



Government Programs: Measuring the Total Costs and Benefits Created For Society

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Abstract

As government spending becomes a greater focus for societies throughout the world, the ability to accurately measure the impact of government spending has become more important. While the cash revenues and costs of programs are generally obvious, other factors are not as apparent. Assuming that the role of government spending is to increase the welfare of society at large, rather than to generate a profit, the ability to measure the amount of welfare created is vital. This measurement is enhanced by borrowing concepts from the field of economics, such as deadweight loss and externalities because those costs and benefits need to be included in the analysis in determining the correct and the total value of government programs. Two examples of government programs are the construction of the Hoover Dam and the operation of the Amtrak system. Applying basic analysis to these programs helps frame the discussion of measuring total economic costs and benefits. This analysis is not intended to be exhaustive but rather suggestive in the approach skillful analysts should frame their work. In theory, switching to a more mathematical model for evaluation of government spending can have the effect of more rational political discourse. Limitations to this model exist, as do suggestions for ways to work around these measurement limitations.

Keywords: Benefits; Society; Government; Programs; Deadweight loss; Externalities.

1. Introduction

Government spending has dominated headlines both domestically and overseas as societies debate the value of government broadly, its role in an economy and which programs should be victims of austerity measures. Unlike businesses, the government is not subject to traditional accounting rules, nor is it motivated to generate profits for itself. Instead, a government should theoretically generate profits for its society in the form of increased benefits for its population. These benefits do not necessarily take the form of cash payments and so they are much harder to measure precisely. However, in determining the true costs and benefits of governmental programs, unnoticed economic benefits must be included as well.

Typical government accounting does not factor in the costs and benefits that are not directly associated with the cash flow. The government uses cash flow accounting, in which the budget is balanced as long as cash received is equal to the amount being spent. Every year is an independent period, so benefits in the future are not netted against costs in the present. Additionally, the government uses baseline accounting, under which the cost of a new program or change to an existing one is relative to the current baseline. For instance, the Congressional Budget Office, the government's accountants, assigns a cost to patch the Alternative Minimum Tax (AMT) every year. This cost is borne through revenue that is not received, rather than extra cash being spent. Additionally, because in this example the AMT patches are just extensions of current policy rather than an actual reduction in tax burden, no one is made better off from an AMT patch. People just avoid being made worse off, a nuance that the typical person probably does not intuitively understand.

2. Concepts from Economics

Governmental accounting can be improved by borrowing concepts from economics, such as deadweight loss and externality analysis. Deadweight loss is a concept for measuring the distortions created by tax policies. Without government intervention, the forces of supply and demand theoretically equalize, setting a price at which the market clears. Introducing taxes or subsidies artificially change prices, so the supply and demand relationship is distorted. Suppose a family wishes to buy ten apples and have the resources to afford those apples at the regular price. However, the government imposes a transaction tax of one apple on families. The family may now only purchase nine apples, taking home nine and sending one to the government as a tax payment. From a societal standpoint, only nine apples have changed hands, so the value of this lost apple and the happiness it would bring this family is a deadweight loss to society ([Basic Business Economics, \(n.d.\)](#)). It is worth noting that deadweight loss is not a judgmental term, but rather an objective measure. Because governments do not produce anything themselves, they must extract value from their citizens and use that money to provide for the greater societal good. One way in which governments can advance society is by recognizing and reacting to externalities, another term from economics. An externality is a side-effect of an action, either intentional or unintentional. An externality does not cost anyone money, but does produce a real effect, which can either be positive or negative. Pollution is a classic example of a negative externality. A company produces products and pollution, sells the products, but does not bear any of the

cost of the pollution. The cost of the pollution is borne by society. Externalities can also be positive. Vaccinations help individuals avoid diseases, and they help society in general avoid diseases. For every person who is vaccinated, society has one less person who can make other people sick, thus reducing the chances of epidemics. Eliminating the spread of disease did not cost anything, but society still enjoys the benefit (Caplan, (n.d.)).

3. How to Think About Societal Good

When the government publishes the cost for a program, it only includes the cash cost to the government. The true cost to society is the cash cost to the government, the deadweight loss created by raising taxes and the value of any externalities that are generated, either positive or negative. All three of these must be entered into the cost equation to get an accurate accounting of the costs of a program. Calculating the benefits of the program is also a difficult task. Two theoretical frameworks are appropriate. For any program, net present value (NPV) analysis is a valuable framework. To calculate a NPV, the costs and benefits of a program are discounted to the present using an appropriate interest rate and then summated. If a NPV is greater than zero, the project has added value and is a good idea. If the NPV is less than zero, the project destroys value and should not be pursued. As mentioned above, all of the costs and benefits must be included in the calculation, including deadweight loss and externalities. The second method for calculating societal good is appropriate for government projects that result in an asset, such as a bridge or dam. The asset may generate cash flow, such as a dam that creates hydroelectric power, or may generate positive externalities. By dividing the annual cash flow by the inflation-adjusted cost of building the asset, the government can determine an effective yield for the asset. The government can then compare the yield on this asset with the interest it pays for long-term debt. If the asset yield is greater than the debt yield, it is generally a good idea to pursue the project.

4. Evaluating the Hoover Dam and Amtrak System

One of the classic examples of government spending is the Hoover Dam. Located at the border of Nevada and California, this dam provides hydroelectric power to areas of southern California, Nevada and Arizona. Following Congressional authorization in 1928, construction was completed in 1936 for a cost of \$49 million, or about \$845 million adjusted for projected inflation to 2014, using 1932 as the average year for the initial costs. The Hoover Dam has an installed capacity of 2,080 megawatts and can generate 4.2 billion kilowatt-hours of electricity annually (Wikipedia, (n.d.)). Electricity generated by hydroelectric power costs an average of \$0.007 per kilowatt-hour, while power plants that use fossil fuels have costs ranging from \$0.021-\$0.042 (Alternative Energy, (n.d.)). Using the low end of this range, the Hoover Dam generates electricity for \$0.014 cents per kilowatt-hour cheaper than its closest generator competitor. This saves households in the region, a minimum, of \$58.8 million in electricity costs annually. As discussed above, \$58.8 million is the amount of societal good produced each year, so it is used to calculate the asset yield for the Hoover Dam. Relative to its inflation-adjusted cost, this government project yields 7.0 percent, well above the current government interest rates of about two percent. This analysis does not fully incorporate the costs and benefits of the Hoover Dam. From an environmental standpoint, several species of fish were eliminated because of the changes to the ecosystem. On the benefit side, hydroelectric power does not emit pollution into the environment. The Hoover Dam also attracts over one million tourists per year, clearly providing a psychic benefit to many people, in addition to the positive effect that those tourism dollars have on the local economy. While there is no ready estimate available on the value of a species of fish or air pollutants, measurement of the psychic benefits to tourists is fairly straightforward. A 30-minute tour of the dam costs \$10 - \$15 depending on age and other classifications (Bureau of Reclamation Homepage, (n.d.)). Longer and more expensive options are also available. Multiplying the \$13 average admission by the roughly one million annual guests generates \$13 million, excluding parking fees, of implied psychic benefits to society for the existence of the dam. Adding this value to the cost savings from cheaper electricity moves the implied yield on the asset to 8.5 percent. While the above math shows unequivocally that the Hoover Dam has been a successful government undertaking, the costs and benefits are not always clear. Amtrak is a fairly well-known example of a government entity that does not earn an accounting profit. Based on the year-to-date July 2014 fiscal forecast year, Amtrak is expected to collect \$3.2 billion in revenue (ticket sales, state funding, food and beverages, commercial development, etc.) but with expected expenses of over \$4.2 billion, costing society \$1.0 billion. An average of 89,300 passengers ride the system daily, working out to over 32.6 million rides per year and implying a subsidy of \$31 per passenger per day (Train and Bus Tickets, (n.d.)). Determining if the \$31 per day per passenger subsidy is good for society largely depends on what externalities Amtrak creates. A 2009 study by the Subsidy Scope, part of the Pew Charitable Trust, argues that certain portions of Amtrak do generate a profit, specifically the trains operating in the northeastern portion of the country where many commuters use the system to travel between major cities and for daily commutes from suburbs into city centers (O'Connell, 1995). There are several ways to theoretically estimate the gain that accrues to society because of the presence of a transportation network such as Amtrak. Consider the gain to society by allowing for cheaper real estate. The median residence in Manhattan sold for \$829,000 in August 2014 (Zillow, 2014a). compared with only \$181,750 for the median residence in Newark, NJ (Zillow, 2014b). Newark is a good comparison because it is a suburb like New York City that is served by Amtrak. Assuming a 20 percent down payment, a 30-year loan and a 4.2 percent interest rate, the costs of the residences per month, principal and interest, are \$3,243 and \$711 respectively, a monthly difference of \$2,532 or over \$83 per day. The \$31 per day subsidy the government implicitly provides to riders in this situation is more than offset to society as a whole by the ability of those commuters to live in a cheaper housing market while still maintaining jobs in Manhattan. Both of these examples lend themselves to a discussion of the use of taxes, an efficient way to raise revenue to fund

government programs. In the Hoover Dam example, the benefit of lower electricity cost is easily measurable and easily assigned to specific people, specifically those homes that receive the electricity. By applying a tax to the electricity generated by the dam, the government could collect revenue to offset the cost specifically from those who will benefit from it. By targeting revenue collection, the government can limit the amount of deadweight loss generated, since there is a more direct relationship between cost and benefit. Similarly, Amtrak users in certain markets could probably bear higher ticket prices than those that are already paying to help fund the shortfall because of the impressive benefits they are reaping from the system.

5. Political Benefits

Current political discourse can be frustrating for outsiders to watch because often it seems like Democrats and Republicans are not talking about the same things. Both parties like to utilize slogans and strategies when analyzing government programs rather than consider the numbers. Republicans are reticent to raise taxes on high-income taxpayers regardless of the potential benefit a program may offer. Equally, Democrats are unwilling to eliminate government spending even when the net benefits of the program are questionable from a societal standpoint. Both tend to use moral arguments, such as fairness, to support their viewpoints, although to date, there is no consensus on a definition of fairness. One way to understand the fundamental difference between parties is as a disagreement over the size of externalities that government programs create. Military spending may create externalities by protecting businesses from foreign invaders, creating an environment where business owners are confident enough to invest and expand their businesses. Programs designed to alleviate poverty can create externalities by protecting people from unfortunate outcomes, allowing them a higher standard of living and less fear of the future. While these are nice sentiments, without an estimate for the size of these effects, it is impossible to decide if a program is providing net value to society. By switching to an accounting method that makes estimates for the total value to society, politicians would be able to standardize their debates. Armed with facts and figures, politicians would be able to debate the true costs of policies without resorting to morality arguments. By using a more mathematical approach, politicians would be able to make better choices about how to allocate tax dollars. With more efficient capital allocation, governments could spend either less money for the same amount of societal good or create more societal good for a constant amount of dollars spent.

6. Limitations/Conclusions

Estimating the size of deadweight losses and externalities is difficult. There are multiple variables involved in each analysis, so calculating the government's effect across all elements is not always straightforward. Additionally, people are dynamic and change their behavior when new policies and programs are put into place, so the value of one variable may change over time as people adapt. One of the biggest challenges is that this type of analysis tends to be counterfactual. Unlike hard sciences like physics and biology, it is difficult to run accurate experiments in accounting or economics. Experiments tend to be designed to solve for what may have happened if a program had not been implemented. This can lead to ambiguous results. Perhaps analysis of a program designed to spur hiring concludes that one million jobs were created, but simultaneously, other factors in the economy resulted in the destruction of one million different jobs. The program may have been successful and unemployment is now lower than it otherwise would have been, but this tends to be a difficult message to convey to people not versed in economic theories who only see that the total number of jobs has not changed. One way to work around the measurement limitations is to pilot programs in different states and compare results. This creates a type of experiment and provides data for policymakers to work with and analyze. Continuing with the example of a jobs program, if the government rolled it out in selected states rather than nationally, economic data over time from the affected states would show differences relative to the control states. Using this comparison would help define the costs and benefits of a program more concretely. Random inclusion in the program would prevent one state from having a systemic advantage relative to its neighbors over time and would eliminate the ability for the most powerful politicians seeking benefits for only their home states. Another way to help measure the costs to society is by looking for private market substitutes. With Social Security, the government guarantees each enrollee a monthly payment, inflation adjusted, until death. This is very similar to annuity products offered by insurance companies, which provide a monthly payment in exchange for an initial lump sum payment. Since people buy insurance contracts voluntarily, the prices that they pay should equate to the value they derive from having the income security. To evaluate the societal benefits of Social Security, an analyst could determine how much the program would cost to replicate using private market annuities and compare that to the government's cost. The difference between the numbers would approximate the net benefit or cost to society of running the program. Regardless of the methods used to evaluate the costs and benefits of a government program, the best analysis will include not just the cash accounting costs and benefits, but also the invisible economic costs and benefits, such as the deadweight loss and externalities that the program creates. For some programs, such as building the Hoover Dam, benefits to society are readily apparent because of easily accessible monetary information. For other programs, such as the Amtrak system, looking at only cash costs and benefits may lead to a different conclusion than the consideration of the total economic impact. Politicians would benefit by switching to a more holistic approach, replacing contradictory moral arguments with analysis more rooted in mathematical methods. From a societal standpoint, this will lead to the government making better uses of its capital. While there are limitations to every method, using an economic framework to account for government programs and policies can lead to better results for society as a whole.0

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