PUBLIC DEBT MANAGEMENT

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Contents

1. The Importance of Public Debt Management
2. Definitions and Debt Algebra
3. Legal, Institutional and Managerial Frameworks
4. Coordination with Monetary and Fiscal Policies
5. Sources of Public Debt Not Linked to the Fiscal Deficit
Glossary
Bibliography
Biographical Sketch

Summary

This article explains why there is public debt and the importance of an effective public debt management including aspects of economic theory and practice. It gives a brief historical perspective of debt crises—from the XIX century to beginning of the XXI century—that originate the effective debt management functions. The article follows the definition of public debt given by the international Task Force on Financial Statistics (TFFS); however, it also explains other alternative definitions. The debt algebra is briefly explained as well as some debt instruments and their valuation giving numerical examples and the corresponding formulae for the calculations. The legal and institutional setup for an effective debt management is described for democratic countries, where the parliament has a paramount role in approving the level of public indebtedness of a country, as well as the coordination among public debt management and fiscal and monetary policies.

Debt sustainability regarding the external gap, i.e. balance of payments, and the fiscal gap, i.e. the central budget deficit is also explained and dealt with giving a numerical example for the balance of payments. Indebtedness sources for the government that are not linked to the budget deficit are explained as well, in particular contingent liabilities. The article devotes a special chapter to debt of emerging markets and developing countries. There is also a brief description of the existent debt rescheduling clubs, i.e. the Paris Club and the London Club(s), as well as the proposal for a Sovereign Debt Rescheduling Mechanism that has not found an international consensus in order to be implemented; however, this is an important initiative that is worthwhile to mention.
1. The Importance of Public Debt Management

1.1 Why Public Debt?

1.1.1 Economic Theory and Practice

Public borrowing is an alternative to taxes, and it allows for sudden increases of budgetary expenditure without having an immediate effect on the taxation rate: an increase of public debt in one monetary unit today implies an increase in present value in one monetary unit of future taxes. In fact, the previous sentence assumes that there is Ricardian equivalence (Ricardian equivalence states that when a government tries to stimulate demand by increasing debt-financed government spending, the global demand remains unchanged; because the public will save in order to pay for future tax), in which whether the government finances spending are financed through taxes or borrowing is irrelevant, as long as there is certainty about future levels of income, public spending and rates of return, with perfect capital markets and certain future horizons for households.

Under these conditions, the present value of taxes is fixed by the path of government spending. In this case, public borrowing can change the timing of taxes but not the present value. Therefore, the issue of an extra monetary unit of debt to cut current taxes by one monetary unit implies an increase by one monetary unit in the present value of future taxes. This result applies as long as the government does not pursue borrowing schemes that may be a “fuite en avant” (fuite en avant is a French expression that means something one does when one is in a difficult situation, and one hopes to salvage it by doing more of the same or worse, in our case borrowing more to finance expenditures and debt service. A typical example of fuite en avant is the implementation of a Ponzi scheme), e.g. borrowing for paying government expenditures and to repay debt, leading to a situation in which the public debt grows faster than the economy.

The debt financed tax cut does not affect consumer demand, because the extra government bonds issued to finance the tax cut are bought and held by households without any changes in market interest rates. The additional monetary unit of public dissaving is offset by an added monetary unit of private saving; in consequence national savings do not change. Dissaving is spending an amount of money greater than available income. Dissaving is considered the opposite of saving, and can include tapping into money already in a savings account or accumulated elsewhere. Dissaving may also take place by borrowing against future income by taking out a loan or using credit cards. Dissaving can continue to the point where income, savings and available credit are all exhausted.

Households are connected to future generations by a network of active wealth transfers based on family linkages or altruism, a tax cut financed by borrowing would not shift tax burdens from today’s generations to later ones. Normally, parents provide voluntary transfers to children, either through bequests and/or resource transfers during their life. Hence, there is no effect on parents’ wealth and there are no changes in consumer demand. Under these circumstances of Ricardian equivalence, public debt management is irrelevant, as well as its amount and structure. This result remains valid with the
existence of external debt. The present value of taxes paid by domestic residents is invariant with a current budget deficit even if some debt is held by non-residents. However, the existence of external debt may influence the government to default on its external outstanding obligations. This effect could emerge if governments attach less cost to expropriating non-residents, rather than domestic residents.

Notwithstanding, in real life, Ricardian equivalence hardly holds. The most important reason for the failure is the distortionary effect of real-world taxes. Distortionary taxes are taxes that affect the prices of items in a market. For example a tax on beef might oblige people to switch to pork. A tariff is an example of distortionary tax because imported products cost more, so consumers have an incentive to purchase domestic products. In our case, income taxes influence choices of how much and when to work. Similarly, taxes on wealth, expenditures and production—for instance, value-added taxes (VATs)—affect decisions on how much and when to spend and produce. In these cases, economic choices depend not only on the prospective present value of taxes but also on their timing.

As Ricardian equivalence does not hold, the government has to arrange its debt issues so that the required taxes—on income, production and consumption—are smoothed over time. This pattern avoids distortions that arise from irregular patterns of tax rates. In other words, the government does not wish to induce variations in work, production and consumption that would lead to irregular patterns of tax rates. The tax-smoothing approach generates two implications:

- First, the government should run budget deficits at times of temporarily high public outlays. The classic situation is wartime or natural disasters that require exceptional spending, where the high levels of spending during wars or reconstruction after natural catastrophes are paid mostly by borrowing, rather than current taxation. The policy of paying for added public spending with debt issue works only if the extra spending is temporary. If the expansion of the public sector is permanent, then deficit finance means that taxes must be raised even more in the future, partly to pay for the added government expenditure and partly to finance the extra debt. Thus, the proper response to a permanent expansion of the public sector is a corresponding rise in tax revenues. For instance, Keynes recommended deliberate deficit spending by governments to increase aggregate demand: public spending—putting people to work and money into investment—has a multiplier effect that will lead to full employment.

- Second, budget deficits should be high at times of temporary economic distress and low—preferably zero or in surplus—in good times. If public outlays do not fall proportionately with real income during a recession, a balanced-budget policy would require higher tax rates. This policy would therefore violate the principle that tax rates should be smoothed over time. To avoid this outcome, the government has to borrow during recessions to keep tax rates relatively stable. This policy works because future periods with renewed economic activity will provide better times to raise tax revenues and repay debt. However, the policy does not work if the depression in economic activity is permanent. In that case, if government expenditures are not cut, the proper response is higher tax revenue, not more public borrowing.
The two implications stated above are illustrated in Chart 1 for the evolution of the budget deficit and public debt in France from years 2000 to 2014.

![Chart 1. Budget Deficit and Public Debt in France in Percentage of GDP: 2000-2014](source.png)

In this stage of the analysis, the choice between public debt and taxes is of a paramount importance. However, the selection among types of debt instruments—short- versus long-term, nominal versus indexed, domestic currency versus foreign currency—still does not matter. With perfect certainty for interest rates, price levels, exchange rates, etc., the rational pricing of each instrument on financial markets ensures that each option entails the same time path of real interest payments on the public debt. To assess the optimality of the composition of the public debt, one has to go to a further stage of the analysis in which uncertainty is introduced.

The relevant uncertainties for the government are those that have a direct effect on its budget: expenditure and real GDP, which affect the government’s tax base; as well as rates of interest on public borrowing, which affect the public debt service. The government’s optimal tax problem is to minimize expected deadweight losses financing the budget, subject to these uncertainties. Deadweight loss is a welfare loss, and to estimate welfare losses it has to be considered the total surplus before and after the tax. Deadweight loss, also known as ”excess burden”, is a pure loss to society. It represents lost value to consumers and producers due to the reduction in the sales of the good due to its price increase after taxes, but not captured by government revenue. In other words, the loss to consumers and producers from the tax is larger than the size of the tax revenue.

Making abstraction of the currency in which the government borrows, the uncertainties motivate the government to issue securities whose payoffs are countercyclical to the relevant risks. For instance, the government would apply a strategy issuing bonds which coupon rate is low when government expenditure is high and high when expenditure is low. However, that kind of contingent bonds on government expenditure may create
moral-hazard problems; e.g. the government is motivated, *ex post*, to overspend. For this reason, the government bonds for which the pay-outs are explicitly contingent on the levels of public expenditure are not utilized.

The argument developed in the previous paragraph can be further extended to nominal bonds, i.e. bonds that are not linked to inflation. For these securities, the real pay-outs decline when inflation rise; hence, fluctuations in the inflation rate cause variations in real financing requirements and, hence, in future taxes. Since the government is trying to smooth taxes, this property makes nominal bonds less attractive than indexed bonds if there is randomness in inflation.

To the extent that the inflation rate and government expenditure are positively correlated, the existence of nominal debt motivates the government to overspend in the same way as the government expenditure contingent bonds. Thus, nominal bonds have the same moral-hazard problem as the government expenditure contingent real bonds and are otherwise inferior, because of the random fluctuations in inflation. If the moral-hazard problem is serious enough to make the issue of government expenditure contingent bonds unwise, then this problem would also be strong enough to make nominal bonds less attractive for the government than indexed bonds.

However, regarding inflation and its effect on government’s bonds payoffs, the Central Bank has a paramount role to play, which is its specific responsibility on the implementation of monetary policy, i.e. controlling inflation and fixing the rate of interest. In modern and democratic economies, the Central Bank and the Ministry of Finance are meant to take independent policy actions. The implementation of this independent policy by the Central Bank during inflationary times would, in some extent, decrease the moral-hazard on nominal bonds, because during these inflationary times the Central Bank would raise the interest rate, and this would be reflected in the real government bonds payoffs, decreasing the moral-hazard problem pointed out above.

Regarding the GDP, the government would also be motivated to issue securities that payoff low during recessions, when the tax base is low, and well during booms. This pattern can be achieved by issuing GDP-contingent bonds. This kind of securities has seldom being issued, the explanation being that errors and delays in national-accounts measurements may complicate and occasion delays in the payments to creditors. There is, however, one historical precedent: the restructuring of the Argentinean debt in 2004-2005. In this case, the Argentinean statistical office, the “Instituto Nacional de Estadística y Censos” (INEC) is in charge of calculating the GDP rate of growth. Notwithstanding, it has not been without controversy, with investors complaining that the Argentine government manipulates the statistics (On the theory of GDP-indexed bonds see Borensztein and Mauro (2002), Griffith-Jones and Sharma (2006) and Ruban, Poon and Vonatsos (2007)).

Finally, the government would like to issue securities whose payoffs are contingent on required coupon or interest rates for future debt issues. The goal is to insulate the public budget from variations in these rates. This part of the government’s objective can be accomplished by issuing indexed government bonds—linked, for example, to the consumer price index—and then choosing an appropriate maturity structure for the debt.
If indexed bonds are not desirable and the government wants to issue nominal bonds, then the solution for the optimal maturity structure of the public debt will depend on different factors. Fluctuations in inflation and, hence, nominal interest rates tend to affect the value of long-term nominal bonds more than that of short-term nominal bonds. Therefore, the government can lessen the impact of inflation on the public budget by shortening the maturity structure of the nominal debt. However, shortening the maturity has the drawback of increasing the sensitivity of the public budget to variations in real interest rates.

Note that the relevant aspect of short-term is not the maturity of the debt but, rather, the degree of sensitivity of debt payments to fluctuations in short-term market real interest rates. The desire to insulate the budget from these variations in real rates is the rationale for long-term debt. The problems of fluctuating refinancing costs can be avoided by making the maturity structure of the public debt long-term. The strategy is to structure the debt so that similar and small quantities of government bonds are rolled over in each period.

However, the hypothesis at the base of the strategy described in the previous paragraph will seldom realize. Therefore, uncertainty about future values of expected growth ratios of government expenditures and GDP implies that future refinancing or retirements of public debt must occur; and variations in the rate of interest have impact on the public budget. Notwithstanding, the use of long-term debt makes the budget less sensitive to fluctuations in interest rate.

Governments may also issue bonds denominated in foreign currency. In contrast with indexed domestic debt, foreign currency bonds introduce effects from variations in real exchange rates. If the domestic currency depreciates in real terms during bad economic times, then foreign currency obligations affect the public budget adversely just when the tax base, the GDP growth rate, tends to be low. Hence, the use of foreign currency debt makes the government’s public debt management more complicated.

In spite of that, developing and emerging market countries do issue debt in foreign currencies, like the Swiss franc (CHF), the Euro (EUR), the Great Britain sterling pound (GBP), the Japanese yen (JPY) and the United States dollar (USD); the main reason would be that the world financial markets operate in these currencies (Sometimes, the unit of account of the International Monetary Fund is also used: the Special Drawing Rights (SDR). The currency codes used all along this article are the ISO 4217 currency codes). Hence, the extra premium required on domestically denominated issues—even if indexed—in order to make them attractive to foreign investors may justify the extra riskiness of the foreign currency debt (Chapter 8 will treat the foreign currency debt more in detail).

In reality, governments issue instruments—indexed and nominal, as well as in domestic and foreign currency—with different maturities that are targeted to specific government needs, making public debt management more complicated. Nevertheless, the structure and different maturities of public debt is necessary because two reasons: first, in order to smooth the tax rate as explained above, and second, in order to address different investment needs and manage risk.
Actually, governments issue short-, medium- and long-term debt (Short-term debt has maturity of less than one year; medium-term debt is sometimes defined as having a maturity from one to three years, and sometimes from one to five years, and long-term debt is defined as with maturity longer than medium-term. In order to avoid discrepancies when dealing with medium-term debt, it has been agreed to distinguish—from the statistical point of view—only short-term, maturity less than or equal to one year, and long-term, above one year. This will be dealt with more in detail in Section 1.1.2). Short-term debt addresses needs for investors which need liquid instruments, on the one hand, and on the other hand, it is used by governments for managing treasury cash-flows, i.e. to finance the time gaps between revenues and expenditures. Medium-term debt is used to finance current expenditures in order to smooth the tax rate. Long-term debt is used to finance public investment, which full profitability will take long time to achieve.

The different maturities of government’s instruments bear also different and corresponding interest rates. The rate increasing with maturity, fact that would reflect the risk incurred by the investor: the longer the maturity—and the smaller the instrument liquidity—the larger the risk. These particularities are represented on a classical chart called the rate or yield curve. The typical yield curve is represented on Chart 2 for the public debt of France at three different dates, values end of the month. The notion of yield will be introduced later, it refers to the fact that the yield of the instrument may be different to the coupon or interest rate depending on external conditions.

Chart 2 shows on abscises the maturity of debt, and the interest or yield rates on ordinates. The shape of the curve is said to be typical because, as expected, the shorter the maturity the lower the rates, and the longer the maturity the higher the rates.
curve shows a convex shape. Chart 2 shows that for short-term maturities, the rate is smaller than one per cent, and for long-term maturities, e.g. 30 to 50 years the rate is around 4 per cent.

However, in exceptional cases in which expectation on future inflation is high, it is possible to have a concave curve, i.e. the shorter the maturity the higher the rates, and the longer the maturity the lower the rates. In other cases, where the expectations for deflation in the short-, medium-term are high, the yield curve can show a “compressed” section for those maturities, as the case in the USA in 2011, originated by the radical decrease on interest rates after the sub-primes crisis. Chart 3 shows this situation, where all maturities below 2 years are yielding less than 1 per cent and the yield curve shows an “S” shape.

Another important fact is that investors are of different kind along the yield curve. Long-term issues are mainly bought by insurance companies and pensions funds, whereas short-term are instruments demanded by investors active in the money market. In the middle, we can have a large range of investors, including households’ savings.

The yield curve has an important role as benchmark for domestic issuers—and sometimes, depending on the currency, like the USA and Germany, also for international issues in USD or EUR—because the government, in every country, is the most reliable creditor, i.e. the creditor that represents the lower credit risk (Credit risk refers to the possibility of default by the borrower. Different types of risks will be deal with more in detail in Chapter 7). Therefore, if other potential borrowers wish to issue debt in the same market—i.e. the domestic market or international markets when the issue is labelled in USD or EUR—the yield offered by these issuers has to be larger than the rate offered by the government for similar maturities. This means that a margin risk is paid by the issuer on top of the government’s yield in order to compensate for a larger
credit risk. This spread or margin reflects the creditworthiness of the issuer in respect to
the lower credit risk, which is the government, or in the case of international issues in
major currencies, the government issuing the concerned currency. The creditworthiness
of debt issuers, normally, is rated by specialised agencies, rating agencies. The major
rating agencies are Fitch, Moody’s and Standard & Poor’s (See: http://
www.standardandpoors.com /home /en/ us). The better the rating of an issuer, the
smaller the spread in relation to the market benchmark—the government yield curve—
reflecting a smaller risk premium. Chart 4 shows the yields of 10 year maturity
 corporate issuers rated by Moody’s as Aaa and Baa—i.e. investment grade rating—in
respect to the US Treasury 10 year maturity bond. On Chart 4 the yellow curve
represents the US Treasury bonds yield, and the blue and red curves the corporate
issuers rated Aaa and Baa respectively. The green curve relates to the federal funds
interest rate (the federal funds rate is the interest rate at which private banks lend
balances—federal funds—at the Federal Reserve to other depository institutions,
usually overnight. It is the interest rate banks charge each other for loans. The interest
rate that the borrowing bank pays to the lending bank to borrow the funds is negotiated
between the two banks, and the weighted average of this rate across all such
transactions is the federal funds effective rate). It is interesting to note that Chart 4
shows that before the sub-prime crisis, the spread for Aaa corporate bonds was around
100 basis points (100 basis points equal 1 per cent), and for Baa around 200 basis
points. After the sub-prime crisis, this difference, respectively, became more than 200
basis points for Aaa corporations and more than 400 basis points for Baa corporations.
Hence, Chart 4 illustrates how the risk is measured using as benchmark the
government’s bonds.

Chart 4. US Treasury Bonds 10 Year Maturity Yield Curve as Benchmark For
Investment Grade Corporate Issuers January 2005-March 2009
investing.curiouscatblog.net /2009/04/09/ continued-large-spreads-between-corporate-
and-government-bond-yields /

Actually, the interest rate or yield obtained by investing in government bonds has a
further benchmark role for investment decision making that may include stock shares.
Within this approach, the government bond’s rate of interest is the “risk-free” investment benchmark, but this goes beyond the aim of this paper.

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Biographical Sketch

Dr. Cosío-Pascal obtained his Doctorate in Econometrics with Professor Edmond Malinvaud at the University of Paris I, Pantheon-Sorbonne, in 1975. He also holds a B.Sc. in Applied Mathematics option Actuary, a M.A. in Economics and a M.Sc. in Mathematical Statistics. Dr. Cosío-Pascal is a Statistician-Economist from the French “École Nationale de la Statistique et de l’Administration Economique” (ENSAE). Dr. Cosío-Pascal worked for UNCTAD for 22 years where he founded and developed the Debt Management and Financial Analysis System Programme (DMFAS) that provides technical assistance—around 70 countries—to governments on public debt management. He was the Chief of the Debt and Development Finance Branch (DDFB), in which quality represented UNCTAD to the Task Force on Financial Statistics (TFFS), drafting the “External Debt Statistics: Guide for Compilers and Users”. Before working for UNCTAD, Dr. Cosío-Pascal was a staff member of the General Directorate of International Financial Affairs at the Ministry of Finance in Mexico. Presently, Dr. Cosío-Pascal is a Free Lance consultant on debt management and public finance, in which quality have undertaken missions for the International Monetary Fund, the World Bank, the African Development Bank, the Asian Development Bank, the Inter-American Development Bank, UNCTAD, UNDP, UNITAR and regional economic and financial organisations like MEFMI and the LAC Debt Group.