithms of GDP or personal income and σ coefficient of population should be interpreted as elasticities of public expenditure, revenue, and employment with respect to output and population. For example the elasticity of revenue with respect to GDP or personal income is always larger than the elasticity of expenditure resulting in a negative elasticity of expenditure ratio with respect to either variable[10]. In addition the elasticity of expenditure with respect to population is significantly larger than the elasticity of revenue resulting in a positive elasticity of expenditure ratio. Most important is the observation that the determinants of employment are very different than expenditure, revenue, or deficits. While both GDP and personal income have a positive and significant relation to employment, both elasticities are quite small. But the elasticity of public employment with respect to population is always very large, 10 times as large as the GDP elasticity and 5 times the personal income elasticity. Accordingly, population rather than output is the primary determinant of employment. Of course the explanation is that, where output or income per capita is low, earnings of public employees are lower so that a small increase in these variables generates a much larger rise in employment in areas where earnings are low. Therefore, judging the appropriateness of employment in Puerto Rico using the ratio of public to total employment is misleading and inappropriate.

Finally, the estimates of equation (2) with public expenditure, revenue, deficits and employment as the dependent variables can be used to construct estimates of actual versus predicted values for Puerto Rico over the 1992 to 2014 period in order to determine the relation between actual behavior and expectations if Puerto Rico had behaved like a similar state. In order to do this, the specific coefficient estimates from equation (2) for the five states, Rhode Island, Massachusetts, Connecticut, Maryland, and New Jersey, which were most similar to Puerto Rico in terms of output and population density, were averaged and then used to estimate expected values for Puerto Rico over time. Measurement of actual Puerto Rican revenue, expenditure, and deficits was not straightforward. Expenditure and revenue data for municipalities over time are not compiled conveniently for Puerto Rico. Accordingly, special efforts, reported in Appendix B of this report, were used to estimate these totals including the 78 municipal governments in Puerto Rico.

Figures 2 and 3 show that estimated expenditure and revenue using the model in equation

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[10]Expenditure ratio = expenditure/revenue. Therefore, Ln(expenditure ratio) = Ln(expenditure) – Ln(revenue). We refer to this term also as "deficit" throughout the report.

(2) with GDP are both higher than actual values computed for Puerto Rico[11]. Actual expenditure and revenue is almost identical with estimates when personal income rather than GDP is used as an independent variable. A rise in actual expenditures in Puerto Rico in 2001-2002 was not matched by a rise in predicted expenditures and the recession of 2008-2009 had a greater effect on predicted revenues than actual. Figure 4 shows that the actual Puerto Rican expenditure ratio was well below predictions throughout much of this period. What has changed about the actual Puerto Rican expenditure ratio is that, since 2010, it has been slightly above the level predicted based on the version of equation (2) using GDP and matched almost identically to that projected using personal income. Put another way, the models predict that Puerto Rico should have fiscal deficits given the current state of the economy, and, of course, it does. What has happened is that, since 2010, the reference states recovered from the recession which was quite sharp but Puerto Rico has not recovered, even though its decline was more modest.

Figure 5 shows the logarithms of actual versus expected government employment. From 1992 through 2008, actual public employment in Puerto Rico was 4 to 5 percent above the predicted employment. However the difference narrowed sharply starting in 2009. By 2014, actual government employment in Puerto Rico was identical to predicted employment from the model based on GDP and barely (2%) above the predicted level from the estimates of equation (2) using personal income.

Taken together, these results suggest that public employment in Puerto Rico is not inconsistent with expectations if the Commonwealth behaved like a similar state. Furthermore, current expenditure, revenue, and deficits associated with government operations are not inconsistent with expectations for behavior by a similarly situated state. This does not mean that pension funds associated with operations are not a problem but they are a problem for a number of states also. However, it is apparent that a program of austerity applied to current expenditure would drive Commonwealth spending and employment significantly below levels that would be expected if it were a similarly situated state.

3.2 How large is the fiscal multiplier for Puerto Rico – could budget cuts raise the deficit?

Although the previous analysis has demonstrated that public sector spending and employment in Puerto Rico are consistent with levels that would be expected in comparable states,

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[11]As noted in the data appendix (Appendix B), expenditure and revenue data for Puerto Rico used in this analysis exclude public corporation figures.

the simplistic response to a debt and deficit problem is to lower expenditures and raise taxes. In the case of Puerto Rico, there is significant support in the literature for substantial changes in the tax system that might raise additional revenue because of positive effects on the efficiency of the local economy and the size of the tax base. The FOMB should consider the opportunities to make such changes in the tax system regardless of the direct impact on revenues because the indirect effect achieved through additional economic growth will certainly outweigh any short term direct effects.

This section is concerned with measuring the likely effects of any fiscal austerity that lowers public expenditure and employment significantly below current levels. Such spending cuts have direct and indirect effects on aggregate economic activity. Effects on GDP will be the focus of this discussion. As discussed in Whalen and Reichling (2015), the standard instrument for measuring such fiscal effects in the United States (by the Congressional Budget Office and other government agencies) is the fiscal multiplier.

A review of the austerity plan and projections by the FOMB indicates that they are ignoring the fiscal multiplier effects of their actions. For example, the FOMB fiscal plan described in their March 13, 2017 release includes substantial expenditure cuts and projections of revenue increases with no discussion of the effects of the former on the latter. Indeed the word "multiplier" does not appear in the report and there is no indication that the FOMB has constructed a formal model of the Puerto Rican economy to support their projections[12]. On August 16, 2017, the FOMB issued a request for proposals for an "Independent Investigation Team" with a closing date for receipt of responses of August 23, 2017. In addition to the timing for responses being too short to attract the most competent researchers, the request listed needs for experience in conducting investigations, securities law, municipal bond markets, and budgeting and fiscal management. There is no indication that the FOMB intends to support construction of an economic model capable of relating expenditure cuts to multiplier effects on the economy of Puerto Rico or projecting the consequences for Puerto Rican migration.

Fiscal expenditure multipliers relate budget cuts to measures of aggregate economic activity, GDP in this case. The multiplier recognizes that budget cuts have an obvious direct effect on GDP. Furthermore, they also have an indirect impact, due to economy's initial reaction to the cuts. As noted below, there is substantial evidence that the multiplier is positive or that aggregate activity moves in the same direction as the budget. The multiplier is best seen in context of equation (3) below:

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[12]See Government of Puerto Rico, Puerto Rico Fiscal Agency and Financial Advisory Authority (2017).

$$\Delta B(M) = \Delta B[E + I] = \Delta GDP \tag{3}$$

In equation 3, ΔB is the change in the government budget (negative in the case of cuts), M is the fiscal multiplier, E is the direct effect of government expenditure on demand and I is the indirect effect on demand as the changes cycle through the economy. Lastly, ΔGDP is the final effect on economic activity. Of course tax revenues depend on GDP. This implies that there is a secondary effect on tax revenue of the change of GDP which is given by equation (4):

$$\Delta T = \tau(\Delta GDP) \tag{4}$$

In this case ΔT is the change in tax revenues, and τ is the relation between GDP and tax collections. Combining equations (3) and (4) produces implications for the effect of budget cuts on the budget deficit given by equation (5), where ΔD is the change in the deficit.

$$\Delta G - \Delta T = \Delta D = \Delta B - \tau \Delta B(M) = (1 - \tau M)\Delta B \tag{5}$$

Equation (5) reveals the problem in determining the effects of budget cuts on the budget deficit. If τ and/or M are sufficiently large so that their product exceeds unity, then a cut in budgets, $\Delta B < 0$, will have a positive effect on deficits because the indirect effect of the budget cuts lowers GDP enough so that tax revenues actually fall more than the initial expenditure cut. Even if $\tau M < 1$, equation (5) demonstrates that a \$1 cut in expenditure may produce a very small deficit reduction due to its negative effect on output and consequently on tax revenue.

What values of the fiscal multiplier are used by the Congressional Budget Office (CBO) to estimate the effects of transfer payments to states? Whalen and Reichling (2015) report separate values of 0.4 to 2.2 for transfers to states and localities for infrastructure and 0.4 to 1.8 for transfers for other purposes. The direct multiplier used for Federal Government purchases is 0.5 to 2.5. These multipliers are applied to increases in expenditures. The academic literature suggests that values of the multiplier for budget cuts are larger than for increases. The reason is that a fraction of budget increases to states can be saved by increasing contributions to pension funds or paying off debt but budget cuts are not as fungible.

It is possible to estimate the value of τ using data from Puerto Rico over the 1992 to 2014 period. Table 4 contains econometric estimates of a simple tax revenue equation for Puerto Rico. The estimated value of τ, the elasticity of tax revenue with respect to GDP, is stable

over time and equal to 0.4. Assuming that the value of M, based on the state estimates from CBO, is equal to 2, this means that a \$1 expenditure cut reduces GDP by \$2. Furthermore given that τM is equal to 0.8, the change in expected budget deficit associated with a \$1 fall in expenditure, i.e. with $\Delta B = \Delta G = -1$, is equal to $(1 - \tau M) = (1 - 0.8) = 0.2$ or 20 cents decline in the deficit produced by an expenditure cut of \$1, including both direct and indirect effects. Thus even using the standard multipliers that CBO has applied to states, there is a heavy price paid for achieving deficit reduction through expenditure cuts in Puerto Rico. A \$1 fall in the deficit requires a \$5 cut in expenditures and generates a \$10 decline in GDP because tax revenues will fall by $0.4 (\$10) = \$4$ which only reduces the deficit by $\$5 - \$4 = \$1$.

Recent research has demonstrated that fiscal multipliers commonly in use are too small. The International Monetary Fund has substantial experience with forecasting the effects of fiscal consolidation. Blanchard and Leigh (2013) reviewed the experience with these forecasts. In general, forecasts predict a modest decline in real output and rise in unemployment associated with fiscal contraction, even when it is done in a period of crisis when some would argue that government austerity can raise confidence that the end of the problems is at hand. However, regressing the forecast error in GDP growth on the forecast of planned fiscal consolidation, they found a negative, statistically and economically significant relation between expected austerity and the forecast error in subsequent real GDP growth. This work was done for European economies over the past fiscal crisis. The fiscal multiplier was often twice as large as initial estimates.

There is reason to believe that fiscal multipliers for Puerto Rico may be even larger than those estimated for sovereign countries because it is common for the effects of fiscal austerity to be softened by accommodative monetary policy. Similarly they may be much larger than the CBO state multipliers which are based on the assumption that EVERY state has the same fiscal shock at a given time and monetary policy can adjust to accommodate the shock. The case of Puerto Rico is very different. First, the FOMB will only set fiscal policy for Puerto Rico while there will be no budget cuts in the states. Second, U.S. monetary policy will not lower interest rates to accommodate the fiscal austerity in Puerto Rico. Indeed, it seems likely that the Board of Governors of the Federal Reserve will continue to raise interest rates during the period when the FOMB is most active. Third, the currently binding minimum wage will not be lowered to allow labor markets to clear with lower labor demand. Taken together these facts suggest that the fiscal multiplier for budget cuts in Puerto Rico over the next few years may be very large. Christiano, Eichenbaum and Rebello (2011) have shown that, in the absence of interest rate relief, fiscal multipliers can be above three.

If the fiscal multiplier for Puerto Rico is even as high as 3, this means that a $1 budget cut produces a $3 decline in GDP which lowers tax revenue by 0.4($3) = $1.20 and actually raises the budget deficit, because the $1.20 fall in revenue exceeds the $1 budget cut. Put another way, attempts at deficit reduction through budget cuts may produce the perverse result that the deficit rises as tax revenues fall by more than the fall in expenditures.

3.3 What are the implications of fiscal austerity for population and migration?

Puerto Rico has a final feature that could result in a large fiscal multiplier for output. Workers can readily migrate to the US. The fact that US Census Bureau estimated that population fell from 3.726 million in April 2010 to 3.411 million in April 2016 indicates that slower growth in Puerto Rico can prompt significant migration to the US, even during periods when US growth is also modest.

Modeling the relation between fiscal austerity and population or migration is challenging. Because migration data are not available annually, an econometric model of the relation between government employment and working-age population (15 to 64) was estimated[13]. The specific estimation results are displayed in Table 5. These estimation results indicate that a rise in government employment, holding other factors constant, has a significant effect on working age residents of Puerto Rico. Specifically, the implication for fiscal austerity is that a reduction of one public employee reduces the working age population of Puerto Rico by 1.3 to 1.8. Given that the working age population is almost exactly half of total population, this implies that approximately 3 residents leave Puerto Rico per public employee. This does not include the multiplier effects of the reduction in public employment for private employment and GDP. Accordingly, it is an extremely conservative effect of the migration implications of budget and public employment reductions.

What are the implications of a significant program of fiscal austerity for migration from Puerto Rico? According to the Bureau of Labor Statistics, public employment in Puerto Rico was 223,600 in January 2017. Based on the estimates above, a 5% reduction in government employment to 212,400 would generate migration of 37,000. This migration, induced by fiscal austerity, would result in a substantial increase in annual migration[14]. Projected

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[13]In a recent research report, Reeves and Guyot (2017) have used the Puerto Rican and American Community Surveys to construct annual estimates of gross migration flows to the US from Puerto Rico and reverse flows. Between 2010 and 2015 outmigration increased substantially from 60,000 to 90,000 per year while return migration fell from 35,000 to about 24,000 per year.

[14]The Economic Commission for Latin America and the Caribbean "Resumen Economico de Puerto

over a five year period, this means a total loss of approximately 350,000 Puerto Ricans. Because these emigrants tend to be younger, the net result is an increasingly aging population generating growing demand for government services without matching revenues. Thus both the population level and composition effects of a recession in the island economy induced by budget austerity should be a major concern for the FOMB.

Presumably before taking any actions regarding fiscal control, the FOMB will develop a more elaborate econometric model to forecast the relation between planned fiscal contraction and changes in employment and population. Based on all the evidence above, there is a danger of underestimating the actual effects of fiscal austerity on the island economy and turning a moderate deficit problem into a major recession in which the deficit could expand rather than contract and significant numbers of Puerto Ricans would emigrate to the US.

4   Conclusion

Puerto Rico has already defaulted on some debt issues. The FOMB has already acknowledged that the government can only repay a fraction of the debt for which it appears to be legally responsible. However, the vast majority of this debt is not related to direct government operations. Most of it is the product of inefficient public enterprise operations. Previous studies have identified many important structural problems in the Puerto Rican economy that can be the object of reforms instituted by the current government and the FOMB. There are also areas where government efficiency could improve the business climate and increase the growth rate of private sector output. Experts have called for fundamental structural changes in the tax system, not just to increase revenue, but to promote economic efficiency. All this should provide ample opportunity for dealing with much of the current problem.

The research presented here also suggests that simplistic approaches to the debt and deficit problem could cause the FOMB to seriously harm the Puerto Rican economy, and by extension harm both the population and the bondholders whose interests are not served by policies that would collapse GNP. The common fiscal austerity approach to default is to cut government operating budgets. The rational is that deficits indicate bloated budgets and that a dollar of budget cuts equals a dollar of deficit reduction.

Rico: Supplemento Especial Migracion" (March 2014, p. 17), places net out-migration at 32,000 in year 2010. According to Reeves and Guyot (2017) net out-migration was 25,000 in 2010 and about 66,000 in 2015. Adding 37,000 more migrants due to fiscal austerity to either of these totals would result in a substantial increase in net out-migration.

This thinking does not apply to Puerto Rico for two reasons. First, expenditure and employment are not unusually high if Puerto Rico is compared to similarly situated US states. Second, fiscal multipliers for Puerto Rico, particularly at this time when monetary policy is tightening, may be quite large. This means that the indirect effect of budget cuts on GDP may be large, and the net reduction in deficits per dollar of budget cuts can be quite small. The interests of bondholders and Puerto Ricans are best served by growing rather than contracting the economy.

At the same time falling public sector employment has the extra effect of increasing migration. Overall, it appears likely that if substantial budget cuts are implemented by the FOMB, this could produce a perfect storm of economic collapse for the island economy. At a minimum, the FOMB should take the time and effort to produce formal econometric models – not just budget models with no economic content – of the likely effects of its actions on Puerto Rico considering all the issues raised in this paper. Any models or budget proposals that assume a dollar of expenditure cuts results in a dollar deficit reduction are assuming that the multiplier is zero. This is certainly not a valid assumption and will lead to faulty projections of deficit reduction.

Unfortunately, recent reports from the FOMB indicate that it is ignoring fiscal multipliers and migration when projecting revenues under its proposed austerity plan. The FOMB appears to lack any formal econometric model of the Puerto Rican economy to use in validating its proposals. Given the potential for Puerto Rico to have a large fiscal multiplier, the FOMB should exercise caution in cutting budgets and certainly proceed only after constructing a formal econometric model of the economy which includes implications for migration and is available for public inspection and critique.

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Figure 1. Change in manufacturing employment

········· US annual % change ———— PR annual % change
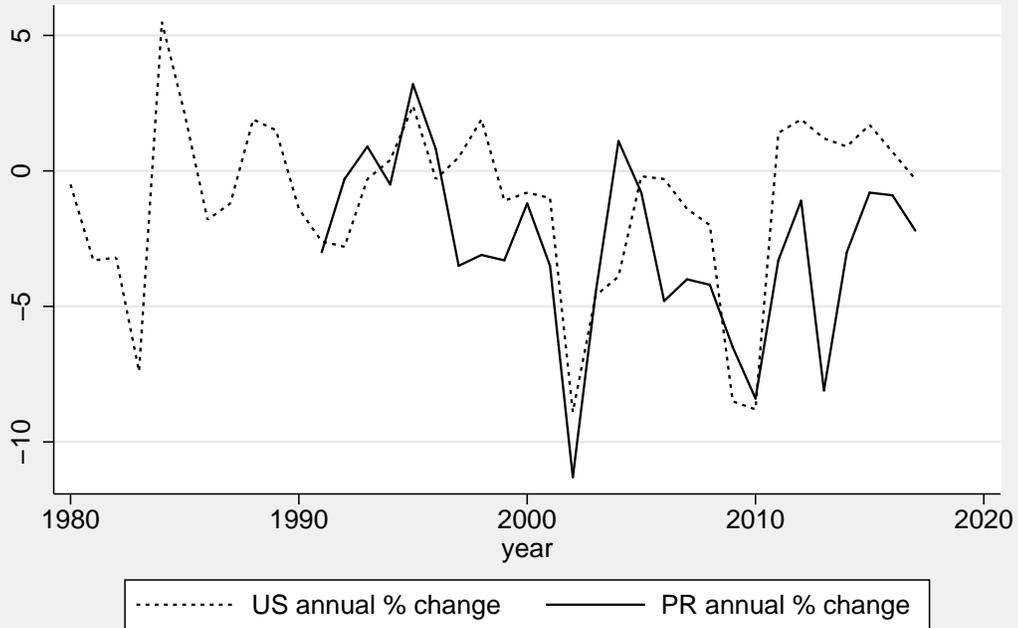
Source: BLS. Seasonally adjusted figures for the month of January.

Figure 2. Expenditure for Puerto Rico

———— actual expenditure   – – – – predicted (using GDP)
········· predicted (using personal inc)   —·—·— predicted (using GNP)
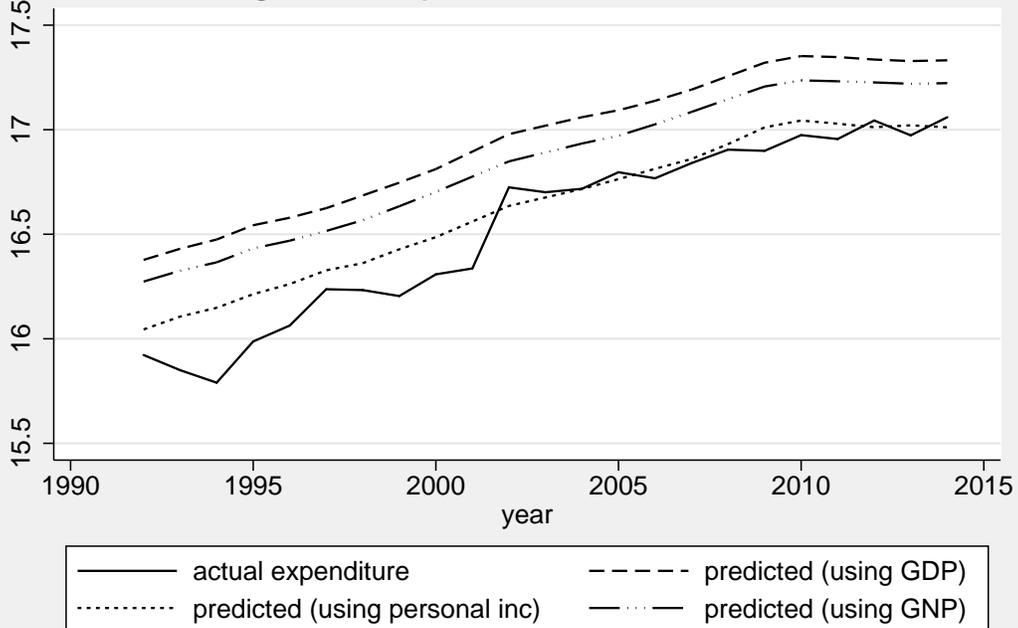
Source: Government Development Bank for Puerto Rico. Values in logs.

Figure 3. Revenue for Puerto Rico

actual revenue — — — — predicted (using GDP)
·········· predicted (using personal inc) —·—·—· predicted (using GNP)
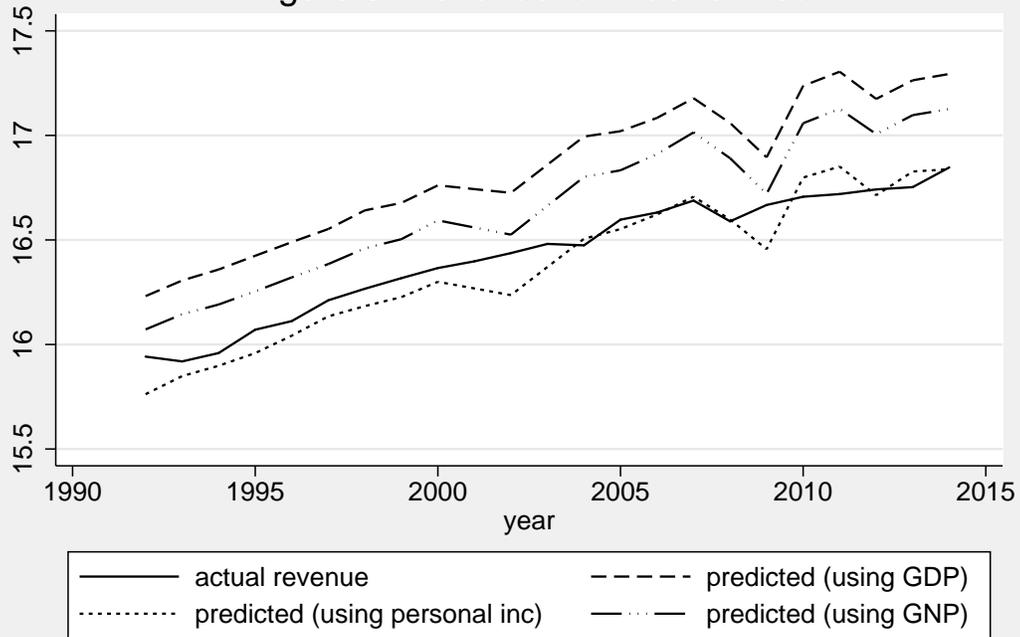
Source: Government Development Bank for Puerto Rico. Values in logs.

Figure 4. Expenditure ratio for Puerto Rico

actual expenditure ratio — — — — predicted (using GDP)
·········· predicted (using personal inc) —·—·—· predicted (using GNP)
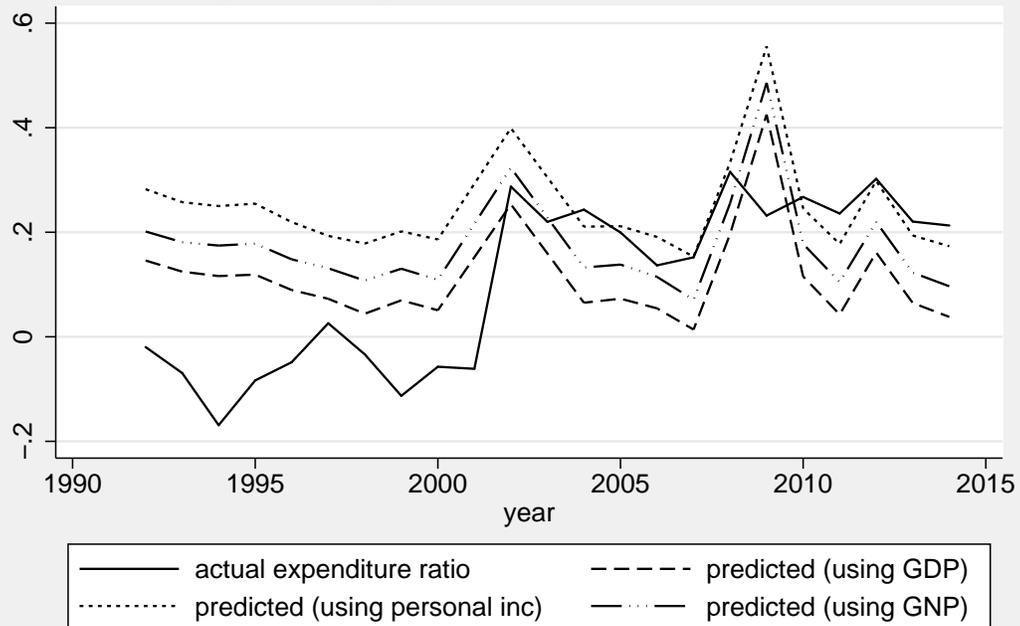
Source: Government Development Bank for Puerto Rico. Values in logs.

Figure 5. Government employment for Puerto Rico
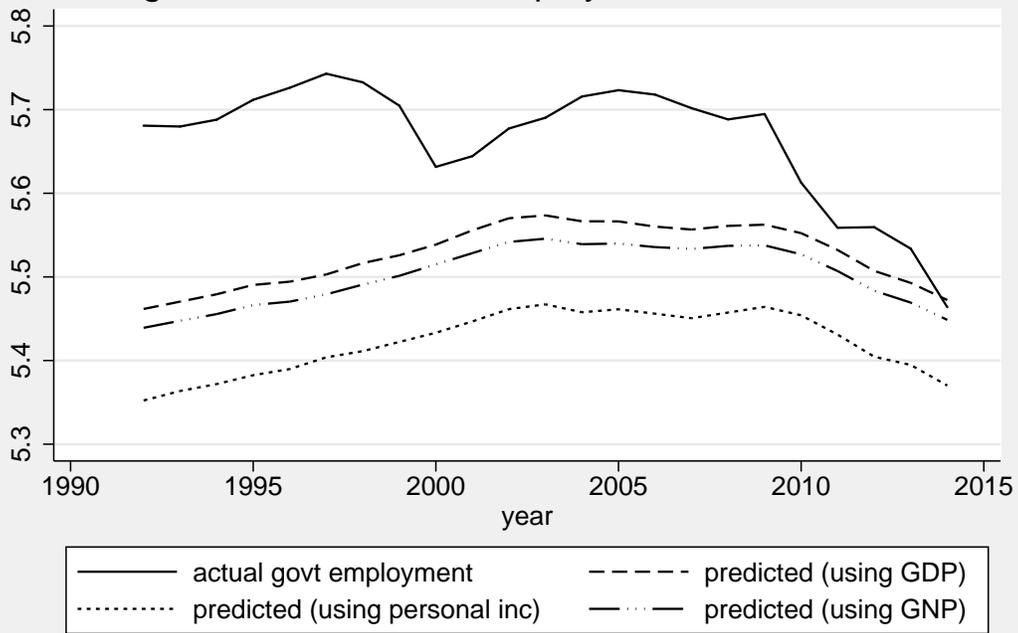
Source: BLS. Seasonally adjusted figures for the month of January. Values in logs.

Table 1: Ratio of government employment to total population

| | Puerto Rico | Similar states according to the Jaccard Index | | | | |
		Rhode Island	New Jersey	Massachusetts	Maryland	Connecticut
1992	0.082	0.059	0.072	0.065	0.085	0.063
1993	0.081	0.061	0.072	0.065	0.084	0.064
1994	0.081	0.061	0.071	0.065	0.084	0.064
1995	0.082	0.061	0.071	0.065	0.084	0.067
1996	0.082	0.060	0.070	0.066	0.083	0.067
1997	0.083	0.061	0.069	0.066	0.081	0.068
1998	0.082	0.061	0.069	0.066	0.083	0.068
1999	0.079	0.061	0.068	0.067	0.084	0.069
2000	0.073	0.061	0.069	0.068	0.084	0.071
2001	0.074	0.061	0.070	0.069	0.084	0.072
2002	0.076	0.062	0.072	0.069	0.085	0.073
2003	0.077	0.062	0.072	0.067	0.084	0.073
2004	0.079	0.061	0.073	0.066	0.084	0.070
2005	0.080	0.061	0.074	0.066	0.083	0.070
2006	0.080	0.061	0.075	0.067	0.083	0.071
2007	0.079	0.061	0.075	0.067	0.084	0.071
2008	0.079	0.061	0.075	0.067	0.085	0.072
2009	0.079	0.059	0.075	0.067	0.085	0.071
2010	0.074	0.059	0.074	0.067	0.086	0.069
2011	0.071	0.058	0.070	0.066	0.086	0.068
2012	0.071	0.057	0.070	0.065	0.086	0.067
2013	0.070	0.057	0.070	0.065	0.085	0.067
2014	0.067	0.057	0.069	0.066	0.084	0.066
Average	0.077	0.060	0.072	0.066	0.084	0.069

Sources: Employment: Bureau of Labor Statistics, seasonally adjusted employment data for the month of January. Population: World Bank for Puerto Rico and Bureau of Economic Analysis for US data.

Table 2: Elasticity of public expenditure, revenue, and employment with respect to GDP and population

	(1) Ln(expenditure)	(2) Ln(revenue)	(3) Ln(expenditure ratio)	(4) Ln(govt empl)
Ln(GDP)	0.274***	0.420***	-0.146***	0.059***
	(0.029)	(0.046)	(0.042)	(0.011)
Ln(population)	0.523***	0.376***	0.147**	0.724***
	(0.036)	(0.042)	(0.046)	(0.027)
Constant	3.647***	3.212***	0.435	-6.320***
	(0.470)	(0.589)	(0.615)	(0.350)
Observations	1071	1071	1071	1173
R^2	0.998	0.996	0.767	0.999

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This panel regression includes all 50 states and Washington DC for years 1992 to 2014. The number of observations is lower for the first three models because the Census Bureau does not supply state and local government expenditure and revenue data for year 2001 and 2003. Government employment data is available for all years under study. State and year dummy coefficients are suppressed to save space.

Sources: US Census Bureau; US Bureau of Economic Analysis; Bureau of Labor Statistics.

Table 3: Elasticity of public expenditure, revenue, and employment with respect to personal income and population

	(1) Ln(expenditure)	(2) Ln(revenue)	(3) Ln(expenditure ratio)	(4) Ln(govt empl)
Ln(personal income)	0.448***	0.658***	-0.210***	0.124***
	(0.037)	(0.056)	(0.051)	(0.018)
Ln(population)	0.383***	0.186***	0.198***	0.672***
	(0.041)	(0.050)	(0.052)	(0.030)
Constant	2.638***	1.849**	0.789	-6.700***
	(0.468)	(0.599)	(0.621)	(0.355)
Observations	1071	1071	1071	1173
R^2	0.999	0.996	0.766	0.999

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This panel regression includes all 50 states and Washington DC for years 1992 to 2014. The number of observations is lower for the first three models because the Census Bureau does not supply state and local government expenditure and revenue data for year 2001 and 2003. Government employment data is available for all years under study. State and year dummy coefficients are suppressed to save space.

Sources: US Census Bureau; US Bureau of Economic Analysis; Bureau of Labor Statistics.

Table 4: Puerto Rico: Tax revenue and GDP over time

	(1) Log(tax revenue)
Time	0.573**
	(0.267)
Ln(GDP)	0.423*
	(0.203)
Time x Log(GDP)	-0.030**
	(0.014)
Constant	8.180**
	(3.505)
Observations	23
R^2	0.958

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Gross Domestic Product data is obtained from the World Bank and the Government Development Bank of Puerto Rico. Tax revenue is estimated using Commonwealth and Municipal Comprehensive Annual Financial Reports. See Appendix B for further details.

Table 5: Working age population as a function of the unemployment rate and employment by sector

	(1) Population 15-64	(2) Population 15-64	(3) Population 15-64
Unemployment rate	-16508.135***	-14694.622**	-1609.646
	(4532.353)	(5207.452)	(7432.323)
Personal income	0.003***	0.006*	0.000
	(0.001)	(0.003)	(0.004)
Government	1.378**	1.259**	1.829**
	(0.633)	(0.592)	(0.701)
Manufacturing		1.213	0.721
		(1.537)	(1.507)
Professional/business serv.			4.941**
			(2.028)
Constant	2114998.885***	1867086.380***	1368414.304***
	(256293.897)	(414606.639)	(414901.632)
Observations	23	23	23
R^2	0.798	0.806	0.834

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Population data obtained from the World Bank. Labor data from the US Bureau of Labor Statistics. Personal income from the Government Development Bank of Puerto Rico.

Appendix A: Supplemental Tables

Table A1: Jaccard Index

	Year		
State	1992	2002	2012
Puerto Rico	1.000	1.000	1.000
Rhode Island	0.770	0.794	0.836
New Jersey	0.715	0.741	0.788
Massachusetts	0.703	0.712	0.754
Connecticut	0.655	0.672	0.730
Maryland	0.646	0.673	0.730
Florida	0.518	0.570	0.692
Delaware	0.498	0.520	0.633
New York	0.545	0.559	0.601
Ohio	0.510	0.529	0.589
Pennsylvania	0.513	0.532	0.580

Table A2: Ratio of government employment to total employment

	Puerto Rico	Similar states according to the Jaccard Index				
		Rhode Island	New Jersey	Massachusetts	Maryland	Connecticut
1992	0.302	0.127	0.151	0.135	0.170	0.123
1993	0.294	0.128	0.155	0.134	0.169	0.126
1994	0.290	0.128	0.153	0.133	0.168	0.128
1995	0.285	0.129	0.150	0.131	0.165	0.135
1996	0.277	0.127	0.147	0.133	0.165	0.136
1997	0.273	0.126	0.142	0.131	0.159	0.138
1998	0.274	0.125	0.141	0.130	0.164	0.136
1999	0.261	0.124	0.140	0.131	0.166	0.138
2000	0.243	0.122	0.141	0.133	0.166	0.141
2001	0.249	0.124	0.145	0.135	0.166	0.143
2002	0.254	0.127	0.150	0.136	0.169	0.148
2003	0.252	0.126	0.152	0.133	0.169	0.149
2004	0.256	0.124	0.152	0.130	0.168	0.145
2005	0.254	0.122	0.154	0.132	0.167	0.144
2006	0.243	0.120	0.154	0.132	0.165	0.143
2007	0.234	0.118	0.153	0.132	0.166	0.141
2008	0.246	0.120	0.153	0.133	0.169	0.143
2009	0.261	0.122	0.156	0.136	0.172	0.144
2010	0.255	0.123	0.159	0.139	0.177	0.144
2011	0.250	0.122	0.151	0.136	0.176	0.140
2012	0.254	0.121	0.149	0.134	0.175	0.138
2013	0.251	0.119	0.149	0.134	0.173	0.142
2014	0.240	0.119	0.148	0.136	0.172	0.137
Average	0.261	0.124	0.150	0.133	0.169	0.139

Sources: Employment: Bureau of Labor Statistics, seasonally adjusted employment data for the month of January. Population: World Bank for Puerto Rico and Bureau of Economic Analysis for US data.

Appendix B: Data Appendix

B1: Data and Research Limitations

This research relies on the published literature and data sources footnoted throughout. In most cases, the authors have not reviewed original source material and have instead relied on these secondary sources. For example, in characterizing current expenditure, revenue, and employment in the general government sector of Puerto Rico, an effort has been made to compare the situation of the Commonwealth with a typical US state. This requires aggregating state and local expenditure while netting out intergovernmental transfers. There are many features of public sector accounting conventions in Puerto Rico that make this exercise challenging. For example, the use of cash versus accrual accounting may allow accounts receivable to grow. No adjustment has been made for the likelihood that public employee pension funds may soon become cash flow negative because states do not currently have this burden and the attempt is to compare current expenditures with current demand for public services. Furthermore, comments on overall levels of expenditure, revenue, and employment, do not mean that economies are not possible through changes in work rules and/or improvements in productivity. It is also likely that such changes could also be made in state policies. Additional modeling of the type undertaken here should be done in order to determine if the potentially harmful and dysfunctional effects of fiscal austerity noted here are robust to use of alternative data sources and econometric techniques.

B2: Puerto Rico Commonwealth Revenue and Expenditure

The Government Development Bank for Puerto Rico provides Comprehensive Annual Financial Reports (CAFR) for the Commonwealth from year 1999 to 2014. Similar to US state reports, they note the operations of the Commonwealth in two forms – government wide financial statements and fund financial statements. These two methods are comparable but differ on basis of accounting. Government wide financial statements report on governmental activities and business-type activities using accrual basis of accounting[15]. Fund financial statements include all the governmental funds and proprietary funds, i.e. business-type funds. Governmental fund statements are reported using modified accrual basis of accounting. Whereas proprietary funds use accrual basis of accounting. Business-type activities/funds include mainly the unemployment insurance trust fund and the lotteries fund.

For comparison to US states data obtained from the Census Bureau, we use the fund financial statements. Ideally we need data on all governmental and proprietary funds from 1992-2014

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[15]Government wide financial statements report separately on component units as well. They include the state owned enterprises such as Puerto Rico Aqueduct and Sewer Authority, Puerto Rico Electric Power Authority etc.

but we only have data on all governmental funds during that time frame [16].

B3: Puerto Rico Municipal Revenue and Expenditure

For US states we use the state and local government revenue and expenditure reported by the Census Bureau. Therefore it is necessary to obtain the financial reports of all municipalities of Puerto Rico – 78 in total. This proved to be difficult and we had to rely on estimation. An organization called Abre Puerto Rico[17] has published some municipal financial statements. For year 2013 we accessed the statements for all 78 municipalities. For year 2012 we retrieved only 75 of them – no data on the municipality of Aguadilla, Fajardo and Maunabo. The following steps were used to obtain the figures for commonwealth and municipal revenue and expenditure:

- To estimate the 2012 figures for Aguadilla, Fajardo and Maunabo we used the growth rate of revenue and expenditure for all 75 municipalities for which data was available for both years.

- Revenue net of transfers from the commonwealth was calculated – this to avoid double counting.

- The ratio of total commonwealth plus municipal to commonwealth was calculated for 2012 and 2013. For expenditure this ratio is 1.20 and 1.21 for year 2012 and 2013, respectively. For revenue this ratio is 1.18 for both years.

- Commonwealth figures, for the period of time under study (1992-2014), were scaled up by 1.20 and 1.18 for expenditure and revenue, respectively.

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[16]The 1999 CAFR reported retrospective data on all governmental funds going back to 1990.

[17]Abre Puerto Rico's main goal is to promote governmental transparency.