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# Evaluating the Cost of Government Credit Support: The OECD Context

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# Evaluating the Cost of Government Credit Support: The OECD Context

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## 1. Introduction

Governments throughout the OECD and around the world allocate a significant share of societies' capital and risk through their credit-related activities. Those activities include explicit and implicit guarantees of too-big-to-fail private and international financial institutions and non-financial firms; direct and guaranteed lending; and credit-related insurance and guarantee programmes such as deposit insurance. In deciding whether to initiate or modify a credit programme, policymakers consider a broad array of political and economic factors. Costs play a prominent role in such deliberations--policies are often debated and ultimately justified on the basis of formal or informal cost-benefit analyses. Consequently, accurate cost estimates are a prerequisite for efficient resource allocation, informed and transparent government decision-making, and effective management and oversight of government programmes.

This paper explores how OECD governments determine the official costs of their credit-related activities, evaluates those methods against the metric of a market-price or "fair-value" approach, and illustrates the divergence between reported and fair-value cost estimates through an analysis of several major OECD government credit programmes.[1] It adds to a growing number of studies that address those issues as they pertain to the U.S. federal government (Lucas, 2012, surveys that literature). Similar analyses do not appear to have been performed for other OECD member states, despite the growing prevalence of government credit support by those countries and the significant differences from the U.S. in policies and institutions. The aim of this paper is to begin to fill that research gap, and to draw attention to the importance of accurate cost measurement for credit support in the OECD context and the shortcomings of current practices. A caveat is that the conclusions drawn rely on examination of a small subset of the hundreds of financial reports and budgetary documents where credit cost information may appear; a reading of the relevant portions of the International Public Sector Accounting Standards (IPSAS) and related commentaries; and conversations with OECD experts. A comprehensive analysis of

[1] What is termed the fair-value approach would measure those programs' costs at market prices or at some approximation of market prices when directly comparable market prices are unavailable.

OECD credit programmes and accounting practices was not attempted. Thus there may be important exceptions and variations that remain to be identified in future research.

The premise behind the analysis--that government costs should be evaluated on a fair-value basis--rests on the logic of the famous Modigliani-Miller (MM) theorem (Modigliani and Miller, 1958) as it applies to governments.[2] The MM theorem established that as a first approximation, the cost of capital for a project (including financial projects) depends on the timing and risks of the associated cash flows, not on the mix of debt and equity used to finance it. Debt and equity holders collectively bear the entire risk of a project, and the cost of the total risk is the same no matter how it is divided across those claimants. The relevance to the government arises from the recognition that the risks inherent in most government credit activities are similar to those in private credit transactions and that those risks are ultimately are borne by taxpayers and the general public, who are the *de facto* equity-holders in government investments.[3]

The analysis reveals a large divergence between how OECD governments account for the costs of credit support and the corresponding fair-value costs: Governments (and government-owned entities) systematically understate the costs of credit support, often by a considerable margin. Cost understatement has a number of potentially adverse consequences: It encourages over-reliance on credit support relative to other types of assistance, such as grants or in-kind transfers, for which costs are measured more fully. The impetus to use credit support in lieu of other types of assistance may be particularly strong during periods of fiscal consolidation when there is intense pressure to reduce measured spending. Cost understatement creates incentives for capital misallocations and overinvestment; and it underreports the size of the public sector. Furthermore, it encourages a larger buildup of financial risk by governments than would otherwise occur, increasing the likelihood of future funding shortfalls that could hinder

[2] Cost estimates based on a weighted-average or market cost of capital are often described as fair value estimates, and the terms are used interchangeably.

[3] That perspective was endorsed by the Financial Economists Roundtable (2012), a non-partisan group of senior financial economists, but remains controversial among U.S. budget practitioners.

governments' capacity to respond to adverse shocks, and adding to the aggregate financial risk in the world economy.

The phenomenon of significant cost understatement and several valuation approaches that can be used to address it are illustrated with three OECD examples: (1) the European Bank for Reconstruction and Development (EBRD), a large international financial institution whose disclosures are typical of such organizations; (2) the Tennessee Value Authority (TVA), a wholly federally-owned firm responsible for about 1/6 of the electrical generation and transmission in the United States; and (3) the European Financial Stability Facility (EFSF) and its successor, the European Stabilization Mechanism (ESM), a permanent crisis resolution mechanism established by the euro area Member States as an intergovernmental organisation to ensure financial stability by providing financial assistance to ESM members experiencing or threatened by severe financing problems.

The fundamental conceptual reason for the systematic understatement of credit costs by OECD member states and government-owned entities is relatively straightforward: Governments generally identify their cost of capital with their borrowing rate, independent of the risk of the activity being financed. Relatedly, government entities use an accounting notion of profitability rather than an economic one.

The practical impediments to a full recognition of credit costs are numerous and complex. They include the panoply of legally binding directives and long-standing practices that allow the costs of many credit activities--particularly credit guarantees and other contingent commitments—to be entirely unaccounted for in government budgets, or to be accounted for on a cash basis that largely obscures the lifetime cost of new obligations at the time they are made. The U.S. federal government took the positive step of moving to an accrual basis of accounting for its direct loans and loan guarantees programmes, but its use of government interest rates for discounting results in downwardly-biased cost estimates. Even if one is willing to take reported costs at face value, identifying the relevant programmes and uncovering the available cost information often requires delving into a combination of budgetary accounts, financial statements, and special reports issued by multiple reporting entities.

Despite the complexity and heterogeneity of current practices, it is possible to characterize the differences in the information disclosed by government entities and by publicly-traded firms in a way that clarifies the relation between financial accounting, budgetary accounting, and market prices. That taxonomy represents an original contribution of this paper, and it is useful for several reasons. For one, it suggests the importance of recognizing the fair-value costs of credit support in budgetary accounts. Government financial statements, even when they include a fair value balance sheet, do not reveal the full cost of credit support. The observation is important because whereas government financial accounting has become increasingly standardized and is largely consistent with financial accounting practices in the private sector as more countries chosen to adopt IPSASB guidelines, international standard setters have offered much less guidance on budgetary accounting practices. Furthermore, many OECD government credit activities are conducted by entities such as international financial institutions, which evaluate their financial performance largely on the basis of data on their financial statements. The fair-value costs of their credit activities, which for a publicly traded firm would be reflected in stock price movements, are generally not estimated or recognized as relevant.

While accurate cost measurement is important for the many reasons noted, it is clearly not sufficient for policy evaluation--private benefits and any positive or negative externalities also must be taken into account. Although those broader issues are outside of the scope of the analysis here, there is an extensive academic literature on the broader effects of government credit support. Government credit support can improve social welfare when it alleviates informational and contractual frictions in credit markets (e.g., Stiglitz & Weiss, 1981, and Williamson, 1994). Credit market frictions and their consequences may be particularly severe during periods of financial upheavals. Relatedly, during downturns credit policy can be a powerful tool for delivering economic stimulus (Gale, 1991, and Lucas, 2012). Public financing of infrastructure projects may improve welfare when it is infeasible for the private sector to collect sufficient revenues from users. Potential adverse effects of credit support include the crowding out of more productive investment activities; effects on prices that reduce the benefits to the

intended beneficiaries; incentives for greater risk taking by guaranteed entities; and a build-up of debt by unsophisticated borrowers.

The remainder of the paper is organized as follows: Section 2 gives an indication of the size and scope of OECD government credit activities. Section 3 reviews the conceptual case for applying a fair-value approach to cost estimation in government accounting, and explains how credit costs are accounted for in practice. It then clarifies the complementary roles of budgetary accounting and financial accounting, and compares the information provided therein with information available to investors in publicly traded firms that also have information about stock prices. Section 4 reports the fair-value costs to governments of the EBRD, the EFSF/ESM, and the TVA, and compares those estimates to the government-reported information on their costs. Those analyses demonstrate several of the approaches that can be used to estimate the fair-value of government credit support. Section 5 concludes.

## 2. Government Uses of Credit Support

OECD governments provide credit support for many purposes, and by a variety of means. Governments provide explicit and implicit guarantees to too-big-to-fail private financial and non-financial institutions, and to international financial institutions. Direct government loans and loan guarantees programmes provide assistance for housing, education agriculture, small businesses, development, energy, trade, and to foreign and subnational governments. Certain government insurance programmes, such as those protecting bank deposits and private pension benefits, are effectively credit guarantee programs. Government-owned firms that finance their investments through low-cost debt issuance provide credit support to the activities they engage in.

Cataloguing the size and scope of government credit support for OECD countries using a consistent approach across jurisdictions and programmes would be a worthwhile and challenging undertaking, but such an exercise has not been done and is not attempted here. Nevertheless, information is available that provides a sense of the magnitudes involved, and suggests credit supported by OECD governments amounts to several tens of trillions of Euros.

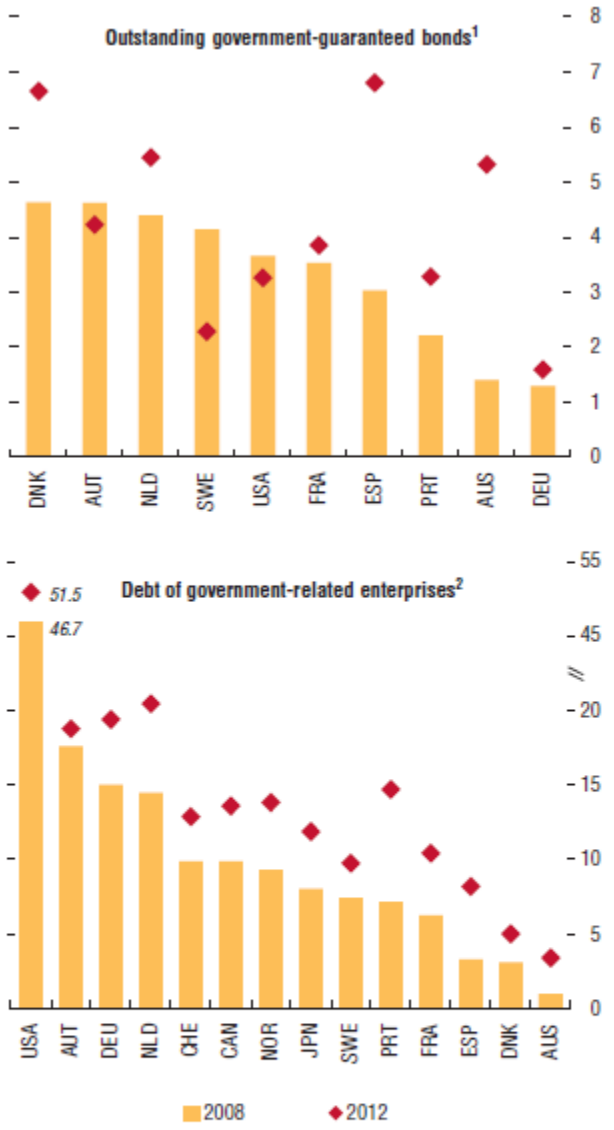
For the U.S., Lucas (2011) provides an inventory of federal credit support programmes which underscores the very large size of those obligations when considered collectively. Exposures are measured by dollar amounts of outstanding of guaranteed obligations. Prominent implicit guarantees are included but state and local government obligations are not. That analysis concludes that for 2010, credit backed by the U.S. federal government topped $18 trillion. The major components include: traditional direct loans and loan guarantees, primarily for low-income housing and higher education ($2.3 trillion); backing for mortgages insured by Fannie Mae and Freddie Mac ($5.8 trillion); deposit insurance ($6.2 trillion); guarantees of private defined benefit pension plans by the Pension Benefit Guarantee Corporation (about $2.8 trillion); and implicit guarantees to the Federal Home Loan Banks and the Farm Credit System (about $1 trillion). In general, the fair-value cost of those obligations is much smaller. For example, the U.S. Congressional Budget Office (CBO, 2012) reports that for the estimated $635 billion of new direct loans and loan guarantees issued in 2013, the fair-value cost would be $11 billion.[4]

The International Monetary Fund (IMF) presents estimates of outstanding government-guaranteed bonds and debt of government-related enterprises as a share of GDP for selected OECD countries in 2008 and 2012 (IMF, 2012). That graph is reproduced here as Figure 2.1. It shows the significant growth in those obligations over that period for almost all of the countries reported. In 2012, government-guaranteed bonds reached close to 7 percent of GDP for Denmark and Spain, and exceeded 3 percent of GDP for 8 of the 10 countries shown. The U.S. tops the list at 51.5 percent of GDP for debt of government-related enterprises (because of Fannie Mae and Freddie Mac), while for 10 of the other 13 countries shown such debt represents more than 10 percent of GDP. Details are not reported on the uses of the funds, but the report notes that in some countries the largest shares go to financial institutions including development banks (e.g., Germany) and housing agencies (e.g., Canada and Japan). The IMF also notes that in some countries the amounts are likely to be underestimated given data constraints. The totals also are not comprehensive in that they do not include various contingent liabilities such as those of

[4] That estimate excludes the cost of Fannie Mae and Freddie Mac, deposit and pension insurance, contributions to multilateral financial institutions, and implicit guarantees.

the European Stabilization Mechanism, and national credit programmes, such as for student loans and deposit insurance, appear to be excluded.

Figure 2.1: Outstanding Government-Guaranteed Bonds and Debt of Government-Related Enterprises (Percent of GDP)




Sources: Dealogic; and IMF staff estimates.
Note: In some countries, amounts are likely to be underestimated given data constraints.
[1] Outstanding government-guaranteed bonds correspond to bonds that are issued by private and public banks and financial institutions and carry state guarantees. Short-term debt is not included.
[2] Bonds issued by government-owned or government-related institutions; includes both financial and nonfinancial institutions, subject to data availability. For the United States, includes mortgage-backed securities and other guarantees of government-sponsored enterprises.

Source: Reproduced from IMF 2012 Fiscal Monitor.

Survey information on national direct loan and loan guarantee programmes from 22 OECD countries shows a combined total stock outstanding of $2.5 trillion (Hawkesworth, 2010).[5] Loan guarantees account for $2.3 trillion of the total. Sectors receiving assistance (and their percent of the total) included the financial sector (76%); export (10%); other (8%); non-financial, non-agriculture (3%); and student loans (3%).

OECD members rely on international financial institutions, and particularly multilateral development banks, to provide credit and other financial support to projects in developing countries and regions. Such institutions are chartered by more than one country and hence are subject to international law. Individual countries provide capital by purchasing shares in the institutions. They also provide "callable capital" which commits them to buy additional shares when sufficiently large losses are incurred. In 2012, those institutions collectively had assets totaling more than EUR 1 trillion, as shown in Table 2.1.[6]

| **Table 2.1: Assets of Selected International Financial Institutions, 2012** | **(EUR billions)** |
|---|---|
| African Development Bank[1] | 25 |
| Asian Development Bank[2] | 95 |
| European Bank for Reconstruction and Development | 52 |
| European Investment Bank | 508 |
| Inter-American Development Bank[2] | 71 |
| World Bank Group[2] | |
| International Bank for Reconstruction and Development | 183 |
| International Development Association | 123 |
| International Finance Corporation | 58 |
| Multilateral Investment Guarantee Agency | 1 |
| [1] UA 1 = EUR 1.2<br>[2] USD 1 = EUR .77 | |

[5] Includes Australia, Austria, Canada, Denmark, Finland, Germany, Greece, Hungary, Iceland, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Sweden, Switzerland, Turkey, and the UK.

[6] Assets reported in Euros are converted to dollars at an exchange rate of $1.34/Euro. It is not clear whether the debt backing those assets are included in the IMF calculations of guaranteed debt or debt of government guaranteed enterprises.

The data presented confirms the importance of credit support in OECD countries. It also suggests that credit assistance in most OECD countries is channeled through the financial sector, whereas in the U.S. the assistance is more targeted to specific purposes through government agencies.

## 3. Estimating the Cost of Government Credit Programs

This section briefly lays out the economic rationale for evaluating the cost of government credit programs on a fair-value basis, and contrasts that approach with the practices that OECD governments follow in measuring and reporting credit costs. Most importantly, the differences between the information disclosures by government entities and by publicly traded firms are characterized in a way that clarifies the relation between financial accounting, budgetary accounting, and market prices. That decomposition points to the nature of underreporting under the most common accounting regimes, and suggests how accounting practices could be modified to incorporate more complete cost information.

### 3.1 Rationale for Fair-Value Reporting by Governments

Unlike most ongoing government programs that may be modified by future legislation or administrative policy changes (e.g., unemployment benefits may be changed year to year), the terms agreed to in a credit contract represent a firm legal commitment that binds the government over the life of the contract. Therefore the grant-equivalent measure of cost for a credit contract must represent its lifetime cost—the net present value of the associated cash flows from and to the government. Those cash flows are inherently uncertain, but they can be characterized by a probability distribution of possible outcomes. For a direct loan, when the present value of future cash inflows (from interest payments, fees, and repayments of principal) falls short of the principal loaned out, the difference represents a cost to the government and a subsidy to the recipient. Similarly for a credit guarantee, when the present value of future cash outflows under the contract exceeds the present value of fees and recoveries, then the cost to the government is positive and a subsidy is conferred.

Present value calculations are quite sensitive to the choice of discount rates, and the results can only be meaningfully interpreted if appropriate discount rates are chosen. The discount rates used in the private sector take into account time value—that a dollar received today is worth more than a dollar received in the future. Private sector discount rates also include a risk premium that compensates investors for the risks associated with a particular investment that cannot be easily avoided through diversification. Those priced risks include market risk, and in some cases prepayment risk and liquidity risk[7]. For contingent claims such as credit guarantees, it is often most straightforward to incorporate an appropriate set of discount rates using a derivative-pricing approach, as discussed in Section 5.

Private sector discount rates depend primarily on the risks inherent in a particular investment, not on how it is financed: The value of a bank loan which is financed 90 percent by debt and 10 percent by equity is approximately the same as if it were financed with 50 percent debt and 50 percent equity.[8] Risk is distributed differently between debt and equity holders in the two financing schemes, but the total risk to be shared is the same. Hence the total cost of the risk, reflected in the weighted average cost of capital for the bank loan, is unaffected by how it is financed. This is the logic of the famous Modigliani and Miller (1958) theorem that remains a cornerstone of finance theory.

The risks inherent in government credit activities are similar to those in private credit transactions, but those risks are ultimately are borne by taxpayers and the general public in place of private equity holders. Consider a risky loan funded by the issuance of government debt. If the borrower repays the loan in full then the proceeds can be used to pay back the debt holders, and if there is money left over it can be used to increase other government spending or to reduce taxes. However, if the borrower defaults then the debt will be repaid using new tax revenues or reductions in other government

[7] Market risk is the aggregate economic risk that remains even after investors have diversified their portfolios to the fullest extent possible. Loans and loan guarantees expose the government to market risk because future repayments of loans tend to be lower when the economy is performing poorly and losses are more costly for the government to absorb. Prepayment risk arises when borrowers have the option to prepay a loan before its final maturity date. The prepayment option affects the probability and timing of defaults. Liquidity risk is the risk that market conditions may make it difficult to quickly find a buyer for an asset without large price concessions.

[8] This abstracts from the effects of taxes, financial distress, and other financing frictions, but those various effects push in different directions and their net effects vary, leaving risk as the central consideration that is relevant to the issues discussed here.

spending. Taxpayers and the public are effectively equity-holders (albeit with unlimited liability) in government investments and bear the associated risks.

As we will see, the direct practical consequence of treating taxpayer-supplied equity as free is that countries' budgetary costs are downwardly biased, and the profits reported by government firms in their financial disclosures are upwardly biased. Those biases will be largest for credit activities that involve relatively large exposures to market risk, such as government guarantees to financial institutions, and for government firms that achieve a very low borrowing cost because of public backing.

### 3.2 Current OECD Practices in Budgetary and Financial Reporting for Credit

Myriad approaches and formulas are used by OECD governments and government entities for estimating and reporting credit costs. The problems of incomplete and inconsistent cost measurement are more acute for credit support than for most other types of government spending because credit provision involves uncertain cash flows that often extend out over many years. That complexity, combined with the fact that governments tend to produce credit services in-house rather than purchasing them from financial institutions, creates latitude in how the costs of credit are measured and reported.

Budgetary costs are of particular importance because it is in the budget process that policymakers make tradeoffs between competing spending priorities. Whereas for government financial reporting there has been a move towards common standards across countries and with the private sector, there appears to have been little effort to harmonize budgetary accounting across countries.[9] Nevertheless, for the purpose of understanding the most common budgetary practices and their main strengths and weaknesses, the various accounting approaches can be broadly characterised as: (1) off-budget; (2) cash basis; and (3) accrual basis.

[9] The International Public Accounting Standards Board endorses the use of accrual for budgetary accounting but does not require it: "The Cash Basis IPSAS encourages an entity to voluntarily disclose accrual based information, although its core financial statements will nonetheless be prepared under the cash basis of accounting. An entity in the process of moving from cash accounting to accrual accounting may wish to include particular accrual based disclosures during this process."

*Off-budget.* For an important subset of OECD countries, some or all credit-related costs are omitted from national budgets. Survey data (Hawkesworth, 2010) indicates that for loan guarantees, no budgetary expenditures are reported apart from administrative fees for Canada, UK, Slovak Republic, Australia and Turkey. For direct loans, no expenditures apart from administrative fees appear for Canada, UK, Spain, Germany, Austria, Slovak Republic, Portugal and Turkey.[10] The survey responses also indicate that during the global financial crisis, some countries ignored general procedures due to the extreme circumstances or made adjustments to their standard procedures.[11]

*Cash basis accounting*. Those credit activities that are considered budgetary are most often accounted for by OECD countries on a cash basis. Cash accounting entails reporting the cash flows associated with a direct loan or credit guarantee in the years that they are realised.

Cash-basis accounting for credit has significant and widely recognized weaknesses. It delays recognition of the full cost of credit support until many years after the commitments are made, when cost information is most decision-relevant to policymakers. It distorts comparisons between the subsidies associated with economically equivalent direct loans and loan guarantees. Newly guaranteed loans may actually appear to make money because typically the government receives fees upfront and only bears the costs of defaults years later, often outside of the time horizon covered by the budget. By contrast, direct loans show a large upfront cost when principal is disbursed, even for loans that are likely to be repaid in full. Loans with high expected default rates appear initially to be no more costly to make or guarantee than those extended to the safest borrowers. Furthermore, cash accounting does not recognise the effects of time or risk on the value of cash flows.

A possible response to the shortcomings of cash-basis accounting is to simply not report credit costs in national budgets. However, excluding credit from budgetary accounts creates other problems, including that total government expenditures are underreported and that credit support becomes less

[10] Some countries (e.g., Norway and Denmark) report that no expenditures appear, but seem to contradict that by indicating that subsidy costs and write-offs of bad loans are reported. Presumably this reflects differences across programmes.

[11] The respondents for Denmark and Netherlands said they ignored the rules; those for Hungary, Finland, Mexico, Germany, Turkey, and the UK said they adjusted them.

transparent than other forms of spending. A more satisfactory alternative is to switch to an accrual basis of accounting for credit. When properly implemented, accrual accounting addresses all of the concerns noted above, although it has the disadvantages of somewhat complicating the preparation and interpretation of budgetary estimates.

*Accrual accounting.* Budgetary accruals measure the lifetime cost of new credit support in the year a commitment is made. Accruals are calculated by projecting the future cash flows associated with a loan or guarantee and discounting them to the present. Despite its conceptual advantages over cash accounting, the U.S. is the only major OECD country that appears to have adopted accrual accounting for activities classified as credit programmes. That change, which took effect in 1996, represented a major improvement over the cash basis budgeting that preceded it. However, the implementation has some shortcomings—primarily the use of Treasury rates for discounting--that cause costs to be underreported, and that create inconsistences across the way functionally similar programmes are accounted for.[12]

The picture is brighter for financial reporting. The International Public Sector Accounting Standards Board (IPSASB) has promulgated accounting standards for public entities that are similar to the International Financial Reporting Standards (IFRS) that apply to private sector entities, but that allow specific differences that accommodate features special to public enterprises. Many OECD countries and government institutions have adopted some or all of IPSASB guidelines. Importantly, because it incorporates IFRS rules that require financial institutions to report balance sheet information on a fair-value basis, the IPSASB standards implicitly accept the relevance of market prices to governments. As a result of adopting those standards, government institutions such as multilateral development banks disclose a significant amount of information on their credit exposures and the value of loans and other

[12] The stipulation in the law that U.S. Treasury rates be used for discounting causes those estimates to be a less-than-comprehensive measure of cost. For a few credit-related programs, most notably the Troubled Asset Relief Program enacted to respond to the 2007 financial crisis, the law requires budgeting to be on a fair value basis, which replaces discounting at Treasury rates with discounting at market-based rates. Other major U.S. credit support is classified as insurance and is budgeted for on a cash basis. Legislation has been passed in the House of Representatives that requires fair value accounting for most credit-related programmes (H.R. 3581) but the bill has not been taken up by the Senate.

financial holdings. However, as explained next, financial statement disclosures do not reveal the full cost of the credit support provided, and they were not designed to do so.

### 3.3 Extracting Cost Information: the Role of Budgetary Accounting, Financial Reporting, and Market Prices

An important question is how much can be gleaned about credit support costs from budgetary reports and financial statements, and how that information differs from what is available for publicly traded firms? The answer is shown here to depend on the budgetary accounting rules for credit support. Only when budgetary accounting is on a fair-value basis is the information provided equivalent to what is available for publicly traded firms.

It is useful to begin with a reminder of the different functions of government budgetary reports and financial statements. Budgets record a government's annual expenditures and receipts, primarily on a cash basis. Budgets are used to set spending priorities, and budgetary totals feed into the calculation of a country's official deficit.

Financial statements are designed to give a picture of the operations and overall financial health of a public or private sector enterprise. They also provide commentary on an enterprise's risk exposures. Financial statements include a balance sheet, which shows assets and liabilities; an income statement, which recognizes various categories of revenues and expenses generally using accrual concepts; and a statement of cash flows, which tracks actual cash flows associated with different categories of receipts and payments.

Financial statements only provide partial information about the cost of capital: they treat interest payments on borrowed funds as an expense, but make no mention of the required return to equity capital. Instead, the difference between revenues and expenses is reported as earnings, which is an indication of the value accruing to equity holders. A government enterprise is generally referred to as "profitable" if those earnings are positive, even if they are insufficient to provide a fair rate of return on equity. Put

differently, “economic profits” are only considered positive if returns exceed the weighted average cost of capital, whereas accounting profits are positive if returns exceed the cost of debt financing.

For a publicly traded firm, the fact that accounting profits exclude a return on equity is less consequential because of the availability of stock price information. Stock prices reveal whether the market views a firm’s earnings as providing a fair rate of return to equity; when earnings fall short stock prices decline, and conversely when earnings exceed the required return. For that reason, a firm announcing a positive accounting profit may nevertheless see its stock price drop.

For national governments, budgetary cost estimates are the closest substitute for the information in stock price changes. Ideally, the budgetary cost of a programme represents the value of public resources committed to it. For grants and transfers, cash accounting achieves that objective. For credit support, budgetary accounting only represents the value of public resources committed—and stands in for the information in stock price changes for private firms--when it is carried out on a fair-value accrual basis. Because that is generally not the case, policymakers lack the cost information that is available to their private sector counterparts.

For a government firm or international financial institution, the information in its financial statements is more salient to its decision-making than the budgetary information about it that is reported by national governments. For those enterprises, even when financial reporting is on par with the best private sector practices and it includes a fair-value balance sheet, the full cost of credit activities is not likely to be recognized because of reliance on the accounting definition of profitability.

This line of reasoning suggests two main conclusions. Firstly, if governments were to report the budgetary costs of credit support on a fair-value basis, then the combination of financial reporting and budget estimates would provide information that at least in principle is similar to the information available to investors in publicly traded firms through financial reports and stock prices. The second is that for government firms and international financial institutions, even when financial reports conform to IFRS guidelines, the cost of capital is generally not measured or reported, and there is often a misplaced emphasis on accounting profitability that is likely to have real effects.

## 4. Quantifying Fair-Value Costs

To demonstrate some of the approaches that can be used to evaluate the fair-value cost of government credit support, and to compare the resulting cost estimates with the cost information disclosed under current budgetary and financial accounting regimes, three examples are analyzed: (1) the European Bank for Reconstruction and Development (EBRD); (2) the U.S. Tennessee Valley Authority (TVA); and (3) the European Financial Stability Facility (EFSF) and the successor European Stabilization Mechanism (ESM).

Those examples were chosen with several considerations in mind. A substantial amount of credit assistance from OECD governments is channeled through international financial institutions such the EBRD, as shown in Section 2. The EBRD's structure, activities and financial disclosures are typical of those types of institutions, and the results are therefore suggestive of the costs for other development banks. With regard to TVA, although quite a bit has been written on the fair-value costs of U.S. government credit programmes, much less attention has been paid to the cost of credit support delivered through non-financial government firms. TVA serves as an example of how large credit subsidies are conveyed through government firms in the U.S. and elsewhere, and how those costs are obscured by current budgetary and financial reporting practices. The EFSF and ESM were chosen because of the size and importance of those facilities and because costs estimates do not appear to have been previously attempted. That analysis also illustrates the greater challenges involved in estimating the cost of open-ended contingent guarantee programmes.

### 4.1 European Bank for Reconstruction and Development

The EBRD is an international financial institution that was established in 1991 to provide financial support for projects that "foster innovation and build sustainable and open market economies

from central Europe to central Asia and in the southern and eastern Mediterranean."[13] It supports such projects with loans, equity investments, and guarantees. It also holds a portfolio of safe assets for liquidity, and it uses derivatives to hedge against interest rate and currency risk. Assets totaled EUR51 billion in 2012, of which EUR18.8 billion were loan investments in its banking portfolio.

The capital structure of the EBRD is similar to that of other large international financial institutions. The bank relies on mandatory equity contributions and so-called "callable capital" from its members to obtain low borrowing costs on the debt issued. Callable capital represents firm commitments from members to purchase additional shares up to an agreed upon maximum, should capital infusions become necessary.

The EBRD is owned by 64 countries, the European Union and the European Investment Bank. A member's equity stake consists of its paid-in capital plus cumulative returns, which may be negative. Table 5.1 shows the 2012 capital subscription (the sum of paid-in and callable capital) of the top 12 equity holders, which collectively accounted for about 70 percent of total subscriptions. The ratio of members' paid-in capital, reserves and surpluses; to its outstanding loans, share investments and guarantees; is required to be above 50 percent. Under the callable capital arrangement, members are obligated to increase their equity stakes if required by the Bank's Board of Governors. Effectively, equity holders provide the EBRD with a free call option. The callable capital creates a substantial cushion for its debt against default. Because of those protections, the EBRD is able to issue debt in international capital markets that has consistently carried an AAA rating.

Capital calls are infrequent, but they do occur. For example, the EBRD Board authorized a capital call in 2010 to comply with its statutory capital requirement. It increased paid-in shares immediately by EUR1 billion and increased authorized callable capital shares by EUR9 billion. There are provisions in the law for redeeming callable shares in the future if the bank has sufficient capital, but it appears that equity purchases are essentially non-refundable cash expenditures by member countries.

[13] EBRD Annual Report, 2012.

Table 4.1: Top Capital Contributors to the EBRD

| **EBRD Top Capital Contributors** | **Capital subscription (000 Euros)** |
|---|---|
| United States of America | 3,001,480 |
| France | 2,556,510 |
| Germany | 2,556,510 |
| Italy | 2,556,510 |
| Japan | 2,556,510 |
| United Kingdom | 2,556,510 |
| Russian Federation | 1,200,580 |
| Canada | 1,020,490 |
| Spain | 1,020,490 |
| European Investment Bank | 900,440 |
| European Union | 900,440 |

4.1.1 Financial Reporting

In reporting its financial results, the EBRD generally follows IPSASB guidelines. Consequently, the EBRD's reporting is quite informative about the value of its assets and liabilities, which it reports at fair value as well as book value. Not surprisingly, the return on equity is considerably more volatile when reported on a fair-value basis, as shown in Table 4.2. The EBRD also enumerates its various risk exposures, and provides data that could inform a quantitative estimate of that exposure. For example, the Bank reports the distribution of investments by credit risk category, by country and by industry.

As is standard in government and private sector financial reporting, the only component of capital costs that is recognized in the EBRD's income statement is its interest costs. Those interest costs are much below the full cost of capital for the bank, which includes a fair return on equity and the annualized cost of callable capital. Put differently, the EBRD is reported to be profitable on an accounting basis in any year where the return on equity is positive, whereas it is only profitable on an economic basis if the average return on equity and callable capital exceeds a fair rate of return.

| Table 4.2: Returns to members' equity, fair value vs. book value | | | | | |
|---|---|---|---|---|---|
| | 2012 | 2011 | 2010 | 2009 | 2008 |
| Return on members' equity--IFRS basis | 8% | 0% | 12% | -2% | -15% |
| Return on members' equity--Realised basis | 7% | 5% | 8% | 2% | 3% |
| Source: EBRD Financial Report 2012 | | | | | |

4.1.2 Fair value vs. Reported Cost of Capital

A straightforward way to estimate the fair-value cost of capital for the EBRD is to identify the cost of capital for private sector firms in a similar line of business. The calculation of the weighted average cost of capital here relies on the Capital Asset Pricing Model (CAPM) and a typical asset beta for the banking industry. The EBRD's activities are clearly similar to those of private financial institutions, albeit with more credit risk than taken by a typical bank. To the extent that the additional risk is largely idiosyncratic (e.g., arising from economic shocks to small countries), it would not affect the asset beta or the cost of capital.

The components of the weighted average cost of capital calculation for the EBRD in 2012 are summarized in Table 4.3. The asset beta is set to 0.3, based on global data on banks over the last five years provided by Professor Damoradan.[14] The market risk premium (the difference between the short-term risk free rate and the required return on the stock market) is set to 6.5 percent, consistent with historical returns data. The 3-month government borrowing rate, which represents the risk-free rate, is set to .0003. Together, those assumptions imply a required return on assets is .0003 + .3(.065) =1.98 percent. Multiplying the required return on assets by the value of bank assets implies a cost of capital for the year of (.0198)(EUR 52 billion) = EUR 1.03 billion.

The total annual financing cost implied by this calculation is about three times the cost of debt financing that appears in the EBRD's income statement. In its 2012 Annual Financing Report, the EBRD shows borrowing costs inclusive of hedging expenses of 0.90 percent on its debt of EUR 37.1 billion,

[14] The asset beta is based on returns data on 568 banks globally, as reported by Damodaran. http://pages.stern.nyu.edu/~adamodar/

which implies a borrowing cost of EUR 331 million. The difference—EUR 699 million (EUR 1030 million – EUR 331 million) is the unreported capital cost for 2012. The corresponding unreported capital cost for 2011 is EUR 716 million.

| Table 4.3: Calculating the Weighted Average Cost of Capital for the EBRD | | |
|---|---|---|
| | 2012 | 2011 |
| Interest Expenses | 155 | 145 |
| Hedging Expenses | 176 | 118 |
| Assets (Fair value, EUR millions) | 52,015 | 46,622 |
| Total Debt (Fair value, EUR millions) | 37,106 | 33,724 |
| Borrowing cost (interest plus hedging) | 0.89% | 0.78% |
| Risk Free Rate (3-month t-bill) | 0.03% | 0.15% |
| Market risk premium | 6.50% | 6.50% |
| Asset Beta | .3 | .3 |
| Required Return on Assets | 1.98% | 2.1% |
| Unrecognized capital subsidy | 699 | 716 |
| All euro amounts are in millions | | |

4.1.3 The Value of Callable Capital

The unrecognized capital costs reported in Table 4.3 include the annualized value of the callable capital. However, to understand the fair-value cost to a government of entering into a new or incremental callable capital arrangement that will remain in force indefinitely, it is useful to be able to estimate the lifetime cost of the commitment. The estimates presented here can be interpreted as fair-value accruals, and the approach used to calculate them could be used for budgeting for the cost of new callable capital commitments (in lieu of the current off-budget treatment that represents them as costless).

The cost of callable capital for the EBRD is estimated using a derivatives-pricing approach that builds on Lucas and McDonald (2006, 2010), modified to replace bankruptcy events with periodic and stochastic draws on member capital. The cost has the interpretation of being the present value of future capital infusions associated with capital calls. The model builds on the basic insights in Merton (1976, 1977), and on the extensions of Crosbie and Bohn (2003) to a more complex capital structure. The basic

idea is that adverse shocks may cause asset values to fall below a threshold that causes a capital call to restore target equity ratios and thereby protect debt holders from losses. The call exposes governments to significant market risk, and its value reflects that it is most likely to be exercised when the economy is weak and the cost of capital is high. The model is dynamic, and incorporates that over time the EBRD will tend to adjust its asset mix to achieve its target risky asset-to-equity ratio, but that those adjustments are gradual and only partially offset exogenous shocks to asset values. Appendix I describes the model and its parameterization in more detail.

The model is calibrated using EBRD financial data for 2012. Asset volatility, which is not directly observable, is a critical parameter in the calculation of guarantee value. For publicly traded firms, asset volatility can be inferred from market data using a derivatives pricing approach, but for government firms that data is not available. For the EBRD, the annual standard deviation of asset values used in the guarantee cost calculation is .075, which is based on the standard deviation of the reported fair-value equity of .104 from Table 4.2, and an assumed standard deviation for debt values of .03, weighted by the 2012 proportions of debt and equity. Setting asset volatility to .075 may be conservative; Damodaran reports volatility of bank assets of 29 percent. .

Another important but unobservable parameter is the liability-to-equity threshold that determines the timing of capital calls. The threshold rule is based on the requirement that equity be maintained at a level of at least 50 percent of risky assets. However, it is restated in terms of a maximum liability-to-equity ratio that triggers a call.[15] The distribution of the size of the equity infusions when capital is called depends on multiple parameters, but most importantly on asset volatility; the level that the liability-to-equity ratio is returned to when new capital is added; and how often the threshold condition is checked. In the base case, the equity is restored to 45 percent of liabilities, which is typical for that ratio for the EBRD

[15] The model tracks the market value of risky assets, not their book value. Stating the capital call trigger in terms of a maximum market asset to equity ratio can create the perverse situation where an increase in the value of risky assets triggers a capital call. That problem is avoided by using a book liability ratio to express the trigger and target ratios.

over the last five years. Risky asset values are shocked monthly, but threshold condition is checked only quarterly.

Under the base case parameterization, the cost of total callable capital over a 20-year horizon is EUR 7.2 billion, and the annual probability of a call is 6 percent. As is generally the case, the cost of the option is considerably less than the amount of callable capital outstanding (which stands at EUR 23.4 billion), but nevertheless significant. The estimate is sensitive to the various modeling assumptions and in particular to the assumed volatility of assets. For example, if average asset volatility is lowered to 3.75% then the cost falls to EUR 2.7 billion and the annual probability of a call is 1.4%; and if volatility is increased to 10 percent then the cost rises to EUR 11.8 billion and the annual call probability is 9.7%. More generally, the calculation underscores why omitting the cost of contingent credit liabilities from budgetary totals can significantly understate government expenditures.

### 4.2 Tennessee Valley Authority

TVA, the largest wholesale supplier of electricity in the United States, is wholly owned by the federal government. Its assets, which include coal-fired, nuclear and hydroelectric generators and an extensive transmission system, have a reported book value of $47.3 billion in 2012.[16]

TVA funds its assets primarily through long-term debt issues to investors and also from earnings. Under the 1959 TVA Self-Financing Act, TVA is one of the few federal agencies in the U.S. that issues debt in its own name rather than through the U.S. Treasury. Its debt is subject to a cap, currently of $30 billion. Despite a history of losses that have repeatedly threatened its solvency, its debt has maintained a rating of AAA and its borrowing costs have historically exceeded comparable maturity Treasury bonds by only about 40 basis points. As emphasized by Logue and MacAvoy (2003), the low borrowing cost reflects the implicit guarantee from the U.S. government on its debt obligations.[17] Similarly to other

[16] TVA reports under GAAP, and is not required to report on the fair value of its operating assets.
[17] See Logue and MacAvoy (2003) for a more complete description of the history and operations of TVA.

government firms, TVA does not recognize in its financial statements any cost of the implicit guarantee provided by taxpayers.[18]

We estimate the market value of the annual subsidy associated with the implicit debt guarantee using a weighted average cost of capital approach, similarly as for the EBRD. The required return that investors would demand on TVA's assets is based on the CAPM and the asset beta for electrical utilities. Following Logue and MacAvoy, the asset beta is taken to be 0.6. The market risk premium is fixed at 6.5 percent. The 3-month T-bill rate represents the risk-free rate. For example, the required return on assets is estimated to be 3.93 percent: .0003 + .6(.065) for 2012. Applying that to the book value of assets (and hence approximating the market value of assets by the reported book value), a fair return to TVA's investors debt and equity holders collectively would be (.0393)($47,334 million) = $1.860 billion. TVA reports a borrowing cost of 5.08 percent on debt of $25,078, for a total capital cost of $1.274 billion. The difference between the fair return to all investors and the borrowing costs is the unreported capital cost: $587 million in 2012. Table 5.4 shows the result of that calculation for the years 2008 to 2012. Over that period, the understatement of capital costs totaled about $3 billion.

The understatement of capital costs in TVA's financial statements has been mitigated in recent years by the interaction of two factors: the long average maturity of about 17 years for TVA debt; and interest rates on average have declined over the last two decades. To abstract from those effects, Table 5.4 also shows what the understatement of capital costs would have been had TVA borrowed anew each year at the prevailing AAA bond rate.[19] Under that counterfactual, the understatement of capital costs over the 2008 to 2012 period would have been $4.38 billion.

[18] The implicit guarantee on its debt is one of several types of direct and indirect government subsidies TVA receives. The company does not pay corporate taxes on earnings, nor does it pay local or state property taxes. It does make payments equal to 5 percent of revenues in lieu of taxes to the counties and states which house the system, but on net it receives a tax subsidy. TVA is restricted to operating within its service area, where it has a legislatively enforced monopoly. Its pension fund, which was underfunded by $4.9 billion in 2012, also is thought to have an implicit government guarantee.

[19] The AAA bond rate is based on the 20-year constant maturity Treasury rate plus 50 basis points.

| Table 4.4: Unrecognized Capital Cost Subsidies to TVA | | | | | |
|---|---|---|---|---|---|
| | 2012 | 2011 | 2010 | 2009 | 2008 |
| Interest Expenses | $1,273 | $1,305 | $1,294 | $1,272 | $1,376 |
| Book Assets | $47,334 | $46,393 | $42,753 | $40,017 | $37,137 |
| Total Debt | $25,078 | $24,431 | $23,424 | $22,640 | $22,619 |
| Borrowing cost | 5.08% | 5.34% | 5.52% | 5.62% | 6.08% |
| Risk Free Rate (3 month t-bill) | 0.03% | 0.15% | 0.06% | 0.13% | 2.75% |
| 20-year Constant Maturity Treasury +50bps | 3.20% | 4.78% | 5.00% | 3.96% | 4.85% |
| Market risk premium | 6.50% | 6.50% | 6.50% | 6.50% | 6.50% |
| Asset Beta | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Required Return on Assets | 3.9300% | 4.0500% | 3.9600% | 4.0300% | 6.6500% |
| Unrecognized capital subsidy at historical interest rates | **$587** | **$574** | **$399** | **$341** | **$1,094** |
| Unrecognized capital subsidy at current interest rates | **$1,058** | **$711** | **$522** | **$716** | **$1,373** |
| All dollar amounts are in millions | | | | | |

The understatement of capital costs is effectively invisible to TVA's managers and policymakers. TVA is accounted for by U.S. budgetary agencies on a cash basis, which does not discriminate between revenues, expenses and capital expenditures, and which excludes capital charges except to the extent that interest payments reduce revenues. Specifically, the effect of TVA on the reported surplus is the difference between revenues (e.g., from electricity sales), and operating expenses plus capital expenditures. Statements in TVA's 2013 Budget Proposal support the contention that TVA's management does not perceive the implicit guarantee on TVA's debt as a cost: "TVA has not received federal government appropriations since 1999. Additionally, TVA makes annual returns to the U.S. Treasury on the government's original $1.4 billion appropriated investments in the power program. Through fiscal year FY 2014, TVA expects to have paid approximately $3.7 billion, principal and interest, to the U.S. Treasury."

The understatement of TVA's cost of capital in its accounting statements and the omission of a capital charge in the federal budget almost certainly has real effects on regional electrical consumption

and on TVA's investment policies. Under the TVA Act of 1933, the company is required to deliver a reliable supply of power (and a variety of other public services such as flood control) at the lowest possible rates to consumers. Because rates are set with the goal of recovering costs, the definition of costs affects electrical rates and hence the demand for electricity. The subsidized borrowing rate in itself reduces perceived costs and hence utility rates, which increases demand relative to its economically efficient level. To the extent that different power generating technologies embody different amounts of market risk, the focus on its borrowing rate as its cost of capital distorts choices between alternative types of generating capacity.

### 4.3 European Financial Stability Facility and European Stability Mechanism

The EFSF was created in May 2010 in response to the Eurozone crisis. It was structured as a temporary rescue mechanism with the mandate of safeguarding financial stability in Europe by providing financial assistance to euro area Member States. In October 2010, it was decided to create a permanent rescue mechanism, the ESM. The ESM has the same membership, mission and structure as the EFSF. Going forward, any new assistance will be funded and managed by the ESM. However, the EFSF will continue to administer and fund ongoing programmes for Greece, Portugal and Ireland. For the purposes of this analysis, they are effectively a consolidated enterprise (and referred to as EFSF/ESM).

The EFSF/ESM has the authority to issue bonds or other debt instruments on the capital markets. Member capital and callable capital allow it to maintain a high credit rating (currently AA+) and hence to borrow at favorable interest rates.[20] Paid-in capital is invested in low-risk and liquid securities to serve as a buffer for losses. New debt is issued to make loans to member countries experiencing or threatened by severe financing problems and agreeing to the conditions set. The funds may also be used to purchase bond in the primary or secondary bond markets, to fund precautionary assistance in the form of a credit line, and to finance recapitalisations of financial institutions through loans to governments.

[20] The bonds are also eligible for purchase by the ECB.

Financial information on the EFSF/ESM is available from the ESM's 2012 Annual Report and the websites of both organizations. To date, the bulk of assistance has gone to Greece, Portugal and Ireland. For those countries, Table 4.5 summarizes the disbursed amounts (which total EUR 168 billion) and remaining amounts authorized (which total EUR 188 billion) as of July 2013. The ESM has also provided financial assistance to Spain for the recapitalisation of its financial sector, and is providing funding to Cyprus.

Table 4.5: EFSF Amounts Disbursed and Available

| | Already disbursed | Remaining amount available | Max. total |
|---|---|---|---|
| Ireland | **14.4** | **3.3** | **17.7** |
| Portugal | **21.1** | **4.9** | **26** |
| Greece | **133.04** | **10.66** | **144.6** |

In € billion

A measure of the maximum prospective exposure of ESM members under current agreements is remaining subscribed capital available to be called, which stands at EUR 620 billion. (However, the rules allow for increasing that amount if certain conditions are met.[21]) To date, EUR 80 billion has been paid in. The largest top 5 subscriptions account for 83 percent of the total in each category.[22]

The prospective fair-value cost to EFSF/ESM members is measured here as the present value of expected future capital calls over a horizon of 20 years, as was done for the EBRD earlier.[23] The calculations employ a derivatives-pricing approach, implemented with a modified version of the EBRD model. However, estimating cost for the EFSF/ESM is more challenging and there is more uncertainty associated with the estimates. Unlike a development bank, most of the claims on the EFSF/ESM are

[21] It takes unanimous agreement among members for certain major changes including making capital calls. However, there is an emergency voting procedure that brings the required share-weighted approval rate down to 85% if the EC or ECB think there is an event that would threaten the economic and financial stability of the euro area.

[22] The largest subscribers are: Germany EUR 190 billion; France EUR 142 billion; Italy EUR 125 billion, Spain EUR 83 billion; and Netherlands EUR 40 billion.

[23] Related analysis (CBO, 2010, and Veronesi and Zingales, 2010), examine the cost of facilities created by the U.S. government to respond to the 2007 financial crisis.

contingent on the future state of the economy and financial markets. Hence, the growth rate of the ESM's future assets and liabilities is expected to be highly variable, and the balance sheet could expand enormously in the course of a year or two if a major crisis were to develop. The amount of new assistance forthcoming not only depends on financial market developments, but also on policy decisions of the EFSF/ESM in terms of whom to assist and in what amounts. In most years there will be little new activity because episodes of the sort the EFSF/ESM is designed to protect against are rare. Crises are likely to occur when the world economy is weak and the cost of capital is relatively high, and clearly the activities entail considerable undiversifiable risk, but the fair value cost of risk during a crisis is hard to determine.[24] Furthermore, the EFSF/ESM's loans outstanding are much less diversified than that of a typical development bank, and may experience discontinuous losses in value when borrowers experience new difficulties. Unlike for smaller government firms, general equilibrium effects also must be taken into account, at least informally. Importantly, the presence of the ESM may reduce the likelihood of future financial distress relative to the past. To the extent possible, effect of the policy on the probabilities of future events and losses should be reflected in the choice of model parameters.

Despite those complicating factors, it is informative to model the prospective cost of the programme and to consider the implied costs over a range of parameterizations. A relatively simple approach is taken here that is intended to illustrate the range of possible costs rather than a definitive estimate. The model could be expanded to incorporate more information about the size of exposures of individual members, differences in the probabilities of requiring assistance, and a more explicit correlation structure between them, but that is left to future research.

To adapt the EBRD model for the EFSF/ESM, stochastic jump processes are incorporated that govern the probability and severity of upward jumps in the size of the balance sheet, and downward jumps to existing risky asset values. Consistent with ESM's policies, balance sheet growth caused by the jumps is financed with additional debt issuance. Capital calls are triggered when the ratio of liabilities-to-equity falls below a threshold level. That ratio may fall either because of balance sheet growth financed

[24] In this analysis no risk premium is attributed to jump risk, which imparts a conservative bias to the cost estimates.

with debt issues, or because of a drop in the value of existing assets. Capital infusions are invested in safe assets, and enough capital is called to restore the target liability-to equity ratio. The model and its parameterization are described more fully in Appendix 2.

Table 4.6 reports the cost estimates for a variety of parameterizations that illustrate the effects of the main cost drivers. Each row show the effects on cost of changing one parameter at a time, holding all other parameters at their base case values, which are listed in Appendix Table A2.1. The assumed frequency and severity of a crisis has the largest effect on predicted cost, whereas the estimates are relatively insensitive to the parameters driving portfolio risk during non-crisis periods. That is to be expected; the target amount of equity capital to risky loans already acquired is high and the risk of needing equity beyond what has already been paid in to absorb losses is low. However, new crises are likely to trigger the need for large capital infusions when they occur.

The sensitivity analysis suggests that the cost of current callable capital commitments is likely to be in the range of 20 to 80 billion euros, depended on the assessed probability and severity of future crises. By contrast, in its financial statements (which consolidate the finances of the EFSF and the ESM), the ESM shows a modest loss of EUR 498 million, none of which is related to prospective outcomes or loan performance. The budgetary treatment of paid-in and callable capital by member countries has not been verified, but it is probable that callable capital is off-budget and hence effectively is treated as having no cost. Of course the benefits of having a safety net in place may far outweigh the costs, but that can only be determined when information about cost is made available.

The EFSF/ESM's philosophy about cost recovery is prominently stated in its Annual Report: "The ESM does not aim to generate profit on financial support granted to beneficiary member states." In keeping with that policy, and with the standard practice of government institutions of treating taxpayer equity capital as costless, the ESM charges interest on the risky loans that it makes that effectively pass through its own borrowing costs plus a small spread to cover administrative expenses. A 200 bps penalty rate is imposed on delinquent loans. In general the EFSF/ESM's financial reporting is much less revealing

than that of a typical multilateral development bank. The EFSF/ESM did not adopt IPSASB guidelines, and notably, it omits a fair value balance sheet from its financial statements.

Table 4.6: Prospective Cost and Call Probability for EFSF/ESM Callable Capital
Sensitivity to Key Parameters
(EUR billions)

| | | | | |
|---|---|---|---|---|
| Annual crisis probability | 0 | .03 | .06 | .09 |
| Cost | 1 | 13 | 36 | 71 |
| Annual call probability | 0.0% | 1.3% | 3.1% | 5.3% |
| | | | | |
| Risky asset multiplier in crisis | 1.25x | 1.5x | 1.75x | 2x |
| Cost | 8 | 36 | 80 | 139 |
| Annual call probability | 1.0% | 3.1% | 4.4% | 5.3% |
| | | | | |
| Asset jump frequency, annual, no crisis | 0 | .05 | .1 | .2 |
| Cost | 35 | 36 | 36 | 37 |
| Annual call probability | 2.9% | 3.0% | 3.1% | 3.2% |
| | | | | |
| Risky asset volatility (non-jump component), annual | .05 | .1 | .15 | .2 |
| Cost | 35 | 35 | 36 | 37 |
| Annual call probability | 2.7% | 2.8% | 3.1% | 3.4% |
| | | | | |
| Trigger liabilities-to-assets (relative to target ratio) | 1.05x | 1.1x | 1.2x | 1.3x |
| Cost | 39 | 38 | 36 | 34 |
| Annual call probability | 6.4% | 4.5% | 3.1% | 2.4% |

Note: Each row varies only the listed parameter from its base case value.

4.4 Discussion: Would Fuller Recognition of Capital Costs Improve Incentives for Public Managers?

A switch to evaluating the profitability of government firms net of its weighted average cost of capital (rather than net of borrowing cost) would be akin to the practice in the private sector of using an "economic value added" or EVA approach to evaluating managerial performance. EVA was popularized in the 1990s as a way to better align managers' incentives for investment choices with stockholder interests. Rogerson (1997) demonstrates the theoretical potential for improvement; he shows that in a variety of settings with asymmetric information between principals and managers, incentive contrasts based on EVA can elicit first best behavior by managers.

Evidence on the effects of EVA adoption by private sector firms suggests that decision-making in the public sector might be improved by a fuller recognition of the cost of capital. For example, Holger et.

al. (2013) find that the seriousness with which firms rely on EVA principles varies, but that serious adopters exhibit superior performance. The incentives facing public and private sector managers clearly would remain different, particularly because government pay is more weakly tied to performance than in private firms. Nevertheless, one would expect that if managers received more accurate signals from accounting data about firm profitability, project choices at least on the margin would be improved.

## 5. Conclusions and areas for further research

Budgetary cost estimates and financial statement data comprise the price system facing policymakers. This paper makes the case for the importance of providing the most accurate available price signals about the costs of credit support, and for using fair value cost estimates to do so, particularly for budgeting purposes. A look at the accounting policies of OECD governments reveals the wide gap between that recommendation and current practice: For many types of credit support little or no cost information is provided, and reported costs are systematically and often significantly understated.

Analyses of the EFSF/ESM, EBRD and TVA illustrate the magnitude of the disparities between fair value estimates and the costs currently reported by governments. These examples also demonstrate the feasibility of developing fair value estimates even for relatively complex credit support arrangements. However, the analyses presented here are not intended to be the final word on the costs of any of these programmes, and it is possible that other approaches or assumptions could improve the estimates. What is important is that while there is significant uncertainty around any of the point estimates or ranges, there is no reason to suspect a systematic upward or downward bias in the estimates. Furthermore, the exercise of model-building is useful in identifying costs and risks that might be otherwise overlooked.

The most striking results are for the EFSF/ESM, where the cost of the outstanding amount of subscribed callable capital to member countries is estimated to be in the range of 20 and 80 billion euros (depending on one's assessment of the likelihood and severity of future crises), but for which no cost is reported by the EFSF/ESM or by member countries in their budgets. The cost of subscribed callable capital for the EBRD is similarly absent from government reports, but it is estimated here to be about $7

billion on a fair value basis. A calculation of EBRD's capital costs on an annual basis shows a fair value financing cost that is about three times the cost of debt financing that appears in the EBRD's income statement. For TVA, the cost of capital for 2012, inclusive of the implicit government guarantee of its debt, is estimated to be $587 million more than the borrowing costs that appear in its income statement.

The analysis suggests several fruitful directions for future research. A foundational project would be to compile a comprehensive inventory of credit support for all OECD countries and international financial institutions, along with the rules governing their budgetary and accounting treatments.[25] Relatedly, subnational government credit support activities and account procedures, e.g., credit extension by state and local governments, could be systematically investigated. Compiling that information in one place and on a consistent basis would shed light on the total amounts of credit support and the exposures of different governments. It would also lay the groundwork for other researchers and policy analysts to undertake more detailed analyses of the costs and risks of government credit support, including the development of new valuation models for the many large and complex contingent claims on governments.

[25] A first step would be to define the scope of what constitutes credit support, for instance, whether or not to count the implicit guarantees that are widely expected to be honored but that do not have legal standing. Challenges would include defining categories of credit that cut across the classifications used by different governments, and representing the size of the obligations in a way that is most comparable across types of support.

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Appendix 1
Modeling the Cost of Callable Capital for the EBRD

The cost of callable capital for the EBRD is estimating using a derivatives pricing model, implemented using Monte Carlo simulation. This Appendix describes the logic and main equations behind the model, and lists the base case parameters. The code, which is in VBA, is available upon request.

A risk-neutral version of the model is used for valuation, and a corresponding set of equations with actual expected returns and therefore actual probabilities is used to calculate the physical probability of default. (Only the equations for the risk-neutral representation are shown here.) The EBRD's assets are divided into safe and risky assets. The time evolution of the risky assets follows a log-normal process:

$$(A1.1) \quad A_{t+h} = A_t Exp\left[(r_f - .5\sigma_A^2)h + \sigma_{A,t}\varepsilon\sqrt{h}\right]$$

where $h$ is the time step, which is set to one month, $t$ subscripts represent time, $r_f$ is the risk-free rate, $\sigma_{A,}$ is the volatility of risky assets, and $\varepsilon$ is a draw from a standard normal distribution. The corresponding actual evolution of risky assets follows the same process, but with their expected return (as derived earlier) in place of $r_f$.

The risk-neutral evolution of the safe assets held for liquidity is deterministic:

$$(A1.2) \quad B_{t+h} = B_t Exp\left[r_f h\right]$$

The corresponding actual process is also deterministic but assumes a 50 bps higher return on the assets. Notice that no dividends are paid to equity holders; returns are assumed to be reinvested in the bank. Therefore in the model, actual bank assets grow on average over time at the expected rate of return on investments. An assumption of faster or slower growth would affect the cost estimates.

To capture the rebalancing between risky and liquid asset that occurs over time as loans mature or liquid securities are sold and replaced by new investments, the model incorporates a periodic partial adjustment towards the target risky asset-to-equity ratio. The adjustment rate is assumed to be

asymmetric, with desired increases in risky asset holdings occurring more rapidly than desired decreases in risky asset holdings. Adjustments occur quarterly. Upward adjustments move 50% of the way to the target ratio over the course of a year, whereas downward adjustments move only 3%. Allowing adjustment maintains a more stable ratio of risky assets-to-equity than if no adjustments were assumed. A faster speed of downward adjustment lowers the cost of callable capital, whereas a faster speed of upward adjustment increases the cost. The cost estimates are similar to what is reported in the base case for modest changes to the assumed adjustment speeds.

Debt liabilities, *L*, are also assumed to increase deterministically at a rate equal to the interest rate paid on them (with the same 50 bps difference between the risk-neutral and actual processes):

(A1.3) $L_{t+h} = L_t Exp\left[r_f h\right]$

The rate on the debt is the same as on the liquid assets held, making an increase in liquid asset holdings equivalent to an equal value decrease in debt. The specification implies that interest paid out is financed by additional debt issues, so that debt outstanding grows over time. Equity is then calculated as the difference between assets and liabilities:

(A1.4) $E_t = A_t + B_t - L_t$

Capital is called when the ratio of liabilities-to-equity, $L_t/E_t$, exceeds the trigger, which is based on interpreting the statutory requirement that equity be maintained at a level of at least 50 percent of (book) banking assets as corresponding most closely in the model to a relation between liabilities and equity. The condition for whether the trigger is tripped is checked quarterly. When capital is called, it is in an amount that restores the target liability-to equity ratio. The new capital is assumed to be initially invested entirely in risk-free liquid assets.

Along each Monte Carlo path, the amount and timing of each capital call is recorded, and the payments are discounted to time 0 using the risk-free rate in the risk-neutral representation to give the cost of the guarantees over the number of years specified. The call probabilities are based on the results of

applying the same shocks to the evolution of actual risky assets. Table A1.1 lists the main parameter values used in the base case calculations.

| Table A1.1: Parameters for EBRD Callable Capital Model | |
|---|---|
| Name | Base Case Value |
| Number Monte Carlo runs | 10,000 |
| Time horizon | 20 years |
| Risk-free rate (annual) | .003 |
| Return on liquid assets and liabilities (annual) | .0078 |
| Expected return on risky assets (annual) | .0198 |
| Initial liquid assets (EUR millions) | 26,528 |
| Initial risky assets (EUR millions) | 25,487 |
| Initial liabilities (EUR millions) | 37,106 |
| Volatility risky assets | .15 |
| Liability-to-equity target | 2.91/1 |
| Liability-to-equity trigger | 2.24/1 |
| Adjustment rate to target when L/E > target | .03 |
| Adjustment rate to target when L/E < target | .5 |

Appendix 2
Modeling the Cost of Callable Capital for the EFSF/ESM

Estimates of the cost of callable capital are derived using a variant on the model for the EBRD. Apart from a recalibration and rule changes that reflect policy differences, the main technical change is the incorporation of two jump processes. The first process represents the occurrence of a crisis (i.e., an event that triggers the purchase of additional assets) in the Eurozone, and the second allows for a discrete downward jump in the value of existing balance sheet loans. The probability of a downward jump in the value of existing assets is assumed to increase during a crisis. The occurrence of a crisis causes the purchase of additional risky assets, and an equal increase in debt liabilities. Existing loans amortize over time, but there is no rebalancing between risky and risk-free assets.

Under a risk-neutral representation in discrete time, risky assets on balance sheet evolve according to:

$$A_{t+h} = (1 + I_{J,t}\omega_t)A_t Exp\left[(r_f - p_j\omega_t - .5\sigma_A^2)h + \sigma_{A,t}\varepsilon\sqrt{h}\right] - A_t\alpha + I_{C,t}\Delta A_t \quad \text{(A2.1)}$$

where $h$ is the time step, $t$ subscripts represent time, $r_f$ is the risk-free rate, $\sigma_{A,t}$ is the possibly time-dependent volatility of operating assets, $\varepsilon$ is a draw from a standard normal distribution, $\omega$ is the non-stochastic jump size, $I_{j,t}$ is an indicator that a jump in existing assets has occurred (the probability of which jumps up during a crisis), $p_j h$ is the probability of a jump over an interval of length $h$, $\alpha$ is the constant fraction of balance sheet assets repaid each period, $I_{C,t}$ is an indicator that a crisis occurs, and $\Delta$ is the proportional increase in risky assets during a crisis. The actual evolution of risky assets is identical except that $r_f$ is replaced by the expected return on assets $r_A$.

New equity from capital calls is invested in liquid assets. The risk-neutral evolution of liquid assets is:

$$B_{t+h} = B_t Exp\left[r_f h\right] \quad \text{(A2.2)}$$

The actual growth rate is also deterministic but at a rate $r_D$, the same rate paid by ESFS/ESM on their debt. Notice that no dividends are paid to equity holders; returns are assumed to be reinvested in the bank.

Debt liabilities, $L$, increase deterministically at a rate equal to the interest rate paid on them, and decline by the amounts repaid each period. They also increase by the amount of new assets purchased during a crisis:

(A2.3) $$L_{t+h} = L_t Exp\left[r_D h\right] + -A_t \alpha + I_{C,t} \Delta A_t$$

Equity is then calculated as the difference between assets and liabilities:

(A2.4) $$E_t = A_t + B_t - L_t$$

Capital is called when the ratio of liabilities-to-equity, $L_t/E_t$, exceeds the trigger, which is assumed in the base case to be 20% higher than the target for this ratio. The target is taken to be the current ratio of liabilities to equity. The condition for whether the trigger is tripped is checked quarterly. When capital is called, it is in an amount that restores the target liability-to equity ratio. The new capital is assumed to be initially invested entirely in liquid assets.

Along each Monte Carlo path, the amount and timing of each capital call is recorded, and the payments are discounted to time 0 using the risk-free rate in the risk-neutral representation to give the cost of the guarantees over the number of years specified. The call probabilities are based on the results of applying the same shocks to the evolution of actual risky assets. Table A2.1 lists the main parameter values used in the base case calculations.

| Table A2.1: Parameters for EFSF/ESM Callable Capital Model | |
|---|---|
| Name | Base Case Value |
| Number Monte Carlo runs | 20,000 |
| Time horizon | 20 years |
| Risk-free rate (annual) | .003 |
| Return on ESM debt and liquid assets (annual) | .01 |
| Fair value expected return on risky assets (annual) | .03 |
| Initial liquid assets (EUR millions) | 80,000 |
| Initial risky assets (EUR millions) | 39,461 |
| Initial liabilities (EUR millions) | 39,461 |
| volatility risky assets, non-jump component | .15 |
| Probability crisis, annual | 6% |
| Risky asset multiplier if crisis | 1.5x |
| Probability jump down in risky assets, non-crisis, annual | 10% |
| Probability jump down in risky assets, crisis, annual | 25% |
| Jump size as percent of risky assets | -20% |
| Liability-to-equity target | 39.461/80 |
| Liability-to-equity trigger | 1.2 x target |