Evaluating the Costs of Government Credit Support Programs during COVID-19: International Evidence

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ABSTRACT: Advanced economies made available more than 5 trillion USD through government-supported credit guarantee and direct loan programs to provide lifelines to firms in the face of the COVID-19 pandemic. Notwithstanding the unprecedented scale of credit made available, an in-depth analysis of the fiscal consequences is missing, and the costs of these programs are not recognized in a transparent way. In this paper, we fill in an important aspect of the fiscal picture by estimating the subsidies that were provided by the largest credit guarantee programs introduced in 2020 in seven advanced economies. We estimate the subsidies on a fair value basis that provides a consistent and comprehensive upfront measure of cost. We explain the logic behind applying a fair value framework in a government context and compare it to alternative approaches. For the programs that we examine, total credit extended totaled 1.7 trillion USD. The subsidy element (cash-equivalent subsidy) is estimated to be 67 percent of loan principal on average (37 percent, excluding the US PPP), with a wide range across programs, from 12 to 100 percent. The variation is explained by differences across programs including eligibility criteria, loan terms, compensation to lenders, and other program design choices.

JEL Classification Numbers: H0, H3, H4, H5, H6

Keywords: credit guarantee programs, fair-value basis, COVID-19, fiscal risks

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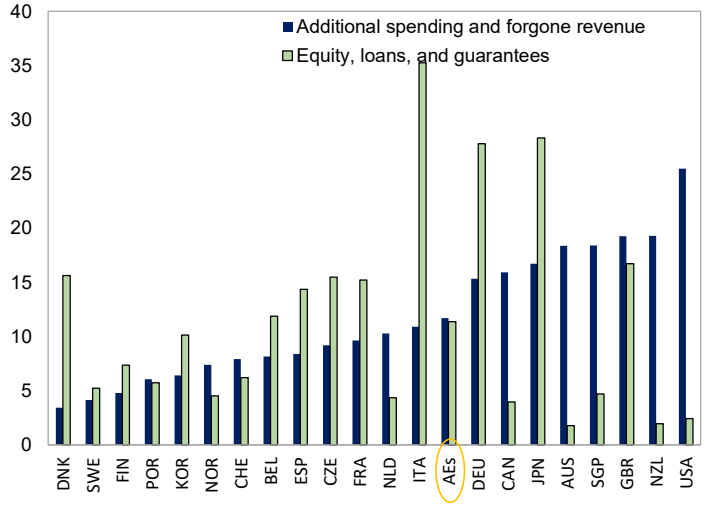
1. Introduction

Governments around the world acted to mitigate the economic fallout from the COVID-19 pandemic using a wide variety of policy measures. In addition to traditional fiscal and monetary responses, governments in advanced economies relied heavily on credit guarantee programs, and to a lesser extent on direct lending, equity purchases and large-scale loan forbearance and payment moratoria programs (see Box 1). Assistance to firms of all sizes, and especially to small and medium-sized enterprises (SMEs), was provided through these credit programs, with the intention of averting large-scale bankruptcies and layoffs and boosting market and firms' confidence (Battersby et al. 2021).[2] According to the IMF's Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic, the authorized envelopes for the principal amounts of credit support in advanced economies reached about 10 percent of GDP, as represented in Figure 1 (and close to 30 percent of GDP in Italy and Germany).[3] Overall, those amounts were similar to traditional 'above-the-line' fiscal measures such as cash transfers and tax deferrals, which averaged about 11 percent of GDP (IMF Fiscal Monitor, April 2020).

Figure 1. Announced Discretionary Fiscal Response to the COVID-19 Crisis in Selected Advanced Economies (Percent of 2020 GDP)



Sources: Database of Country Fiscal Measures in Response to the COVID-19 Pandemic.

Note: Estimates as of September 27, 2021. 2020 GDP is based on October 2021 World Economic Outlook unless otherwise stated. Data labels use International Organization for Standardization country codes. Italy announced unlimited legal limits to some of the guarantee programs for firms and the bars correspond to the governments' injections to guarantee funds, rather than the envelope for guaranteed loans by the government. For Germany, "Equity, loans, and guarantees" comprises the envelope of the Economic Stabilization Fund's equity injections and guarantees, the expanded guarantee capacity through the state development bank (KfW) and state governments. The US PPP was included as additional spending, rather than a below-the-line measure.

[2] Households also received various forms of credit assistance, but those programs are not covered in this analysis.

[3] Totals also include a small amount of authorized equity purchases.

Notwithstanding the unprecedented size of the announced credit support measures in response to the pandemic, there has been, to our knowledge, little in-depth analysis of the immediate and longer-run fiscal implications of those programs. In part that may be because of the complicated nature of making such assessments, and the uncertainty surrounding any quantitative conclusions from such an analysis. Nevertheless, the magnitude of fiscal resources put at risk and the likelihood that similar measures will be introduced in response to future crises suggest the importance of quantifying the cost implications of the programs as accurately as possible. Policymakers need information about program costs to make informed choices between using credit support versus using traditional fiscal measures to address specific goals. Effective design and management of government credit programs, and transparency and accountability, also require comprehensive information about cost. For instance, under what circumstances is it more or less cost-effective for governments to use credit-support as an alternative to direct cash assistance? What are the tradeoffs of more or less stringent eligibility criteria? In making such decisions, fiscal cost is an important factor. Of course, cost is one of many considerations in designing an assistance program, and broader policy goals may favor more costly program designs in some instances.[4]

In this paper, we estimate the fiscal cost of credit support programs, focusing on the largest credit programs introduced during the COVID-19 pandemic in the five largest countries in Europe (France, Germany, Italy, Spain, and the United Kingdom), Japan, and the US. Specifically, we estimate the upfront fiscal cost or subsidy element for each program. There is no common international standard for how the cost of credit assistance is measured and accounted for in budgetary and fiscal accounts and providing estimates on a consistent and comprehensive basis is the main contribution of this analysis. The results suggest a wide range of cost outcomes and the factors driving those differences.

By design, there was significant variation across COVID-19 credit programs in generosity and features. The subsidies conferred to borrowers depended on program attributes: borrower characteristics, eligibility requirements, guarantee coverage, interest rates and fees, loan maturities, and other loan terms. For loan guarantee programs that were intermediated by private sector lenders, a portion of the total subsidy accrued to lenders. Subsidies conferred to lenders depended on the rules governing guarantee fees and benefit passthrough, whether lenders were required to have "skin-in-the-game," and whether they were responsible for screening borrowers and other services. We gathered information on program attributes from a variety of official sources, from government and consulting reports including Anderson et al (2021) and OECD (2020), and from press accounts.

[4] On the benefit side, it is important to be able to quantify the stimulus effects of credit policies in a way that is comparable to other fiscal measures, and to understand how those are related to program characteristics. Those issues are addressed in a companion paper (Hong and Lucas, 2023).

To produce cost estimates, program information is used in combination with contemporaneous market data on interest rates and credit spreads. We develop a simple valuation model that incorporates the various program features in a consistent way across programs, which facilitates comparisons between programs and makes clear the main drivers of subsidy cost differentials.

Specifically, to estimate the upfront fiscal cost or subsidy element for each program, we employ a fair-value approach.[5] International Financial Reporting Standard (IFRS) 13 defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Equivalently, the cost estimates represent the net present value of projected cash flows to and from the government over the life of the underlying loans, approximately as of the point in time when the loans were originated. Discount rates are inferred from quoted or observed market rates, adjusted using fair value principles for rate determination. The aim is to produce cost estimates for credit support that are grant-equivalent, meaning that the cost to the government is equivalent to that of providing program beneficiaries with an upfront cash grant of the same amount.

We discuss the theoretical and practical justifications for using a fair value approach and compare it to the leading alternatives used by governments for assessing the cost of offering credit assistance. Guarantees and risky loans are contingent liabilities that expose governments to significant but often low-probability risks over an extended time period (IMF, 2017). Rather than using an accrual basis of accounting that incorporates the multiyear time horizons and provides a prospective cost of the risk exposure, many countries report credit assistance "below the line." There is no immediate budgetary impact from a new credit assistance program, and losses are only recognized on a cash basis many years later.[6] Those practices cause credit assistance to appear artificially cheap or even "free," a perception that contributed to calls for prolonging loan programs beyond their original expiration dates directed at helping firms survive when the lockdown measures were tightened or prolonged.[7] With little immediate impact on government budgets, credit programs may seem like a powerful, yet low-cost fiscal measure during a crisis, even when the actual costs are substantial.

[5] The approach is conceptually the same as that taken by the U.S. Congressional Budget Office in its analyses of the fair value cost of various U.S. credit programs, for instance as described in CBO (2019).

[6] Even in countries that are vigilant about fiscal risks related to contingent liabilities, there is some evidence that these standards are ignored or adjusted during severe economic downturns such as the Global Financial Crisis (Hawkesworth, 2010). This may be partly because the heightened uncertainty around the size and duration of economic shocks making it very difficult to estimate costs with accuracy.

[7] https://www.wsj.com/articles/europe-keeps-aiding-companies-to-avoid-surge-of-covid-19-insolvencies-11623576603

In our upfront cost estimates, the uncertainty about how the loans will ultimately perform is incorporated indirectly through the information reflected in market lending rates and other credit market data, which reflect investor expectations about the severity and duration of pandemic-related economic and financial distress. Fortunately, the global economic recovery has been more rapid and robust than many had anticipated at the height of the pandemic. With some notable exceptions, realized credit losses in many of the programs are now expected to be modest. However, had effective vaccines not been developed, had the rates of severe illness and mortality been significantly higher, or had longer and stricter lockdowns been deemed necessary, many more businesses might have ultimately been unable to repay their obligations. For the many loans that will not come due for a number of years, performance could deteriorate if there is another recession.

Using market data to infer the value of expected loan losses also incorporates the likelihood that these credit programs along with other policy actions would improve economic outcomes and thereby reduce future loan default rates. Increased access to low-cost credit is likely to have reduced disruptions to business operations. Some businesses used the funds to retain more employees and stay open during the height of the pandemic, albeit at reduced levels. Continuity of operations allowed a quicker return to normal as the virus ebbed. These positive effects of government credit support and other government actions were presumably recognized by investors and reflected in the forward-looking market lending rates that we use to indirectly infer the probability and severity of projected credit losses. However, the possibility of a more severe and protracted downturn remained, and the higher-than-average credit spreads over this period reflected that heightened risk.

The cost estimates reported here may be viewed as conservative in that they are based on realized take-up rather than on the credit envelope at program inception. For the purpose of an upfront assessment of a government's fiscal exposure--when the scale of a program and other critical design choices are being made--estimates based on the authorized credit envelope rather than on take-up would be desirable. However, because of the considerable uncertainty about take-up rates and absence of an empirical basis to forecast them, we chose to abstract from that source of uncertainty in the reported point estimates of cost.

Our main findings can be summarized as follows:

First, the take-up in many credit programs was far smaller than the program envelope.

Second, take-up and subsidy elements varied widely across programs within a single country, reflecting the significant variation in program parameters. As would be expected, programs with relatively generous terms--such as highly subsidized interest rates, relaxed eligibility criteria, and long maturities--had higher take-up rates and a higher subsidy element, whereas programs with stricter eligibility criteria and less

favorable terms had much lower take-up and lower subsidies. However, even after taking into account program differences, considerable variation in take-up rates remain.

Third, take-up and subsidy elements varied widely across countries. Presumably, some of those differences were intentional, as governments sought to balance the attractiveness or accessibility of loans with the fiscal risks the programs entailed. Envelopes that significantly exceeded likely demand may have been chosen to signal the strength of government support. There is variation even across EU countries that shared a common "Temporary Framework" for pandemic credit programs that provided guidelines on program parameters such as guarantee fees and the maximum loan amount for individual firms.[8] In fact, we find that in some cases, the measures that seemed superficially the most generous because of their very large envelopes had relatively unattractive terms and low take-up rates.

Fourth, at inception, the programs had the potential to have an adverse effect on long-term fiscal sustainability. The total credit envelope, which exceeded 30 percent of GDP in some countries, is a loose upper bound on loss exposure. While losses of that magnitude were highly unlikely to occur, significant losses could have been realized if the recession had been deeper and take-up rates higher.

The paper is related to several strands of the literature. The discussion of fair value and alternative approaches to valuing credit subsidies is related to the long-running debate about the appropriate choice of discount rates for government investments that had as its starting point the state pricing approach of Arrow and Debreu, 1954 (e.g., Arrow and Lind, 1970, Hirshleifer, 1964 and 1966, Gollier 2021). Lucas and Phaup (2008 and 2010), and Lucas (2012, 2014) discuss these issues in the context of government budgetary accounting. The methodology used is closely related to a series of reports by the Congressional Budget Office (e.g., CBO 2003, 2004, 2007, 2010, 2011, 2012, 2019) that evaluate the budgetary costs of U.S. credit support programs on a fair value basis, and to Gale (1991) who looks at the broader economic implications of government credit programs. The paper also is related to the literature on the role of government loan guarantees, and on bank lending behavior during the COVID-19 pandemic. Hanson et al. (2020) presents a theoretical framework to design the credit programs for business lending in response to the pandemic. Several studies use micro-level bank-firm matched datasets to analyze to what extent and how credit programs affect borrowing. For instance, Mullins and Toro (2018), Ono et al. (2013) and Bacahs et al. (2021) look at the impact of credit programs on business lending in Chile, Japan, and the US. More recently, Altavilla et al. (2021) and Chodorow-Reich et al. (2020) look at how a bank's lending behavior differs by firm characteristics such as firm size and sector. Core and De Marco (2021), Li and Strahan (2021) and Li et al. (2020) focus on bank characteristics (leverage, asset size) and study how the effects of credit guarantee programs on bank loan supplies differed across banks.

[8] https://ec.europa.eu/competition-policy/state-aid/coronavirus/temporary-framework_en

Kirti et al. (2022) collects the announcements of both economic and financial policies during the pandemic and highlight the complementarities of policies that were announced as packages.

The paper is organized as follows. Section 2 gives an overview of the credit support programs analyzed in this paper. Section 3 reviews the fair-value approach to measuring credit subsidies, and the conceptual and practical case for applying it to government credit programs. It lays out the basic modeling approach and parameter choices used for valuation. Section 4 summarizes the subsidy cost estimates for each credit support program analyzed and their relation to program structures and parameters. Section 5 reports on the sensitivity of the estimates to various assumptions. Section 6 concludes with a discussion of longer-term fiscal implications of these programs. Annex 1 provides additional information on selected programs and parameter choices, and Annex 2 elaborates on the issues surrounding the use of fair value for government cost evaluation.

2. Government Credit-Support Programs for Firms during the COVID-19 Pandemic

In this section, we provide an overview of the major credit support programs introduced by selected advanced economies during the COVID-19 pandemic and covered in the analysis. We highlight program features that we later show have significant effects on subsidy costs. Annex 1 contains additional information about individual programs studied in this paper.

We focus on credit support programs for the five largest economies in Europe (France, Germany, Spain, Italy, and the United Kingdom), Japan, and the U.S. Overall, these programs cover more than 90 percent of the credit support programs for firms that were introduced in the world during the pandemic. We compile program data from a variety of sources. The main source of information is from official reports, which are available with varying amounts of detail on the websites of the relevant ministries, central banks, or public financial institutions that oversaw the programs. Some programs released loan term sheets, and some program parameters were found in the text of authorizing legislation. Information collected from official sources is complemented by the IMF's "Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic."[9] In some cases, discussions with IMF's country teams and with country authorities provided additional information. We also rely on analyst and media reports; notably Anderson et al. (2021) provides valuable information regarding the European credit programs.

Government credit programs were introduced swiftly in anticipation of potential liquidity issues for businesses, with many initiations almost coinciding with the announcement of lockdown orders in March 2020. At a supranational level, the European Commission first adopted the State Aid Temporary Framework that provided guidance on program structure on March 19, and it was subsequently updated over time (see footnote 9).

[9] https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19

The amount of credit support that was authorized under these programs—the credit envelope—was substantial. Table 1 presents the major credit programs introduced in the seven countries studied here. In Germany and Italy, the envelope was unlimited in that no bound was placed on total program borrowing. However, both countries announced caps on loss absorption that we treat as the envelope amount. In absolute dollar amounts, the United States introduced programs with the largest total envelope at over 1.4 trillion USD. It is followed by Germany, which made close to 900 billion USD of support available. In all, the credit envelope for these programs reached nearly 4 trillion USD.

Table 1. List of Major Credit Programs by Country

Country	Scheme	Envelope (LCD)	Envelope (USD)	Borrower Types
US	US Paycheck Protection Program (PPP)	799 Billion USD	799 Billion USD	Small Enterprises
	Main Street Lending Program	600 Billion USD	600 Billion USD	SMEs
	Credit Support for Airlines and Critical Industries	46 Billion USD	46 Billion USD	Airlines and Critical Industries
Japan	Safety Nets for Financing Guarantees No.4 and No. 5, Special Interest Program (実質無利子・無担保融資等)	53 Trillion Yen	496 Billion USD	SMEs
Germany	KfW Instant Loans	357 Billion euro	407 Billion USD	SMEs
	KfW Entrepreneur loans			Firms older than 5 years
	KfW Direct Participation Syndicated Loans*			Medium-sized and large firms
	KfW ERP Start-up Loan			Firms younger than 5 years
	WSF*	400 Billion euro	457 Billion USD	Large firms
UK	Coronavirus Business Interruption Loan Scheme (CBILS)	330 Billion pound	424 Billion USD	SMEs
	Coronavirus Large Business Interruption Loan Scheme (CLBILS)*			Large firms
	Bounce-Back Loan Scheme (BBL)			SMEs
	Covid Corporate Financing Facility (CCFF)*			Large investment grade firms
France	PGE	300 Billion euro	342 Billion USD	All firms affected by COVID-19
Italy	Fondo Centrale di Garanzia PMI	>100 Billion euro		Self-Employed, SMEs
	Public Guarantee for Debt Moratorium*	No limit (155 Billion Euro maximum take-up in March 2020)		
	SACE Garanzia Italia	200 Billion Euro	228 Billion USD	Medium and large companies
Spain	ICO loan guarantees	140 Billion Euro	160 Billion USD	SMEs

Note: We exclude the programs with asterisks that did not provide information on loan terms. We also did not separately estimate the cost of the UK CCFF because of its small take-up and restrictive terms that limited risk.

Eligibility

Firm size was often an important determinant of eligibility and loan conditions. In fact, several countries introduced different versions of a tiering structure, with differentiated offerings and rules for different firm size categories.

To increase the likelihood that the support measures reached otherwise solvent firms facing a pandemic-related liquidity shortage and that needed government support, some programs conditioned the availability of funds on the decline in revenues during the pandemic. Firms had to present evidence of revenue shortfalls during the pandemic compared to previous years to be eligible. Also, firms that were in financial difficulty before the pandemic were not eligible for loans (for instance, EU temporary framework).

Despite such targeting efforts, it was inherently challenging for governments, and for the guaranteed lenders enlisted to act as their agents, to ensure that credit reached the intended recipients. Objective measures such as "revenue shortfall" during the initial months of lockdown were not reliable indicators of need, and it was difficult to assess viability. Although efforts were made to make the lending process more streamlined than usual, some smaller firms without existing bank relationships may have been discouraged by the requirements of the application process. The uneven impact of COVID-19 across sectors and across firms within a sector amid general uncertainty about the recovery path further complicated the task of effectively targeting funds.

Guarantee Program Terms

Most of the programs studied offered government guarantees on loans originated by private financial institutions. The terms of guarantee programs varied along a variety of dimensions. To give an example of program terms, consider the UK Coronavirus Business Interruption Loan Scheme (CBILS), a guarantee program directed at small and medium-sized businesses.[10] It provided loans ranging from 50,000 GBP to 5 million GBP, with the available amounts depending on firm characteristics. Loan maturities ranged from 3 months to 6 years, and a variety of loan types were eligible. Collateral was not required on most loans. The program provided an 80% guarantee, and lenders were charged an annual guarantee fee of 75 basis points. The government paid the first 12 months of interest and fees, up to a maximum of 800,000 GBP. Loan pricing was at the discretion of lenders, but lenders had to demonstrate that the net financial advantage of the guarantee was passed through to the borrower. The program authorized 98,000 loans totaling 23.3 billion GBP.

A typical credit guarantee program has the following elements. First, the program specifies *its targets*. In some cases, companies of all sizes are potential users (e.g., Germany KfW, France PGE), while in other cases, only companies of certain sizes are eligible (e.g., UK CBILS vs. CLBILS). Second, the program specifies *guarantee coverage,* the share of losses absorbed by the government in the event of a default. In the programs that we assess, the guarantee coverage ranged from 70 percent to 100 percent.[11] Third, the

[10] Source: HM Treasury coronavirus (COVID-19) business loan scheme statistics - GOV.UK (www.gov.uk)

[11] The guarantees were typically *pari passu*, meaning that losses were shared proportionally between lenders and the government.

program stipulates other terms, such as how interest rate(s) are set, loan maturities and eligible structures (e.g., term or asset-backed loans), and guarantee and other fees or premium. In some programs, interest rates are fixed by the government (e.g., UK BBLS), and in others, lenders are permitted to set the rate but with a cap (Spain), or subject to benefit pass-through (e.g., UK CBILS and France). For countries in the European Union, guarantee fees are prescribed in the EU temporary framework based on maturity and firm size.[12] Finally, loan sizes were typically limited in absolute amounts. For countries subject to the EU temporary framework, loan size was subject to a ceiling where the total amount should not exceed: (i) double the annual wage bill of the beneficiary for 2019 or for the last year available; or (ii) 25 percent of the beneficiary's total turnover in 2019. Exceptions could be made if there was appropriate justification and self-certification by the beneficiary of its liquidity needs. Several countries included additional provisions to allow loans to be more generous, such as a one- or two-year waiver of principal payments (pre-amortization). In some countries like the UK, interest payments were also paid by the government for one or more years.

Out of the thirteen loan guarantee programs that we explore, five programs (US Paycheck Protection Program, Germany KfW Instant Loan, UK Bounce Back Loan Scheme, Japan Safety Net Guarantee No. 4 and 5, Italy Fondo di Garanzia) offered a full (100%) government guarantee. Compared to other programs under the same umbrella but with partial guarantees, several common features are observed for full-guarantee schemes: (i) a quicker disbursement and significantly less credit risk assessment; (ii) a longer maturity; and (iii) a lower maximum loan amount.

As noted earlier, an important within-country differentiator of guarantee program terms was firm size. Typically, more favorable terms (higher guarantee share, longer maturity, lower rates and fees) were offered for SMEs and less generous ones for larger firms. A good example is the French credit guarantee scheme, where there were three levels of tiering based on firm size. Under that scheme, loans of micro-enterprises and SMEs received 90 percent guarantees, while loans to mid-caps and large companies received 80 percent and 70 percent guarantees, respectively. Guarantee programs favored SMEs over larger firms for a combination of reasons: (i) SMEs, especially in contact-intensive sectors, were more severely affected by the COVID-19, as highlighted in Gourinchas et al. (2020, 2021); (ii) it is generally harder for SMEs to obtain credit during downturns, as banks become more reluctant to lend to small firms when economic uncertainty is high; and (iii) protecting jobs in the SME sector was a high priority.

In some instances, program terms were liberalized over time with extensions of loan maturity, extensions of program end dates, or increases in the envelope. The reported take-up and envelope sizes reflect the most recent information on those totals.

[12] Under the EU temporary framework, guarantee fees (premiums) range from 25 basis points to 200 basis points, increasing progressively in line with the duration of the guaranteed loan and firm size.

Involvement of Public and Private Financial Institutions

Credit extended under guaranteed loan programs often involved both public and private sector financial institutions. Typically, a firm starts the process by applying for a loan from an authorized lender, generally a private financial institution. The lender assesses the request and refers the application to a national public financial institution, which plays a central role as the program administrator.

The financing of public financial institutions differs across countries. While it is universal that the state bears a contingent liability, this liability is direct in some cases (e.g., Germany's WSF program, where the guarantee is directly issued by the Ministry of Finance) and indirect in others (for example, the German KfW must use its own funds first, and similarly for the Japan Financial Corporation). For fully guaranteed loans, additional credit assessment of firms by public financial institutions was discouraged to allow for swift disbursement, with the side effect of increasing the risk of default or fraud.[13]

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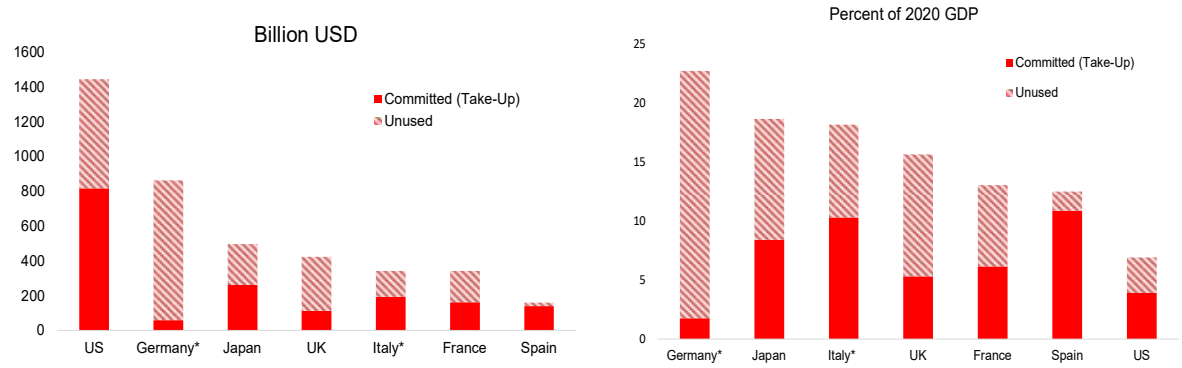
Envelope vs. Take-up

Figure 2 compares the total program envelopes with realized take-up, both in dollar terms and as a share of 2020 GDP. As was mentioned earlier, the envelopes for Germany and Italy are not directly comparable to those of other countries, as some of the guarantee schemes announced in Germany and Italy had no legal limits. Whereas the "envelope" for other countries refer to the maximum principal amount that the government has authority to guarantee or directly lend, for Germany and Italy the "envelope" in Figure 2 is equated to the size of the governments' injections to the guarantee funds.

In dollar terms, the US had the largest envelope of about 1.4 trillion. When normalized by GDP, however, several other countries had larger envelopes. The total take-up of credit support by firms in the seven advanced economies we study reached over USD1.7 trillion. Using a simple average across countries, the average take-up is about 8 percent of 2020 GDP. Figure 3 shows that take-up turned out to be less than half the announced envelope size in most countries. Across countries, it averaged 48 percent of the announced envelope (excluding Germany and Italy).

[13] https://www.nao.org.uk/press-release/the-bounce-back-loan-scheme-an-update/

Figure 2. Credit Support Programs during COVID-19: Committed vs. Unused Envelope

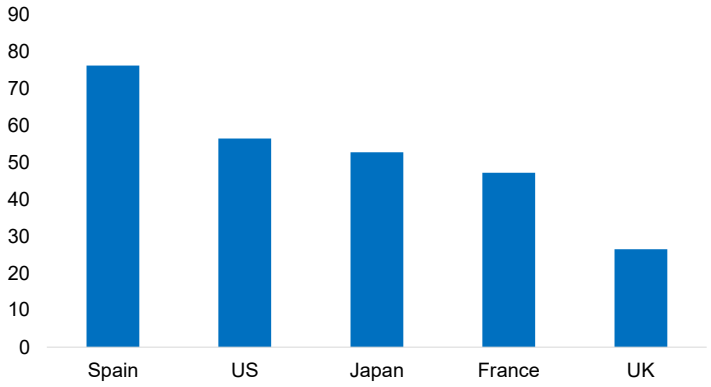


Source: Official sources for each country, IMF Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic, and Anderson et al. (2021).

Note 1/ The following programs are included in each country's total envelope. Italy: "Cura Italia" guarantees and SACE Garantia Italia.; UK: BBLS, CBILS, CLBILS and the Bank of England's COVID corporate financing facility (CCFF); Spain: ICO loan guarantees, France: Prêt Garanti par l'État; Germany: KfW loans for small and large loans and a part of the increase in the economic stabilization fund (WSF) (400 billion euros) to provide additional state guarantees for firms; Japan: Safety Net No.4 and No.5; US: Paycheck Protection Program, Main Street Lending Program, Credit Support for Airlines and Critical Industries. Last observations were in January 2022, except for Japan (January 2021).

Note 2/ Some guarantee programs announced by Germany and Italy have uncapped legal limits to provide funds. The bars shown in the Figure show the cap on total guarantees provided by the government, rather than the actual injections to the guarantee funds.

Figure 3. Take-Up (percent of total envelope)



Note: Same programs as in Figure 2, based on the take-up amount observed as of January 11, 2022, except for Japan (January 2021). Germany and Italy are excluded from the calculation, as some of their guarantee programs had unlimited legal limits, therefore, no limit to the envelope.

A variety of factors affect the take-up ratios. As Anderson et al. (2011) point out, take-up can depend on the size of economic shocks, the attractiveness of program terms, bottlenecks in financial intermediaries in assessing loans, and the availability of non-credit support programs. In Spain, the greater recourse to guaranteed loans can be partly attributed to the lower availability of alternative fiscal relief measures for corporations (e.g., debt moratoria or direct grants of State aid). In France, the higher take-up of guaranteed loans reflects the favorable pricing offered to borrowers, especially during the first year of the loan. In Germany, the relatively limited use of such loans mainly reflects: (i) lower financing needs of firms compared with other countries, owing to a less stringent lockdown and firms' greater use of a combination of other policy measures that included direct grants and tax deferrals and short-time working allowances; (ii) less favorable lending terms (e.g., higher rates, a prohibition on distributing dividends and limits on the remuneration of managers); and (iii) some supply-side bottlenecks related to the risk assessment required for large loans. On the loan supply side, the initial take-up in Italy was reported to have been limited due to operational bottlenecks. Core and De Marco (2021) look at the different levels of information technology used to process online applications by banks in Italy and emphasize the role of information technology in processing high volumes of online applications and disbursements. Over time, the take-up in Italy continued to increase, notwithstanding the existence of the debt moratorium scheme. In Section 4 below, we quantitatively examine the relation between take-up, estimated subsidy value, and other loan characteristics.

3. Estimating subsidy costs

In this section we briefly review some of the theoretical and practical rationales for evaluating the fiscal cost of government credit programs on a fair-value basis and contrast it with other practices governments follow in measuring and reporting the budgetary cost of credit support. Annex 2 provides a more detailed discussion of issues that have been raised regarding its relevance and applicability.[14] We also introduce the framework used to produce the reported fair value estimates in a series of simplified examples. Finally, we explain the principles governing the choice of model parameters and report the baseline values of parameters that are standardized across programs.

3.1 Rationale for Fair-Value Cost Estimation for Credit Assistance

Credit assistance differs in important ways from other types of fiscal support. Loan guarantees, direct loans, and loan participations all involve legally binding commitments that often extend over years or even decades, and that may entail highly uncertain future cash flows. By contrast, most conventional fiscal policies can be modified over time by legislative or administrative actions and therefore have short commitment periods and less uncertainty about fiscal outcomes.

[14] See also Lucas 2012 and 2014.

Those differences raise the question, what basis of accounting for credit support put it on a level playing field with other types of fiscal policies for the purpose of upfront assessment of program cost? In budgetary parlance, the issue is sometimes framed as seeking "grant-equivalence," whereby the cost of credit assistance is equated to the size of a grant that would have the same fiscal cost to the government. Grant-equivalent costs also have the interpretation of being subsidy costs because they represent the transfer of value from the government to program beneficiaries. Here, we make the case that a fair value approach is the best way to achieve grant equivalence for credit support among the leading alternatives for assessing program cost.

The multi-year nature of most credit support implies that to measure costs comprehensively up front at the time at resources are committed, it is necessary to use an accrual rather than a cash basis of accounting. Accruals are usually calculated as net present values of projected cash inflows and outflows over the commitment period. The ability to accurately compare costs between direct lending and loan guarantee programs also requires an accrual approach (Anderson and Burke, 2021).

A critical decision in calculating accruals, and the one that distinguishes fair value estimates from other approaches, is the conceptual basis for selecting discount rates.[15] Under a fair value approach, discount rates are chosen with reference to market rates. Conceptually, market discount rates reflect time value and also compensation for priced risks. Hence, discount rates based on market rates are said to be "risk-adjusted." Priced risks include market risk (also often referred to as aggregate, systematic, business cycle or undiversifiable risk), and to varying degrees, interest rate, prepayment, and liquidity risk. Importantly, priced risks cannot be eliminated by diversification; someone has to bear them. A fair value approach is consistent with the well-established principle in financial economics that discount rates should be selected on the basis of the priced risks associated with the cash flows of the investment being evaluated (e.g., the loan or loan guarantee), but independently of how the investment is financed (e.g., by tax revenues or by issuing debt).[16]

[15] More generally, to value a financial obligation it is often necessary to identify an appropriate cost of capital. For the methodology applied in this paper, the cost of capital is reflected in the choice of discount rates. For valuing more complicated credit guarantees, derivative pricing methods may more accurately incorporate the cost of capital than simple discounting approaches.

[16] The conclusion that how an asset is financed is irrelevant rests on the logic of the famous Modigliani and Miller (1958) theorem. It highlights that the total risk of the investment is conserved between debt and equity, and therefore that the "weighted average cost of capital" for an investment is unaffected by how it is financed. Although factors such as taxes and limited information can cause financing choices to matter, the theorem provides a commonly accepted starting point for the effects of financing choices on value.

The use of fair value accounting has become increasingly widespread in the private sector. For example, under the widely used International Financial Reporting Standards (IFRS), public companies report most asset values on a fair value basis.[17] However, most governments have not adopted fair value principles for budgetary accounting. In some countries, guarantees are accounted for on a cash basis, implying that costs are only recognized when losses are realized. In others guarantees are treated as "below-the-line" and outside of the normal budget process.[18] A below-the-line treatment avoids the distortions of using cash accounting for credit, but it has the negative effect of making it easier to ignore or at least understate the costs of credit support. That in turn creates an incentive to rely on it excessively.

For the governments that evaluate the cost of some or all credit assistance on an accrual basis (e.g., the US and the UK), the discount rate is often equated to the government's own borrowing rate. That choice causes the cost of credit support to be underestimated and is at odds with the principle of choosing a discount rate based on the risk of an investment and independently of how it is financed. Importantly, it ignores the physical impossibility of funding a risky investment—in this context a risky loan--entirely with safe borrowing. By doing so it ignores the role of taxpayers and other government stakeholders as risk-absorbers, and so effectively equity holders, in any risky government undertaking.

The conclusion that discounting at a government's own borrowing rate will understate the cost of credit support rests on several observations. First, the risks inherent in government credit guarantees and direct loans are similar to those for private sector financial institutions offering similar products to similar borrowers. Second, like the private sector, the government cannot eliminate priced risk through diversification. Third, the interest rate on government debt, which notably is itself is a market rate, is relatively low because it is backed by a credible promise that the debt will be repaid. The credibility of the promise to repay government debtholders is largely independent of whether a particular cohort of loans made or guaranteed by the government will default.[19] Forth, the market risk associated with credit assistance has to be absorbed by some combination of tax and spending changes. Taken together, these observations imply that the risks inherent in government credit support are borne by taxpayers and other

[17] IFRS was adopted by the European Union in 2002. Japan requires the use of a modified version of IFRS. The U.S. has not adopted IFRS but financial firms typically are required to report fair values for certain types of assets and obligations.

[18]For countries in the European Union, the Manual of Government Deficit and Debt by Eurostat provides a guidance on recordings of credit guarantee programs in public accounts (Chapter 7.4, "Government Guarantees"). In the case of one-off guarantees, the impact of these schemes on public accounts are on cash-basis. For standardized guarantee programs, an amount equal to the future expected calls on the guarantees are recorded in public accounts as a capital transfer at inception.

[19] The debt of a government that assumes a large amount of risk relative to its ability to tax would also carry a risk premium, but for the developed countries sponsoring the programs discussed here, any sovereign risk premia appear to be small.

government stakeholders who function as conscripted equity holders. Using a discount rate based on a government's own borrowing rate treats that involuntary risk-absorption as costless.

The question of whether or not governments should risk-adjust discount rates has been debated for as long as economists have been writing about the effects of risk on value, and a number of conceptual and practical issues are often raised as potential drawbacks of risk-adjustment. Issues include the relevance of non-cash costs and market rates for governments; the implications of incomplete markets; and practical implementation challenges. These issues are discussed in Annex 2. We believe that the stronger arguments favor the use of a fair value approach, and below we report cost estimates on that basis.

Finally, it should be noted that there is an important connection between fair value cost estimates and making salient the longer-run fiscal effects of credit support. Many COVID-19 credit support programs were designed with the expectation that losses would be modest. However, average outcomes tell only part of the story. Although very large losses are improbable, if they materialize it most likely will be during a severe economic downturn when fiscal capacity is already strained. The coincidence of large losses with future periods of economic weakness magnifies the fiscal risk of credit programs. A fair value approach incorporates the cost of that risk by implicitly putting a higher price on future losses that occur during downturns.[20]

Current Practices in Budgetary Reporting of Credit-Support Programs

Countries differ in their approaches to reporting on the fiscal cost of credit support. The most common practices are briefly described here, and Box 2 summarizes the treatment of one-off guarantees in the IMF Government Finance Statistics Manual (GFSM) 2014. As noted earlier, despite the widespread use of fair value accounting in the private sector and the conceptual advantages noted earlier, most governments have not adopted that practice.[21]

Off-budget (below-the-line). There is cross-country variation in off-budget reporting practices. In some countries, only certain types of credit are omitted from the budget, while in others, all credit-related programs are treated as off-budget items. For example, Hawkesworth (2010) found that for loan guarantees and direct loans, it was a common practice not to record budgetary expenses apart from

[20] Another factor negatively affecting future fiscal outcomes is that a portion of the loans will be voluntarily prepaid, a feature that adds uncertainty and cost to the government. A fair value approach ideally would incorporate the cost of prepayment risk. For the programs considered here and in a rising interest rate environment, prepayment risk is modest and we do not estimate its contribution to program cost.

[21] A partial exception is the US, whose Congressional Budget Office regularly reports on the fair value of credit support programs as supplementary information for policymakers, and fair values have been mandated in special situations.

administrative fees. Reporting can be even more limited during a crisis. For instance, some countries reportedly ignored or adjusted their general procedures due to the extreme circumstances during the global financial crisis. [22] Below-the-line accounting tends to delay the recognition of costs and risks relative to other fiscal measures.

Cash-basis accounting. Cash accounting entails reporting the cash flows associated with programs in the years that they are realized. For most grants and transfers, cash accounting captures the full value of public resources committed to those uses. However, for a direct loan or credit guarantee, cash accounting has significant and well-known weaknesses. For credit guarantees, it delays the recognition of any cost until defaults are realized. That is often many years after the commitments are made, and long after cost information could inform a decision about whether to introduce the program or not. Furthermore, realized losses are a poor indicator of a program's prospective cost because they do not include the full range and probability of outcomes that might have occurred. For direct loans, cash accounting tends to overstate losses when it treats the initial outlay of principal as a cost, even when it is likely to be repaid.

Accrual accounting. Budgetary accruals aim to measure the lifetime cost of newly extended 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 advantage over cash accounting for credit programs, it is rare, even for advanced economies to fully adopt accrual accounting. The U.S. is an important exception that applies an accrual approach for most credit programs.[23] However, it is important to note that there are several shortcomings in the implementation in the U.S, including that Treasury rates are used for discounting and that administrative costs are separately accounted for, causing costs to be underreported (Anderson and Burke, 2021).[24]

3.2. Calculating the Subsidy Element

We now turn to the methodology we use in this paper to calculate the upfront 'subsidy element' of a government loan or loan guarantee on a fair value basis. The subsidy element is the present value of

[22] The survey conducted by Hawkesworth (2010) reports that the respondents for Denmark and Netherlands said they ignored the rules; those for Hungary, Finland, Mexico, Germany, Turkey and the UK said they adjusted the standards.

[23] The Federal Credit Reform Act of 1990 (FCRA) requires federal direct loans and loan guarantees to be recorded in the budget on an accrual rather than a cash basis using Treasury rates for discounting. For such programs, the budget records a single payment or receipt that represents the net present value of expected future cash flows.

[24] There are important exceptions including the Troubled Asset Relief Program (TARP) enacted to respond to the global financial crisis, where the law required budgeting to be on a fair value basis.

government costs per $100 of loan principal. It provides a normalized measure across programs in units of percentage points. Importantly, it is an upfront cost rate and not an annual rate. In many of the programs, both borrowers and guaranteed lenders received a portion of the total subsidy. For borrowers, the subsidy element can be interpreted as the upfront payment that a competitive private sector financial institution would charge the government to offer credit to the borrower on identical terms but without any government support. For guaranteed lenders, the subsidy element represents the excess of lender receipts (fees and loan payments) over normal lender costs incurred (for administration, funding, and risk).

The method described is parsimonious in its data requirements and relatively straightforward for policy analysts to apply and explain. The sequence of examples below illustrates how the methodology can be applied for a variety of stylized program structures, including guaranteed and direct government lending, and full and partial guarantees. We also discuss some of the general considerations that guided the choices of discount rates and other key assumptions.

3.2.1. General Considerations

Two broad technical approaches are available to credit analysts for valuation purposes: discounted present value and derivatives pricing. We take a discounted present value approach that for this application has several advantages: its greater robustness to the limitations of the available data; its more common usage by financial practitioners; its greater familiarity to policymakers; and its relative simplicity and transparency.

Specifically, we calculate discounted net present values by discounting *promised* cash flows with the estimated *interest rate that would be charged* to borrowers by banks for a similar loan without government backing, a quoted or promised rate. The most common alternative would be to discount *expected* cash flows at the *expected return* on a similar loan without government backing. Relying on promised cash flows and observed rates has a major practical advantage in that it avoids the need to estimate expected default rates, recovery rates and risk premiums. Estimating those quantities is particularly difficult during periods of unusual upheaval and uncertainty, when projections based on historical data may be poor predictors of future outcomes. As explained below, quoted interest rates and other market data provide forward-looking proxies for the net effect of default risk on present value.

In general, cash flows to and from a government arise from principal disbursements and repayments, interest payments, guarantee payouts, guarantee and other fees, and administrative costs. Specifically, cash outflows for direct loans are comprised of disbursements of principal and the costs of origination, servicing, and collection. Cash outflows for loan guarantees include guarantee and other payments to participating lenders, and internal administrative costs. Cash inflows for direct loans include principal and interest payments, and any fees collected. Inflows for loan guarantees arise primarily from fees charged to borrowers or lenders. The size, timing and risk of cash flows differs considerably across loan schemes, and

depend on loan maturity, amortization schedule, interest rates and fees charged, borrow characteristics, collateralization, grace periods, whether the guarantee is full or partial, and other factors.

Most subsidized loans and credit guarantees don't have an analogous counterpart in the unsubsidized market. Even when a comparable product does exist, the terms of the agreements usually are not publicly disclosed. Hence, the subsidy element has to be approximated based on available information and extrapolations. Disclosures about government credit programs typically include basic contractual terms like maturity and loan size ranges, eligibility criteria and characteristics of borrowers.[25] Publicly available credit market data such as average credit spreads on bonds by credit rating or average bank lending rates by borrower type also inform the estimates.

3.2.2. Calculating the subsidy element for direct loans

This first example demonstrates the subsidy calculation for a direct government loan calculated by discounting promised cash flows at a rate that would be charged by a private sector lender were the loan not guaranteed. It is also used to explain why this approach is conceptually equivalent to discounting expected cash flows at a risk-adjusted discount rate.

Consider a direct lending program that offers credit to qualifying SMEs. Loans are for two years, and the annual interest rate charged to borrowers is fixed at 3% under the program rules. No interest or principal repayment is required for the first year, and full repayment of principal and interest comes due at the end of the second year. For a 100,000 EUR loan made under the program, the promised cash flow to the government is 100,000 x $(1+.03)^2$ at the end of two years. Because the loans are quite risky, promised payments of principal and interest exceed average or expected payments.

To impute the subsidy element, the key question is how much a private sector financial institution or investor would pay upfront for the promise of EUR 100,000 x $(1+.03)^2$ at the end of two years from the same borrower? Assume we infer that value to be EUR 92,663.11. Then the subsidy element is ((100,000 – 92,663.11) / 100,000) x 100 = 7.34; or equivalently, there is a 7.34% subsidy rate. The subsidy arises because the government has provided EUR 100,000 of principal in return for a claim worth only EUR 92,663 in present value. To put it differently, the government could contract to pay a private lender EUR 7,340 to make the loan to the borrower on those same terms, or the government could have given the borrower EUR 7,3400 to pay to a lender in exchange for making the loan on those terms—it is the grant equivalent cost of credit support.

[25] For some programs loan performance data is also now becoming available. That information is useful for various aspects of program evaluation. However, it is largely irrelevant to these calculations, which aim to estimate the upfront or ex ante cost based on the probability distribution of the possible outcomes, before the actual outcomes became known.

Where did the conclusion that the market would value the promise at EUR 92,663.11 come from? In principle, an analyst could estimate the expected lifetime default rate, "d," recovery rate, "ρ,", and risk-adjusted expected rate of return, "R." Then the expected payment, $E(P_T)$, is $[P_T \times (1 - d) + P_T \times \rho \times d]$. In general, the fair value at time 0, "V_0," of a promised payment, "P_T," in year T would be calculated as its discounted expected value:

$$V_0 = E(P_T)/(1 + R)^T = [P_T \times (1 - d) + P_T \times \rho \times d]/(1 + R)^T \quad (1)$$

However, it's not feasible to estimate the default rate, recovery rate or expected return with any confidence for most pandemic credit support programs. Very limited data are available, and the heightened uncertainty in the early stages of the pandemic makes inferences based on historical averages likely to be unreliable.

Fortunately, an alternative exists that avoids having to estimate these components individually. That alternative is to discount the *promised* payments at the rate a private sector lender would have *charged* for a similar loan. For example, let's assume a lender would have offered a 7% interest rate to these borrowers for the same two-year term. Then the principal amount the lender would provide in exchange for a promised repayment in 2 years of EUR 100,000 x $(1+.03)^2$ is 100,000 x $(1.03)^2/(1.07)^2$ = 92,663.11.

The subsidy element is the difference between the 100,000 principal and the 92,663.11 present value of the promised payments, in this example divided by 1,000 to express the result per 100 of loan principal. The resulting subsidy element is 7.34, based on the 7% rate that lenders would have offered to similarly risky borrowers without government support. Notice that the 7% rate charged by lenders aggregates market perceptions about expected defaults and recoveries. It also embeds a market consensus view of the expected return lenders need to compensate both for time value and priced risks. Effectively, the rate charged by lenders, "C," serves as a sufficient statistic for the combined effect of the various cost factors on the value of promised payments.

The observation that "C" is a sufficient statistic for expected losses and the relevant market discount rate allows us to replace equation (1) with:

$$V_0 = P_T/(1 + C)^T. \quad (2)$$

The promised rate, C, will exceed the expected return, R, because it includes compensation for expected losses. The promised payment P_T is higher than $E(P_T)$ because some default losses are expected. A more general version of equation (2) accommodates multiple promised payments and the possibility that

default could occur before maturity by incorporating periodic default and recovery rates and is used in the analysis below.

Administrative costs and fees were excluded in this example for simplicity, but conceptually it is straightforward to incorporate them into either formulation. For equation (1), other costs and fees enter into expected cash flows in the numerator. For equation (2), some other costs and fees also enter the numerator as promised payments. Often, lenders are compensated for administrative costs via a higher C, in which case the costs enter via the denominator.

3.2.3. Calculating the subsidy element for loan guarantees

This next example demonstrates that the subsidy element of a 100% loan guarantee is the same as that on a direct loan, all else equal and assuming no lender subsidies or rate adjustments to cover administrative costs.

Imagine that the direct loan program of the previous example was instead structured as a loan guarantee program. The guarantee program is designed to appear identical to the direct loan program from the perspective of borrowers. Lenders are required to charge qualified borrowers 3% per annum on 2-year loans, with principal and accrued interest coming due in two years. The government guarantees that lenders will be repaid in full. On a EUR 100,000 loan, the lender would be guaranteed EUR 100,000 x $(1.03)^2$ at the end of two years. The cash flows for borrowers, lenders, and the government are summarized in Table 3.1. The realized borrower payment at time 2, "pmt_2" is a random variable whose outcome will depend on whether there is a default, and if so, the amount recovered.

Table 3.1 Cash flows on 100% guaranteed loans

	t = 0	t = 2
Lender	-100,000	100,000 x $(1.03)^2$
Borrower	100,000	-pmt_2
Government	0	pmt_2 − 100,000 x $(1.03)^2$

The government's time 2 cash flow is identical to the hypothetical case that it had made the risky loan of EUR 100,000 directly, and at the same time had issued a zero-coupon bond with a face value of EUR 100,000 x $(1.03)^2$. That hypothetical is useful because we know how to value each of those two transactions. Specifically, we can now calculate the net present value of cash flows at time 0 for each entity in Table 3.1. By construction, the borrower cash flows and hence the borrower subsidy is EUR 7,340 as above, which is the difference between the principal received and the present value of the borrower's promised time 2 payment.

The net present value for the lender or for the government will depend on whether or not the 3% is the market interest rate for government obligations. When 3% is the government borrowing rate, and therefore also approximately the rate at which the market would discount cash flows with a 100% government guarantee, then the net present value for the lender is: -100,000 + [100,000 x $(1.03)^2/(1.03)^2$]= 0. The lender has made a safe loan and earns the fair rate of return on it, and so has zero net profit. The net present value for the government is: 100,000 x $(1.03)^2/(1.07)^2$ – 100,000$(1.03)^2/(1.03)^2$ = -7,340, where 100,000 x $(1.03)^2/(1.07)^2$ is the fair value of the promised borrower payment, pmt_2.

One can conclude that the subsidy cost for a 100% loan guarantee is the same as for a direct loan when the lending rate is equal to the government's own borrowing rate. In either case, the government absorbs any default losses and is not fully compensated for doing that. Abstracting from any administrative costs, the borrower receives a subsidy and the lender breaks even.

3.2.4. Subsidy element to guaranteed lenders

If the interest rate plus any fees charged to borrowers on a fully guaranteed loan is in excess of the lender's all-in cost of making the loan, then a portion of the total subsidy accrues to the lender.[26] Lender subsidies can be significant, but they are rarely quantified and often go unnoticed.

Consider the same guarantee program as in the above example, but with the government's own borrowing rate at 2% instead of 3%. For the lender, the present value of the safe cash inflow is 100,000 x $(1.03)^2/(1.02)^2$ = 101,970.4, or EUR 1,970.4 more than the value of the principal extended. The government effectively provides a subsidy of EUR 1,970.4 to the lender (again assuming no administrative costs). All else equal, the higher the mandated rate charged to borrowers, the higher the lender subsidy element. We return to lender subsidies below.

3.2.5. Adjusting subsidy element calculations for partial guarantees

Many pandemic credit guarantee programs offered partial guarantees, with the government absorbing a set fraction of realized default losses. The procedures described above are easily extended to the situation where losses are shared proportionally between lenders and the government.[27]

[26] Lenders would not choose to participate if profits were negative, which implies that the mandated rate could not be below the government's borrowing rate unless the government also compensated lenders by other means.

[27] When losses instead are split into a senior-subordinate structure, such as when the government takes losses only up to some cap, or when it absorbs losses after lender losses have absorbed losses up to some cap, a simple discounted cash flow approach no longer produces reliable estimates. A derivatives pricing

Continuing with the previous example, imagine instead of a 100% guarantee, the government absorbs 80% of the losses and lenders bear 20% of losses. The government borrowing rate is 3% and the market interest rate for the risky loans is 7%. Loans come due in two years.

With a partial guarantee, lenders must be allowed to charge a high enough interest rate to compensate for the risk on the unguaranteed portion of the loan. To limit the ability of lenders to capture the subsidy value, many programs mandated that the value of the guarantee be passed through to borrowers. In such cases, we set the borrower rate to a weighted average of our estimate of the fair market rate, C, and a floor rate, f. The floor rate is the government rate plus a spread that covers a normal level of administrative costs. Lenders in a program with an 80% guarantee would be assumed to charge a borrowing rate of .2 x C + .8 x f. Because in this example we abstract from administrative costs, f is just the government borrowing rate of 3%.[28] The cash flows for borrowers, lenders, and the government are summarized in Table 3.2.

Table 3.2 Cash flows on 80% guaranteed loans

	t = 0	t = 2
Lender	-100,000	$.8 \times 100{,}000 \times (1 + .8 \times .03 + .2 \times .07)^2 + .2 \times pmt_2$
Borrower	100,000	$-pmt_2$
Government	0	$.8 \times [pmt_2 - 100{,}000 \times (1 + .8 \times .03 + .2 \times .07)^2]$

As before there is an equivalence between the cash flows arising from the loan guarantee and from leveraged direct lending that make it straightforward to calculate the guarantee value. The government's year two cash flow is identical to if it had made a risky loan of EUR 80,000 directly and funded it by issuing a zero-coupon bond with a face value of EUR $80{,}000 \times (1 + .8 \times .03 + .2 \times .07)^2$.

One can again calculate the net present value of cash flows at time 0 for each entity. For the government, the present value is: $80{,}000 \times (1 + .8 \times .03 + .2 \times .07)^2/(1.07)^2 - 80{,}000 \times (1 + .8 \times .03 + .2 \times .07)^2/(1.03)^2 = 75{,}286.51 - 81{,}247.54 = -5{,}961.04$. Notice that the guaranteed portion of the promised payment is discounted at a higher rate than the obligation of the government to repay its own debt. The government subsidy is 5,961.04 (or subsidy element of 5.96), lower than in the case of a 100% guarantee. That might be expected since there is less risk exposure. However, a partially offsetting effect is that the guaranteed rate of return to the lender is higher on the guaranteed portion of the loan. The borrower subsidy is the difference between the principal of 100,000 and the present value of the promised payment, which is

approach can more accurately value such claims because it adjusts for the uneven distribution of risk. None of the programs considered here involved a senior-subordinate structure.

[28] When there is a similar program in the same country with a 100% guarantee, we take the floor rate to be the mandated rate in that program. In other instances, we start with the government borrowing rate and add to it an administrative cost spread adjusted for any fees paid or received.

$100,000 \times (1 + .8 \times .03 + .2 \times .07)^2 = 94,108.13$. The resulting borrower subsidy of 5,891.87 is smaller than for the 100% guaranteed case because the borrower is paying a higher rate.[29]

The lender subsidy is similarly calculated by discounting the guaranteed portion of the revenues at 3% and the risky portion of the revenues at 7% and comparing the result to the principal extended:

$.8 \times 100,000 \times (1 + .8 \times .03 + .2 \times .07)^2 / (1.03)^2 + .2 \times 100,000 \times (1 + .8 \times .03 + .2 \times .07)^2 / (1.07)^2 - 100,000 = 100,069.2 - 100,000 = 69.2$

The very small lender subsidy reflects the aim of setting the interest rate so that the value of the subsidy accrues to the borrower and not to the lender.[30]

3.2.6. Adjusting lender subsidies for administrative costs

The analysis thus far has abstracted from the administrative costs of lending. A guaranteed lender, or the government as a direct lender, incurs expenses for origination, servicing and collection on defaulted loans. Guaranteed lenders must be compensated for those expenses, else they would not participate in the program. However, depending on the size of fees and who pays them, the fees can generate additional subsidies and alter the incidence of subsidies between borrowers and lenders.

Governments compensate lenders for program participation in a combination of ways, including mandating a higher borrowing rate, allowing additional borrower fees to be charged, or with direct payments. When payments from the government to lenders offset all or part of normal administrative costs, the value of those payments becomes part of the borrower subsidy. In such instances, not only do borrowers benefit from a below-market interest rate with regards to risk pricing, but they also benefit from avoided fees.

However, when total payments to lenders exceed normal administrative costs plus compensation for any risk-bearing, then there is a lender subsidy element, as illustrated in some of the above examples.

[29] We assume that the fair market rate does not change with the increase in the rate charged to the borrower. Whether the market rate would be higher or lower than before is unclear. To the extent that the higher rate causes defaults to increase, the market rate would be higher. However, when lenders retain an interest in the loan, they have more incentive to lend more selectively and that may reduce the incidence of defaults.

[30] The small subsidy reported in this example arises from the non-linearity of the calculations. An alternative approach would be to solve for the interest rate that would cause the lender subsidy to be exactly zero. For programs that allowed lenders to recover normal administrative costs, we adjust the assumed borrowing rate to allow for cost recovery.

To establish the size of subsidies to lenders, we need to estimate a normal level of administrative costs. Those costs are assumed to have two components, an upfront fixed cost and a variable annual cost, both scaled by loan principal. The fixed component accounts for origination costs and any future collection costs. The variable annual component covers periodic expenses such as servicing the loans.

The effect on the subsidy element of periodic fees such as guarantee fees is sensitive to the rate used to discount them. Future fee payments are risky because they will typically stop when a loan defaults, and the government guarantee doesn't provide any compensation for lost fees. Whether the fees are rolled into the quoted interest rate or assessed as annual add-ons, the risk is closely related to that of the underlying loan.[31] Hence, fees are discounted at the assessed fair market borrowing rate.

3.3. Further considerations for inferring discount rates and cash flows

3.3.1. Discount rates and cash flows

Although discounting promised cash flows at promised rates is straightforward, identifying the inputs for these calculations is challenging. Government-supported loans are often quite different than private sector offerings, for instance often having longer maturities and riskier borrowers. The interest rates and other terms on private sector loans are almost never disclosed (including for the loans made under the programs analyzed here). That necessitates relying on more aggregated data, such as bond credit spreads, credit card rates, and average bank lending rates to make inferences. Nevertheless, consideration of borrower and program characteristics can be judgmentally mapped to observable market data, and the sensitivity analysis illustrates how the costs reported vary with the choice of rates and other assumptions.

Several objectives broadly guided the selection of the various interest rates used. An important goal was to produce unbiased estimates that reflected available market information around the time the programs were introduced. Another was to use the same or similar assumptions across similar programs, unless there was an objective reason to make a distinction. For example, the variable cost of servicing loans was assumed to be the same across all programs, but variation in government interest rates across countries created differences in the base level of interest rates. Choosing consistent assumptions about variables where specific information was not available makes more apparent the features driving cost differentials between programs.

We avoided using reference interest rates that were elevated due to financial market distress, as doing so would have been inconsistent with fair value principles. Financial markets appeared to function normally during most of the pandemic. However, there was a sharp spike in credit spreads around the time when

[31] The riskiness of the fees is somewhat higher than for the underlying loan because there is no recovery value in default.

the pandemic was declared by the WHO in March 2020. For example, in the U.S. the rate spread on high yield bonds, which was hovering around 4% in late February, climbed rapidly to a peak of 11% on March 23. By mid-April, it dropped to 8%. It fell to 6% by the first week of June and stayed in the 5-6% range through the beginning of November. Credit markets in other countries also experienced temporary rate spikes. We did not use the highly elevated March rates for any of the base case calculations on the grounds that the spike may have reflected a temporary period of market disruption rather than a sharp increase in expected defaults.

As noted earlier, administrative costs and fees have a significant effect on subsidy estimates and add another dimension of complexity to the analysis. In some programs, the quoted interest rate is set to cover administrative costs, whereas for others, fees or other charges substitute for higher rates. In general, discount rates inferred from secondary market price data (e.g., from bond market prices) don't include the associated administrative costs, whereas loan rates may be set to cover non-interest expenses, and adjustments are made for those differences. Fees vary across programs and may include a combination of upfront and periodic fees. Fee payments flow in a variety of directions: from the government to lenders, from lenders to the government, and from borrowers to lenders. Capturing the size and flow of these payments accurately is important for assessing both borrow and lender subsidies. As for other model inputs, we used the same or similar assumptions across similar programs unless there was an objective reason to make a distinction, so as to avoid adding noise into comparisons of the drivers of costs in the different programs.

3.3.2. Standardized parameters

In the absence of specific data for a program or country, parameters are set to standardized values based on available information. For loan guarantees, several different interest rates are needed to impute promised cash flows and discount rates. Those include a base government rate, the fair market lending rate, the lending rate charged to borrowers, and the bank's cost of borrowed funds. The term structure of government bonds is observable for each country and provides the base rate.

The fair market lending rate is based on an assumed credit spread over the base government rate. For the SME programs with minimal screening and with 100% guarantees, the spread is set to 15%. Many borrowers in those programs could not have obtained a traditional bank loan even before the pandemic, and so were more akin to unsecured individual borrowers. For that reason, one reference point is the low end of unsecured credit card spreads. Another reference point is the ICE BofA US high yield index, which exceeded 15% for most of the period during which lending occurred. For programs aimed at small to medium-sized firms that featured an 80 to 90% guarantee with tighter eligibility requirements and some

screening, we set the credit spread to 10%.[32] An additional reference point here is the ICE BofA US BB US High Yield Index Option-Adjusted Spread, which ranged between 4% and 6% for most of the lending period, The loans in these programs were less risky than those in the 100% guarantee programs, but riskier than BB-rated bonds. The programs aimed at large firms involved the highest level of scrutiny, the possibility of collateral, and were only 70% guaranteed. For those the fair credit spread was set to 6%, roughly in line with the BB spread index.

The lending rate charged to borrowers (the "borrower rate") was fixed by program rules for some of the SME programs. For most of the others, banks were allowed to set borrower rates to recover their costs, but the value of the guarantee was supposed to be passed through to borrowers. Some programs capped the rate that could be charged. For programs where a pass-through of guarantee value was mandated, we solved for a borrower rate that approximately covered the banks' funding, risk-bearing and administrative costs. We assume banks' own borrowing rates are 0.5 percentage points higher than the government rate.

Lender administrative costs are not directly observable. Based on the ranges reported in Berg et. al. (2016), the fixed component is set to 4% for programs directed at SMEs, 3% for those targeting medium-sized firms, and 2% for large firms. The declining schedule for fixed costs is consistent with average loan amounts that increase in firm size. The annual variable cost is set to 0.15% for all firms.

3.3.3. Loan maturities

The assumed distribution of loan maturities can have a significant effect on subsidy estimates. All else equal, subsidies increase in maturity because the annual interest savings last for longer. Whereas for some programs a specific loan maturity was mandated (e.g., 5 years), in others, maturity was flexible within a range (e.g., 3 months to 7 years). Upfront cost estimates always require making assumptions when there is latitude about allowable outcomes, as there is about loan maturities. One possibility is to use realized outcomes as a proxy for expected outcomes. However, in many cases we were unable to obtain information on the actual maturities of loans that were made. A further complication is that some programs were expanded, or repayment terms were eased over time. More fundamentally, realized outcomes may not be representative of what was most reasonable to expect at program inception. For programs where a range of maturities was permitted, we assumed that half of the loans had the maximum allowable maturity, and half had a shorter maturity. The shorter maturity was chosen so as to match the average maturity of the loans with those made to non-financial corporations for 2020Q2.

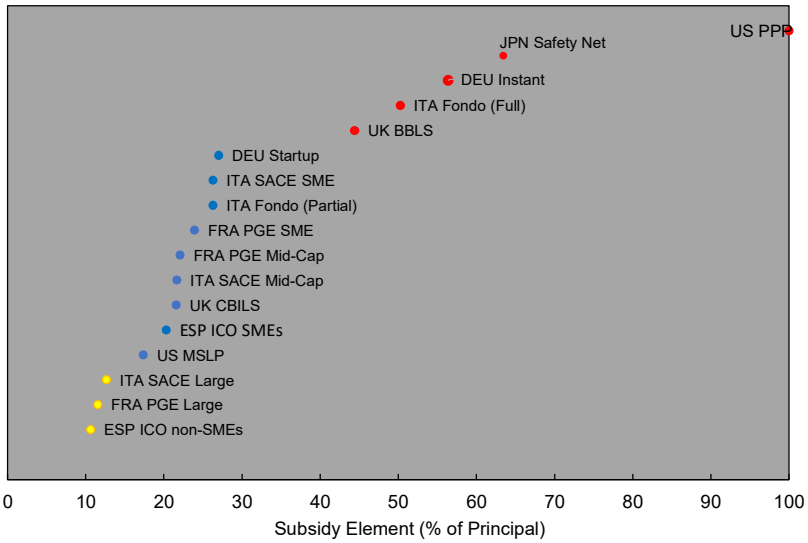
4. Subsidy Estimates for Pandemic Credit Programs

[32] The exception was that France PGE mid-caps and Italy SACE mid-caps were set to 9% to distinguish from loan schemes for SME loans, as eligible 'mid-cap' firms had much larger turnover than SMEs (between 1.5 and 5 billion euros in the case for France, and the same turnover range and more than 5,000 employees in Italy).

Most of the cost estimates reported in this section use the approach and parameters described in Section 3.3.2 and 3.3.3. We report the subsidy estimates for 13 government credit support programs, further broken down into 17 separate sub-programs.[33] For instance, for programs with multiple tiers based on firm size, such as France PGE and Italy SME support by the Central Guarantee Fund (Fondo di Garanzia), each tier is treated as a separate program, and we estimate a separate subsidy rate for each tier based on its rules and participant characteristics.

Figure 4 reports the subsidy elements for each of the sub-programs. The dots are color-coded with fully guaranteed programs in red, partial guarantee programs for SMEs and mid-caps in blue, and partial guarantee programs for large enterprises in yellow. Several patterns emerge. First, as would be expected for subsidized guarantees, the subsidy element is highly correlated with the guarantee share. For fully guaranteed loans, the subsidy rates range from 44 percent to 100 percent of principal, with the US Paycheck Protection Program (PPP) being an outlier on the high end because the loans that didn't default were likely to be forgiven. Subsidy rates for partial guaranteed loans to SMEs and mid-caps ranged from 20 to 27 percent of principal. For programs targeting large firms, the subsidy element is lower, ranging from 10 to 12 percent.

Figure 4. Total subsidy element by sub-program (as a share of loan principal)

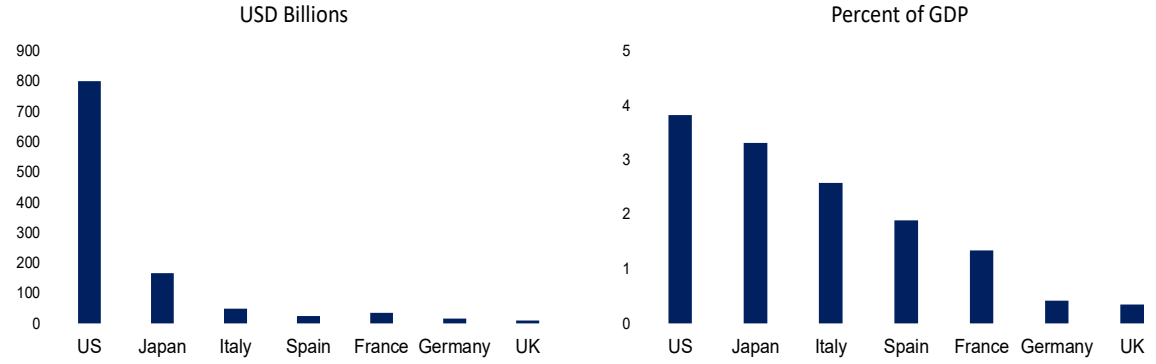


[33] The 17 programs include: US (2) Paycheck Protection Program, US Main Street Lending Program; Germany (2) Instant Loan, Entrepreneurial and Start-up Loans; Japan (1) Safety Net 4,5; UK (2) BBLS, CBILS; France (3): PGE for SMEs, PGE for Mid-Cap, PGE for large enterprises; Italy (5): Fondo Garanzia full guarantee (100%), Fondo Garanzia partial guarantee, SACE SME, SACE Mid-sized, SACE large enterprises; Spain (2): ICO non-SME and SME. In the Appendix, we also estimate the subsidy associated with the US credit support for airlines and critical industries under the CARES Act.

Note: The total subsidy element, the sum of borrower and lender subsidies as a share of loan principal, is plotted. Red dots refer to full guarantee programs. Blue dots refer to partial guarantee schemes for SMEs. Yellow dots refer to partial guarantee schemes for non-SMEs.

There are many design choices that affect the cost differences across programs. The "automatic" and "instant" nature of the fully guaranteed programs was made possible by giving lenders very limited responsibility for screening or verifying borrower eligibility. Those programs offered far below market rates to borrowers and provided relatively generous compensation to lenders. All of these features contributed to their higher subsidy rates. Cross-country differences between programs with the same guarantee share and target firm size are attributable to variations in maturities, amortization rules, fees, and other concessions. Second, as a corollary of the first observation, guarantee schemes targeting smaller firms have higher subsidy elements, reflecting that governments introduced more generous programs for SMEs.

Figure 5. Total subsidy element by country (USD billions and percent of GDP)



Note: Exchange rates (period average) and nominal GDP are for 2020, from the October WEO 2021.

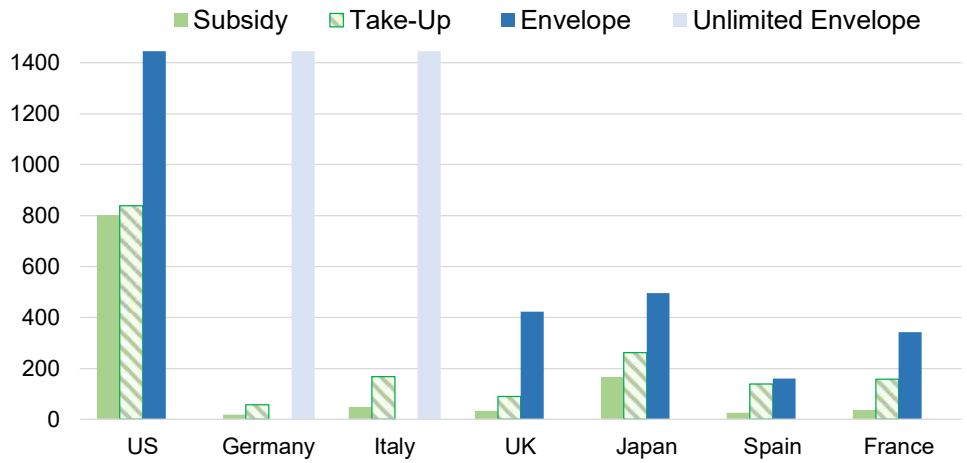
We calculate the total subsidy cost by country by multiplying the take-up for each scheme in a given country by its subsidy element and then summing up the results.[34] Figure 5 reports the results in dollar terms and as a percent of GDP. The total subsidy cost in dollar terms is the largest for the US at close to 800 billion dollars. This is followed by Japan with an estimated cost of more than 150 billion USD. The UK had the smallest cost at about 10 billion USD. When normalized by GDP, the US and Japan provided subsidies in excess of 3 percent of GDP, while other countries' subsidies ranged from 0.3 (UK) to 2.4 percent (Italy) of GDP.

[34] For most programs, information on the breakdown of take-up by firm sizes (SMEs, mid-caps or large firms) is publicly available. However, the breakdown by firm size is not available for Italy's SACE Garanzia Italia. We assume that the majority of loans disbursed (4/6) is to large firms based on the average size of loans being greater than 14 million euros. We assume weights of 1/6 and 1/6 for SMEs and medium-sized firms, respectively.

Although subsidies primarily benefited borrowers, in some cases the financial institutions that participated in guarantee programs also profited. Subsidies to financial intermediaries arise when the value of promised loan payments and net fees received exceeds the cost of funding, risk-bearing, and an allowance for a normal level of administrative costs (Berg et al. 2016; Gurara et al. 2020). For most programs, the rules required the value of the guarantees to be passed through to borrowers, and we chose borrower rates such that lender subsidies were close to zero. Significant lender subsidies only arose in programs with full guarantees and a mandated borrower rate. The subsidies to lenders were highest for the Germany KfW Instant and UK BBLS programs, with subsidy elements of 11 percent and 4 percent, respectively. For a few programs, we estimated a small negative lender subsidy. In those cases, limits on the rates charged made it impossible to fully cover assumed lender costs. Negative subsidies are unexpected because lenders would not voluntarily participate if doing so loses money. Possible explanations include lender costs that are lower than assumed, additional compensation that was not reported, or that participating at a small cost was worthwhile for political or reputational reasons.

Figure 6 summarizes the subsidy element, take-up and the envelope in USD billion for each country. 'Unused' components for Germany and Italy are not shaded to reflect that there is no legal limit to some of the guarantee programs. There is a significant variation in the subsidy element across countries. The relatively high overall US subsidy element is attributable to the 100 percent subsidy for the large PPP program, which had a correspondingly high take-up rate. By contrast, despite having a relatively low subsidy element, the take-up of credit programs in Spain was high, with very small amount of unused envelope.

Figure 6. Subsidy Element and Take-Up (USD billion)

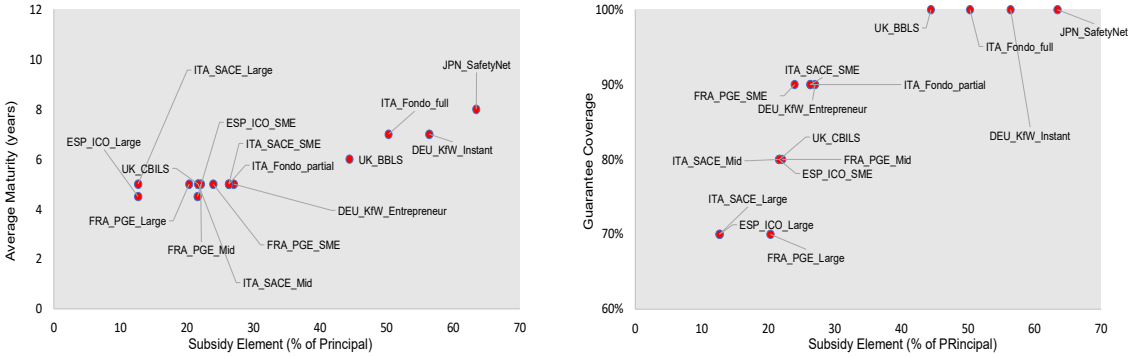


Note: The empty bars for Germany and Italy represent the unlimited legal capacity for some of the credit guarantee schemes.

In Figure 7 we plot the subsidy element against loan maturity and guarantee share. As expected, the subsidy element is positively correlated with both of those factors. All else equal, the subsidy increases when the government bears more uncompensated risk, and when the assistance extends over a longer

time period. However, the relationships are noisy because other loan and program characteristics also affect the subsidy element.

Figure 7. Relation of subsidy element to loan maturity and guarantee share



Note: The programs are the same as in Figure 5 except that the US PPP is excluded. The average maturity is calculated as described in Section 3.3.3. Guarantee coverages are reported in program disclosures.

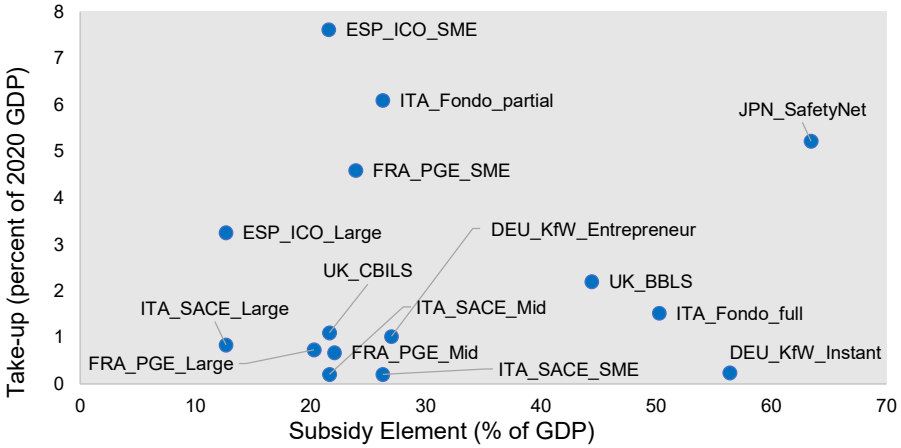
Perhaps more surprisingly, looking across schemes, there is no clear relationship between take-up and subsidy element, with take-up measured relative to GDP (Figure 8). That finding also holds for alternative measures of take-up including absolute dollar amount and percentage of the program envelope. For example, the KfW Instant Loans have a relatively low take-up rate and a relatively high subsidy element. Conversely, take-up was high for Spain's ICO SME lending program, even though the subsidy element is relatively moderate.

There are several possible explanations for the lack of correlation between subsidy element and take-up, and further analysis is needed. The total number of schemes is small, and there may be too few observations for a clear pattern to emerge. It also may be that other factors influenced the sizing of the envelope or the demand for credit. For example, Germany may have announced a credit envelope that was much larger than the potential demand with the intention of boosting confidence in the market. In some places, take-up could have been dampened by the availability of fiscal support for firms other than credit guarantee programs, as suggested by Anderson et al. 2021. Again, using the example of Germany, German workers receive more than 70 percent of his or her pay for the hours not worked, thanks to a social insurance program called *Kurzarbeit*. The program expansion during the pandemic helped alleviate liquidity issues facing firms. [35] Alternatively, the weak correlation could be due to the lower cap on loan amounts for the more heavily subsidized full guarantee schemes compared to the partial ones. For instance, the maximum amount for the UK's BBLS is GBP 50,000, compared to GBP 800,000 for the less generous UK CBILS program. In general, the more generous programs were targeting small firms that

[35] https://www.imf.org/en/News/Articles/2020/06/11/na061120-kurzarbeit-germanys-short-time-work-benefit

were limited in the amount they were allowed to borrow, and hence whereas participation numbers were high, the total amount borrowed was small relative to GDP.

Figure 8. Correlation between take-up and subsidy element by guarantee schemes



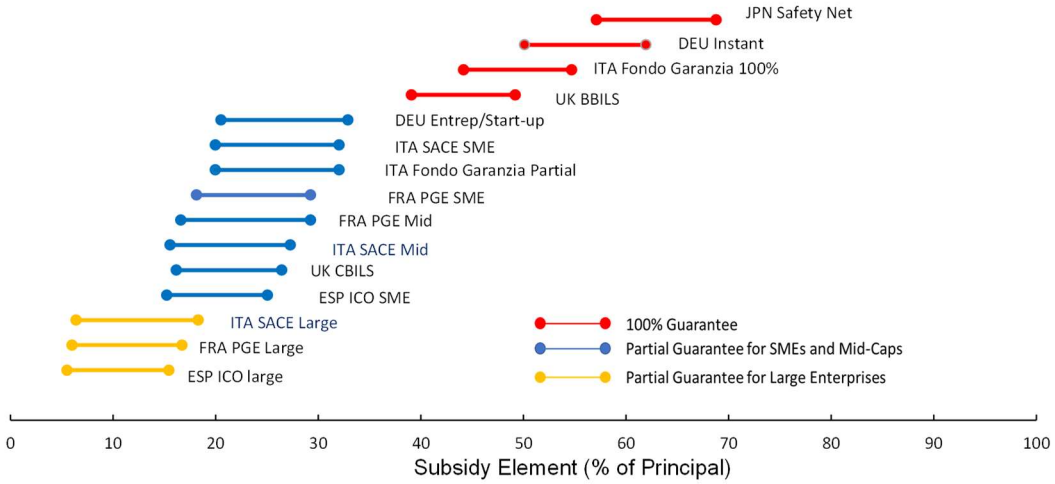
Note: Take-up rate is calculated as a share of a country's nominal GDP in 2020 from the October WEO 2021.

5. Sensitivity Analysis

In this section, we report on the sensitivity of the subsidy estimates to variations in parameters that are imprecisely precisely measured, and that potentially have a significant effect on the results. Specifically, we consider a range of values for the assumed fair market lending spread over the base government rate and for assumed loan maturity. The ranges of results shown vary across programs because of differences in the assumed range of plausible parameter values, and because of interactions with other loan characteristics such as the guarantee share.

The sensitivity of the subsidy element to variations in the assumed fair value lending spread is shown in Figure 9. Recall from Section 3.3.1 that the fair lending rate was constructed using a credit spread over the government rate of 15 percent for SMEs, 10 percent for small and mid-sized firms, and 6 percent for large firms. The ranges reported in the sensitivity analysis are based on an assumed credit spread that is 2.5 percentage points higher and lower than in the base case for each program. For example, for SME programs the calculations are redone assuming a credit spread of 12.5 percent and 17.5 percent, with all other parameters fixed at their base case values. That causes a corresponding change in the subsidy element ranging from 4.5 to 7 percentage points, with the variation across programs reflecting differences in other program characteristics like loan maturity and guarantee share.

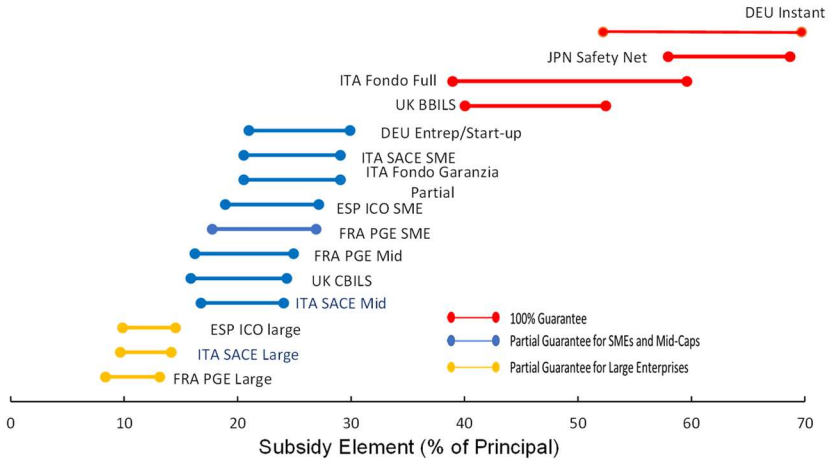
Figure 9. Sensitivity analysis: Fair-Value Lending Rate



Note: X-axis is the subsidy element for each program studied. The endpoints of each bar are calculated by applying a fair-value spread that is 2.5 percentage points lower than, and 2.5 percentage points higher, than the baseline rate spread.

The sensitivity of the subsidy element to the assumed loan maturity is reported in Figure 10. For the nine programs that had a maximum maturity of 6 years, the low end of the range is calculated under the assumption that all loans mature in 3 years, whereas the high end assumes all loans mature in 6 years. For three of the programs, the maximum maturity was 10 years. For two of those, the range is based on 4 years or 10 years. For the Japan Safety Net program, the range is based on 6 or 10 years to reflect the stated intent that the loans be long-term, and the long pre-amortization periods that made long-term borrowing more attractive. The UK BBLS was designed with a 6-year maturity, but it included the option to extend to 10 years. We take the range boundaries for that program to be 5 years and 8 years, with the lower limit reflecting the possibility of prepayments and the upper limit the possibility that a significant fraction of loans would be extended. Finally, the two Spanish programs had an original maturity of 5 years, but that was raised to 8 years several months later. For those programs, the range is based on 4 years and 7 years. The increase in the subsidy element in the Spanish programs of 5.4 percentage points from extending loan maturity from 5 to 7 years serves as an illustration of the potentially significant fiscal cost of liberalizing program rules over time.

Figure 10. Sensitivity analysis: Loan Maturity



Note: X-axis is the subsidy element for each program studied. The endpoints of each bar show the subsidy element calculated at the low-end and high-end of the chosen maturity range, which differed across programs.

For SME programs where the lending rate was fixed by the government, the division of the total subsidy between borrowers and lenders is sensitive to the assumed fixed administrative cost. However, the total subsidy is unaffected by that assumption because the effects are zero sum between borrowers and lenders: an increase in the assumed fixed cost by 1 percent lowers the lender subsidy by 1 percent and increases the borrower subsidy by 1 percent.

The reported sensitivities are based on changes that were made one parameter at a time. An alternative would have been to simultaneously move all parameters in a direction that minimized or maximized the implied subsidy elements. We chose the former approach to avoid presenting an unrealistically wide range of uncertainty. The point estimates for the base case parameters were uncertain but chosen to be unbiased, and it is highly unlikely that all of the errors would have affected the estimates in the same direction.

6. Conclusion

In this paper, we have laid out a framework for estimating the upfront cost of government credit support on a fair-value basis and applied it to assess the cost of the large-scale credit support programs rolled out by the governments of seven advanced economies to assist firms adversely affected by the COVID-19 pandemic. We estimate that the subsidies conferred totaled USD 1.1 trillion (and USD 330 billion excluding the US PPP). Dividing by the principal value of loans extended, the average subsidy element is 34 percent (and 30 percent excluding the US PPP). The subsidy element is shown to vary widely across programs as a function of program design choices such as the riskiness of target borrowers, the size of rate concessions, loan maturity, fees, and other program features.

Because credit support is outside of the normal budget process in many countries and its costs are only partially recognized by others, information on the upfront fiscal cost of these programs was largely unavailable to policymakers when it would have been the most decision relevant—when the credit programs were being designed, and when choices were being made about how much to rely on credit support relative to other forms of fiscal assistance. Although government credit support can provide valuable benefits during crisis periods (Battersby et al. 2022), in the absence of tools and regularized processes to evaluate the cost of credit support, it can appear artificially inexpensive and hence may be overused. The analysis here demonstrates the feasibility of producing credible upfront cost estimates and underscores that the unrecognized costs in the absence of such estimates are often sizable.

Beyond the upfront fiscal cost, it is also important to consider the potential longer-run fiscal consequences of these policies. At inception, with a total credit envelope reaching as much as 30 percent of GDP in some countries, these credit support measures had the potential to adversely effect on long-term fiscal sustainability. With many of the loans still outstanding, it is too soon to assess what total losses will ultimately be. However, unless there is a severe recession in the next few years, the realized losses are likely to be manageable for most countries. Nevertheless, had the economic impact of the pandemic been more severe and had take-up been higher, the eventual cost of honoring credit guarantees could have resulted in a significant fiscal burden. Importantly, large credit losses are most likely to materialize during sustained economic downturns, when fiscal resources are already strained. The fair value approach used to assess upfront fiscal cost implicitly takes into account that losses are more likely to be realized during bad times when fiscal resources are scarce and hence more valuable.

Box 1. Debt Moratorium for Firms

Although payment moratoriums or debt standstill policies are not analyzed in depth here, moratoria (both for households and non-financial corporations) provided considerable credit support in many countries.[36] According to questionnaires conducted by the European Systemic Risk Board (ESRB), the macroprudential authorities identified moratoria as the most important measures to protect NFCs and households, followed by public guarantees.

In France, Germany, Italy, and Spain, national authorities introduced legislative and non-legislative moratoria on loan repayments for business borrowers in financial difficulty. Moratoria eased short-term liquidity pressures on businesses by allowing borrowers to postpone debt repayment for some time. Loan moratoria therefore serve as a complement to the guarantee programs in easing liquidity shortages. They do so for a limited period, however. In a sample of banks that reported to the EBA, virtually all moratoria were due to expire by December 2020, and more than half had expired by September.

In Italy, public guarantees were given to bank loans covered by the moratorium. Under the Cura Italia decree of March 17, 2020, a debt moratorium was established to allow SMEs suffering from liquidity shocks to skip payments on their loans and credit lines until September 30, 2020. Financial institutions adopting the debt moratorium received public guarantees totaling 33 percent of the relevant payment obligations. The accepted moratorium requests were 1.249 million and the covered loans were worth 141 billion euros as of December 2021. As of December 3, 2021 (latest available report as of December 2022), 36 billion euros for 225,000 companies are reported to remain under moratorium.

Changes to macroprudential regulation were made as well. Extraordinary prudential treatment of loans under moratoria was activated by the European Bank Association (EBA) whereby loans under moratoria are deemed eligible under the EBA guidelines. Classification as forborne or defaulted based on the 90-day-past-due criterion was not automatic.

The subsidy cost of a debt moratorium or forbearance program depends on how it is structured. When the government pays lenders in lieu of the borrower for some period of time, and if it does not expect to fully recover the full value of those amounts, then the programs involve a subsidy. The provision of loan guarantees on loans under the Italian moratorium also provided a subsidy. The fair value of such subsidies can be estimated similarly to credit guarantees or direct loans. Sometimes forbearance by creditors is mandated and uncompensated. In such cases, while there is no direct subsidy cost to the government, the mandate is effectively a tax on lenders.

[36] See Cherry et. al. 2021 for an analysis of the effects of household forbearance programs in the U.S.

Annex I. Selected Program Information

This Appendix provides additional information about the programs for which subsidies were estimated.

1. France

France introduced a tiered guarantee scheme (Le prêt garanti par l'État, or PGE). The guarantees were provided by the Ministry of the Economy and Finance, and the program was operated by the French development bank, Bpifrance. The total credit envelope was EUR300 billion, and take-up as of February 10, 2022, was EUR143 billion.

PGE was made available for businesses of all sizes and sectors whose revenues were negatively affected by COVID-19. As of January 8, 2022, nearly 700,000 enterprises participated in the program. While it was initially envisioned that the program would last until the end of June 2021, the deadline for applications was extended several times and ended in June 2022.[37] Guarantee terms differ depending on firm size, with (i) 90 percent coverage for micro-enterprises and employing less than 5,000 employees in France with a turnover under €1.5 billion; (ii) 80 percent coverage for firms with a turnover between €1.5 billion to €5 billion; and (iii) 70 percent coverage for firms with a turnover over €5 billion. Total disbursement (as of January 2022) is about €143 billion, with an average loan size of €204,500. For SMEs, most SMEs was charged an interest rate of 0 percent in the first year. From the second year on, the interest rate could be set freely by the lenders, but in September 2020, banks committed to maximum rates (including guarantee fees outlined by the EU Temporary Framework) so that the interest rates can range between 1 to 2.5 percent. The maximum loan maturity is 6 years. For SMEs, lenders are responsible for ensuring the borrower's quality and eligibility, but the program requires that the lender's assessment be light and conducted within 5 days. The maximum amount of guaranteed loans for individual firms follows the Temporary Framework, equivalent to 25% of annual turnover, with some exceptions for young firms and firms with seasonal sectors.

- **2. Germany**

Germany introduced various federal and regional loan guarantee programs to support businesses affected by the pandemic. In this paper, we focus on the three programs introduced by the KfW (Kreditanstalt für Wiederaufbau) to help SMEs.

The 'KfW coronavirus aid' is comprised of four different loan guarantee schemes that targeted different types of firms: (i) KfW Instant loans (100 percent guarantee); (ii) KfW Entrepreneurial loans; (iii) ERP start-

[37] A new guarantee program "Le PGE resilience" was introduced in April 8 to support firms affected by the war in Ukraine, and will continue until December 2022 (https://www.economie.gouv.fr/covid19-soutien-entreprises/les-mesures/plan-de-soutien-aux-entreprises-francaises-exportatrices).

up loans; and (iv) direct participation for syndicate financing.[38] We estimate the subsidy element for the first three programs and combine (ii) and (iii) in the analysis because these programs offered similar loan terms to borrowers of similarly sized enterprises. The federal government announced that there is no cap on total guarantees provided by KfW and therefore, the government, for businesses in need. The actual treasury guarantee of the KfW was increased by €150 billion in March 2020. For the three programs, about €42 billion has been committed as of August 2021, with 98 percent of applications and commitments from SMEs. The median loan amount is below €100,000.

KfW Instant loans were available to all active companies in Germany. The initial maximum loan was up to 3 months of turnover, with a maximum of €300,000 for firms with less than 10 employees, €500,000 for employees numbering between 10 and 50, and €800,000 for the rest. In April 2021, the maximum loan amount was increased to €1.8 million for companies with more than 50 employees, with a maximum of €1.125 million for firms with 10 to 50 employees and €675,000 for companies with up to 10 employees. It is a term loan with the government's mandated borrowing rate at 3 percent with a 10-year maturity. KfW provides a 100 percent guarantee for the loans, which is backed up by a guarantee from the German Federal Government.

This was in most respects the most generous of the German credit programs. With a 100 percent guarantee coverage, the credit approval was relaxed without any additional credit risk assessment by the bank or KfW in order to allow for quick disbursement. Principal payments were deferred for up to 2 years. The interest rate was fixed at 3 percent. Guarantee fees were subject to the EU temporary framework. Despite the generous terms, the take-up was relatively low at €8.1 billion (as of August 2021).

KfW launched two programs with a partial guarantee of 80 to 90 percent and higher maximum loan amounts. Lenders could determine the interest rate, with the proviso that the value of the guarantee be passed through to borrowers. The 'KfW start-up loans' targeted young companies that had been on the market for less than 5 years, and the 'KfW entrepreneurial loans' were for firms older than 5 years. The guarantee share is tiered based on firm size, with larger firms receiving an 80 percent guarantee and smaller firms receiving a 90 percent guarantee. The maximum loan amount is €100 million, while the loan amount could not exceed 25 percent of the annual turnover in 2019 or double the wage costs in 2019, the current financing requirement for the next 18 months for SMEs and 12 months for large enterprises, or 50 percent of a company's total debt if loans exceed €25 million. Total take-up, combining both programs, is €34.1 billion as of August 2021. Deferral of principal repayment (pre-amortization) is allowed for up to 2 years. Take-up under these programs was EUR34.1 billion as of August 2021.

[38] Official Source: https://www.kfw.de/inlandsfoerderung/Companies/KfW-Corona-Hilfe/

3. Italy

The Italian government introduced several credit support measures, operated and managed by various government organizations, to provide liquidity support for firms hit by the pandemic. For SMEs, the decree "Cura Italia" (March 17, 2020) was introduced to provide public guarantees for corporate lending, and public guarantees to support its debt moratorium through the Central Guarantee Fund (Fondo Centrale di Garanzia). In our analysis, we estimate the subsidy element of public guarantees only, not including debt moratorium. On April 8, 2020, the decree "Liquidità" was established to increase the envelope for guarantees for SMEs through the Central Guarantee Fund. The decree also established a new guarantee program for Italian SMEs and large corporations, "Garanzia Italia" to be administered by SACE, an export credit agency owned by the Italian government. SACE provided different schemes to support business continuity, i.e., support for working capital and the provision of soft loans.

3.1 Finanziamenti garantiti dal Fondo Centrale di Garanzia (FCG)

Initially, the credit guarantee programs in the central guarantee fund (Fondo Centrale di Garanzia) had an envelope of €100 billion. Also provided was €220 billion for public guarantees for debt moratorium for SMEs. Over time, the endowment to the Guarantee Fund was increased and the ceiling on the credit envelope for guaranteed loans was removed, implying that there was no legal limit to the guaranteed loans.

The Fondo Centrale programs included in our subsidy estimates are the public guarantee schemes targeted at SMEs and smaller firms with less than 500 employees, experiencing liquidity constraints as a direct consequence of the pandemic.[39] Guarantee coverage was tiered into three groups: (i) 100 percent guarantee for loans up to €30,000; (ii) 90 percent guarantee for loans up to €5 million; and (iii) 80 percent guarantees on restructured loans up to €5 million. The maximum maturity also differed by firm size, with fully guaranteed loans allowed the longest maximum maturity of 10 years. As of December 31, 2021, the take-up in these programs was EUR151.1 billion.[40] The full guarantee scheme offered a maximum loan maturity of 10 years. For the fully guaranteed loans, the law allowed the FCG to refrain from normal credit assessment. Loans made under the 90% guarantee scheme of up to 5 million euros had a fixed maturity of 6 years and were subject to some review. However, the 90% guarantee scheme allowed larger loan sizes and had more take-up.

[39] Our subsidy estimates only include loans made under the SME guarantee programs provided by the Fondo Centrale de Garanzia and SACE's Garanzia Italia; the costs of supporting the debt moratorium, and for the 70% restructuring program were not included. We also did not include the 80 percent guarantees for restructured loans in our analysis.

[40] Official Source: https://www.bancaditalia.it/focus/covid-19/tabelle-moratorie.pdf

Government administrative unit(s): Banca del Mezzogiorno – MedioCredito Centrale (fully owned by the Italian government, managing the public fund on behalf of the Ministry for Economic Development), the Italian government

3.2 SACE Garanzia Italia[41] [42]

Following the decree on April 8, 2020, SACE agreed to provide up to € 200 billion of loan guarantees. It made available guarantees for firms that were too large to apply for the central guarantee fund guarantees. To be eligible, SMEs must have first exhausted their ability to access the central guarantee fund. The guarantee coverage varied according to firm size, with a 90 percent guarantee for companies with fewer than 5,000 employees and a turnover of less than €1.5 billion, an 80 percent guarantee for larger companies with a turnover between €1.5 billion and €5 billion, and a 70 percent guarantees for very large companies with a turnover higher than €5 billion. Pre-amortization of 36 months is permitted. The application was automatically approved for smaller forms with employees fewer than 5,000 employees. However, for loans for larger enterprises, SACE is responsible for its own credit risk assessment and is subject to approval from the Ministry of Finance.

According to the SACE financial statement for 2020, through "Garanzia Italia", 1,401 guarantees were issued for a total take-up of € 20.8 billion, with guaranteed principal of €17.8 billion, implying an average 86% guarantee. The average guarantee amount per each loan is about €14 million, suggesting that the main beneficiaries of this particular SACE scheme were large enterprises.[43] Since the precise breakdown by firm size could not have been known at program inception and it is not publicly available even now, we make an assumption about the distribution of loan disbursements by firm size as follows: 1/6 of loans are for SMEs, 1/6 of loans are for medium-sized firms, and 4/6 are for large enterprises.

4. Japan

Support for SMEs by the Japanese government was expanded over time, with announcements of an emergency package (March 10, 2020), the first (April 7, 2020) and second supplementary budgets (May 27, 2020).

On March 10, the government announced a further package with several measures directed at SMEs including a specific guarantee program for firms affected by the pandemic with a decline in profits and sales. The Japan Federation of Credit Guarantee Corporations (JFC) would guarantee the full loan amount

[41] Official Source: 2020 Financial Statement of SACE (https://www.sace.it/en/about-us/our-numbers)

[42] Other useful reference: https://www.whitecase.com/publications/alert/state-art-italian-liquidity-measures-keeping-italian-companies-alive-2021

[43] Fiat Chrysler Automobiles received loans from SACE totaling US$7 billion (https://www.reuters.com/article/us-health-coronavirus-fiat-chrysler-loan/italys-credit-agency-sace-approves-state-guarantees-for-fca-7-billion-bank-loan-source-idUSKBN2343HI).

(100 percent guarantee) for such SMEs, under the Safety Net No. 4 for Financing Guarantees.[44] The maximum loan amount of Safety Net Loan for an SME is 720 million Yen (approximately USD 6.7 million per firm). Loan maturity was limited to 15 years for capital expenditures or eight years for operating costs. No principal payment was required for the first five years.

On April 7, the government announced the first supplementary budget for FY2020, called the "Emergency Economic Measures to Cope with COVID-19." It included additional support for SMEs including cash benefits for firms suffering from earnings losses, a one-year moratorium for tax and social security charges, and support for teleworking. METI also introduced an interest subsidy program (特別利子補給制度). The interest subsidy program was applicable for SMEs facing more than a 15 percent decrease in sales so that these firms can either refinance their current debt to interest-free loans or borrow from private financial institutions at interest-free loans without collateral and with a grace period of up to five years for principal.[45]

On May 27, a second supplementary budget for FY2020 was announced, including an additional boost to off-budget measures and quasi-fiscal activities such as enhanced emergency loans and credit guarantees, as well as direct support for SMEs such as a rent subsidy and the subsidy for special paid leaves due to business closures.

The announced envelope for credit guarantee programs (with participations of private banks) is JPY 53 trillion, and the guarantee limit per loan was 280 million yen.[46] The total take-up was JPY 28 trillion as of the end of 2020.

5. Spain

According to the Royal Decree Law 8/2020 of March 17 and the Royal Decree Law 25/2020 of July 3, the Spanish government approved the launch of two credit guarantee programs with a combined envelope of €140 billion (€100 billion initially) to support self-employed workers and businesses affected by COVID-19.[47] The first package, ICO Líneas Avales "Liquidez" COVID 19 (El Real Decreto-ley 8/2020 de marzo), was introduced to support businesses' liquidity (working capital) needs. The second package, ICO Líneas Avales "Inversión y actividad" (El Real Decreto-ley 25/2020, de 3 de julio), provided guarantee lines to

[44] Measure for Supporting SMEs Affected by Novel Coronavirus to be Taken (Designation of Areas Subject to No.4 Safety Nets for Financing Guarantee) (meti.go.jp)

[45] Official Source: Acceptance of Requests for Consultation from SMEs, Small Enterprises and Other Entities Affected by Novel Coronavirus Disease to Start; Concerning Support Measures for Financing and Subsidy Program for Sustaining Businesses (meti.go.jp)

[46] Source: https://www.meti.go.jp/press/2019/03/20200311007/20200311007.html

[47] Official Source: https://www.ico.es/web/guest/ico/informes-seguimiento-linea-avales

fund new investment projects by SMEs. As of December 31, 2021, more than 1.1 million firms have benefited, of which 98 percent are self-employed and SMEs. The programs were administered by the Instituto de Crédito Oficial (ICO), Ministry of the Economic Affairs and Digital Transformation. Take-up totalled €13.5 billion (as of December 31, 2021).

5.1 ICO Líneas Avales "Liquidez" COVID 19 (El Real Decreto-ley 8/2020 de marzo)

In the liquidity program, the guarantee share varies by firm size, with SMEs receiving an 80 percent guarantee, and newly issued loans to large corporations receiving a 70 percent guarantee. Guarantee maturity was initially set at five years and later extended to eight years. In order to be eligible for the loans, firms had to self-declare their working capital needs. As of December 31, 2021, there were 619,118 participants and total take-up of €121.9 billion. 90 percent of participating companies are micro-enterprises and self-employed.

5.2 ICO Líneas Avales "Inversión y actividad" (El Real Decreto-ley 25/2020, de 3 de julio)

Loan conditions for the ICO Líneas Avales "Inversión y actividad" are the same as for the liquidity program described above. Its purpose was to provide financing for current and capital expenses with new investments, the expansion, adaptation or renewal of equipment, facilities and capacities. Firms were required to demonstrate an investment need. As of December 31, 2021, there were102,755 participants and take-up was €13.5 billion. 90 percent of companies with formalized operations are micro-enterprises or self-employed individuals.

6. United Kingdom

The U.K. instituted three major credit guarantee programs, distinguished by the size range of commercial enterprises served and by the terms for borrowers and lenders. All three were under the auspices of the government-owned British Business Bank, with costs covered by HM Treasury. In addition, the Bank of England created a facility to provide liquidity to larger firms through commercial paper purchases, also with backing from HM Treasury to cover losses. The envelope was GBP 330 billion for all four programs.

6.1 Bounce Back Loan Scheme (BBLS)

The BBLS provided loans from banks and other authorized lenders to businesses that had been negatively impacted by COVID-19. Participants were primarily SMEs and micro-enterprises, but the program was open to most businesses. The rate paid by borrowers was fixed at 2.5%, and no guarantee fees were charged. Loans ranged in size from GBP 2,000 to GBP 50,000, with an average of GBP 30,390. An individual firm's borrowing limit was 25% of turnover. Loans had a maturity of 6 years, with an option to extend repayment. The government covered the first 12 months of interest, and no principal repayment was required in the first year. Borrowers were able to self-attest to their eligibility, and lenders were not obligated to review borrowers' plans or decisions. No collateral was required and there was no recourse to

personal assets in most instances. There were few restrictions on the use of the funds. The loans were 100% guaranteed.

More than 1.5 million loans were approved under the scheme between May 2020 at its inception and May 2021 when the program closed. Overall, lenders approved 74% of loan applications received. Total take-up was GBP 46.53 billion.

6.2 Commercial Business Interruption Loan Scheme (CBILS)

The Commercial Business Interruption Loan Scheme (CBILS) Also guaranteed loans from banks and other authorized lenders to SMEs that had been negatively impacted by COVID-19. Eligibility was restricted to businesses with a maximum annual turnover of GBP 45 million. The program is best understood as offering assistance on much larger loans than the BBLS, but at less favorable terms and with more lender oversight and control.[48] Loans ranged in size from GBP 50,000 to GBP 5 million, and averaged GBP 237,000. The loans were 80 percent guaranteed. Borrowers had to present a viable plan to the lender, and some regulatory requirements that had been waived for the BBLS program were in force. Lenders determined the rates and fees charged to borrowers, subject to the restriction that the net value of the guarantee had to be entirely passed through to the borrower. Lenders were charged a guarantee rate that was a function of loan maturity. The guarantee fee was set to be consistent with a maturity distribution around 4 years.[49] No guarantee fees were directly charged to borrowers although they were assumed to be passed through in the interest rates charged. Loans types included overdrafts and invoice finance facilities and asset finance facilities as well as term loans. Allowable maturities ranged from 3 months to 6 years. The government covered the first 12 months of interest and fees. Other features included a limit on refinancing of 20% of the proceeds, and some limited personal guarantees on larger loans.

In comparison to the BBLS, the substantially lower borrower subsidy in the CBILS can be attributed to the lower guarantee percentage, the guarantee fees, and greater borrower screening as reflected in a lower fair value rate. The small lender subsidy is consistent with the rules prohibiting lenders from directly profiting from the program and oversight by the BBB to ensure that lenders complied.

6.3 Commercial Large Business Interruption Loan (CLBILS)

[48] A business was not able to take out a BBLS facility if they had been approved for a CBILS facility, and vice versa, but they could pay off a CBILS loan with a BBLS loan. A CBILS loan also precluded participating in the CCFF.

[49] We have not found data on the distribution of loan types or maturities but assume loans at the longer end of the allowable range were more desirable. The guarantee fee schedule is 25bps for facilities of 12 months or less, 50bps for facilities lasting from 12 months up to 3 years and 100bps for facilities lasting 3-8 years.

The CLBILS offered credit assistance to larger enterprises that had been negatively impacted by COVID-19. In most respects it was similar in structure and intent to CBILS, but it covered much larger loans and placed several additional restrictions on borrowers. Loan size was capped at GBP 200 million and for each firm limited by turnover or the annual wage bill. Loan maturity was capped at 3 years, and firms were restricted from making dividend payments while the loans were outstanding. As with CBILS, the loans had an 80% guarantee and lenders paid a guarantee fee. The government paid the first-year interest and fees up to a cap of GBP 800,000. Lenders were responsible for due diligence and had flexibility in setting rates and fees, with the restriction that the net value of the guarantee be passed through to borrowers.

Lenders made 716 CLBILS loans in total. Total take-up was GDP 5.3 billion, and average loan size was GBP 7.4 million. The approval rate was higher than for CBILS, at 63%. For comparison, there are 46,000 businesses in the UK classified as medium, and 8,000 businesses in the UK classified as large (by number of employees), with total turnover of GDP 2,789 billion.[50]

The low usage of this facility suggests that most larger enterprises that wanted to borrow were able to obtain more favorable terms outside of the program or preferred to participate in one of the other government-backed credit schemes (a firm could only use one program). Businesses that did use the CLBILS presumably benefited from more favorable loan terms or increased access to funding.

Because of its structural similarity to the CBILS and absent additional information to refine the assumptions, we take the subsidy rate and multipliers to be the same as for the CBILS program in calculating total UK subsidies.

6.4 Covid Corporate Financing Facility (CCFF)

The Covid Corporate Financing Facility (CCFF) was designed to support liquidity among larger investment-grade non-financial firms affected by disruption to their cash flows from the pandemic through the direct purchase of commercial paper (CP). The facility was open for new purchases from May 2020 to May 2021. The CP issued had a maturity date of March 2022, but could be prepaid.

Unlike most central bank liquidity facilities where credit risk is largely mitigated by collateral or very short maturities, the CCFF exposed the government to potentially significant losses. The rates charged to issuers were linked to their credit quality, and rates ranged from OIS plus 20 to 60 basis points.[51]

CCFF take-up was £37 billion. 107 different companies issued CP to the BoE, with peak issuance of over £20 billion in May 2020. The facility also provided back-up liquidity to other firms. Over £85 billion of borrowing limits to over 230 companies were approved.

[50] https://researchbriefings.files.parliament.uk/documents/SN06152/SN06152.pdf

[51] OIS is an overnight collateralized rate.

The precise subsidy value is difficult to ascertain. Around the time of peak issuance in the program, market commercial paper spreads had risen sharply, by more than 100 basis points for the lower end of investment-grade CP ratings. To the extent that the rate spike was caused by panic or market disruption rather than a reassessment of expected loss rates, the market rates would have exceeded fair value rates. While it is impossible to know by how much, we calculate a conservative subsidy range for the program based on underpricing on the CP purchased between 15 and 30 basis points, and on the approved but unused lines of 10 to 20 basis points. Assuming an average maturity of 1.5 years, the implied subsidy cost is between GBP 0.155 and 0.311 billion.

7. United States

The U.S. government enacted several new credit support programs as part of its fiscal response to the pandemic. The largest and most popular was the highly subsidized Paycheck Protection Program (PPP) which was directed at small enterprises. The CARES Act, the first major fiscal package that provided pandemic relief, also included a direct loan program for airlines and critical industries operated by Treasury, and several direct loan programs for businesses that were operated by the Federal Reserve.

In addition to the credit programs that served commercial enterprises and that are covered in this analysis, significant credit assistance was provided to U.S. households in the form of forbearance on an envelope of $1.6 trillion of federally-backed student loans and over $5 trillion of federally-backed residential mortgages, but those are not included in this analysis.

7.1 Paycheck Protection Program (PPP)

The PPP is a loan guarantee program administered by the U.S. Small Business Administration (SBA). Small enterprises with less than 500 employees could apply to the program free of charge. The loans, which carried a 1% interest rate and no other fees, were forgivable if certain conditions were met. Those included retaining or rehiring employees for a period of several months. The maximum loan size was based on a multiple of average monthly payroll in 2019 and other conditions and capped at USD 10 million. Loans made in 2020 averaged USD 101,000, and those made in 2021 averaged USD 42,000. Loan maturities were initially set at 2 years, and later increased to 5 years. Principal and interest payments were deferred until at least the first forgiveness eligibility date.

Loans were made by banks and other authorized financial institutions.[52] A lender's primary administrative responsibility was to receive (but not to verify) borrower certifications and representations. The loans had a 100 percent guarantee. Lenders receives fees for processing PPP loans of: 5 percent for loans of not more than $350,000; 3 percent for loans of more than $350,000 and less than $2,000,000; and 1 percent

[52] Lender information is from https://home.treasury.gov/system/files/136/PPP%20Lender%20Information%20Fact%20Sheet.pdf

for loans of at least $2,000,000. The fees were paid upon final disbursement. The Federal Reserve created a secondary market facility to buy the loans from banks, creating a ready source of funding for banks that needed it.

The program had an initial envelope of USD 349 billion, which was expanded twice by subsequent legislation that also relaxed forgiveness requirements and permitted additional draws by borrowers if certain conditions were met. The envelope stood at USD 799 billion after those increases. Distributions were on a first-come first-serve basis. The program was heavily oversubscribed, and very close to 100% of available funds were distributed.

We attribute a 100 percent subsidy element to the loans, and hence a subsidy to borrowers of USD 799 billion. The program was essentially a grant program because most borrowers could be expected to satisfy the modest requirements for forgiveness, and those that couldn't would likely be insolvent and unable to repay the loans. The government might recover some monies, but those amounts were unlikely to cover the administrative costs associated with the program, including the high cost of pursuing delinquent or fraudulent borrowers. The budgetary treatment by the US government reflected that it was essentially a grant rather than a loan program, and unlike other credit programs it was recorded as an immediate fiscal outlay.

The fees paid to financial institutions that administered the program also had a significant subsidy element. At disbursement, the program paid lenders 5% of the principal for loans under USD 350,000, 3% for loans between USD 350,000 and USD 2 million and 1% for loans over USD 2 million. Based on the minimal screening requirements, the absence of servicing obligations, the 100% credit guarantee, and federal funding support, we estimate that actual costs to lenders were considerably less than what they were paid. Assuming actual fixed costs of 2% for loans up to USD 350,000, 0.75% for loans between USD 350,000 and USD 2 million, and 0.25% for loans over USD 2 million, and based on the distribution of realized loan sizes, the subsidies to financial institutions totaled USD 19.5 billion, a 2.4 percent lender subsidy element.

7.2 Main Street Lending Program (MSLP)

The MSLP was administered by the Federal Reserve Bank of Boston (FRBB), and backed by the U.S. Treasury. The program was divided into five facilities, each with a similar structure. On behalf of the FRBB, a special purpose vehicle (SPV) purchased 95% participations in loans to small and medium-sized for-profit businesses and nonprofit organizations. The lenders, mostly banks, retained a 5 percent interest in the loans. Eligibility was based revenues of less than $5 billion and fewer than 15,000 employees, non-participation in other credit relief programs, short-term viability, best efforts retention of employees, and other conditions. Loan size was limited by leverage and an absolute cap of USD 50 million. Some uses of

funds were prohibited. The loans had a 5-year maturity, deferral of principal payments for two years[53], and deferral of interest payments for one year. Interest was set to 1 or 3-month LIBOR plus 3 percent. Loans were prepayable without penalty. Some facilities allowed an increase in the size of existing loans made to borrowers. Lenders were charged an upfront fee of 75 to 200 basis points that could be passed through to borrowers. The FRBB paid lenders 25 to 50 basis points annually for servicing the loans.

Over half of the loans were originated in December 2020. Combined loan volume totaled USD 17.5 billion over 1,830 loans, implying an average loan size of USD 9,562,842. Most of that activity, USD 12.9 billion, was concentrated in priority loans that allowed refinancing of debt owed to another lender and leverage as high as 6. New loans that allowed borrower leverage only as high as 4 accounted for $2.7 billion. The remaining $1.8 billion were in 26 expanded loans. Few loans were made to non-profits.[54] The program terminated on January 8, 2021.

The credit envelope was USD 600 billion for all five facilities. The U.S. Treasury was authorized to absorb losses up to USD 75 billion. Take-up was $17.5 billion.[55]

Unlike guarantee programs that shift losses from lenders to the government, lenders in this program received no special protection on their 5% retained stake in the loans. The loans were *pari passu*, which means that any losses were divided proportionally to ownership stake. That full exposure might suggest that lenders would be unwilling to make these loans at a below market rate. However, because the loans typically provided cash to lenders' existing customers in an amount that was 20 times greater than its participation stake, and because some or all of those funds presumably would help a borrower to meet its existing obligations and possibly avoid default, lenders could reap large benefits even if it entailed some lending at a below-market interest rate. We report the total subsidy, but because it is hard to estimate the indirect benefits that accrued to lenders from helping their existing customers, we do not attempt to impute how it is divided between borrowers and lenders. The total subsidy is estimated to be USD 3.04 billion.

7.3. Credit Support for Airlines and Critical Industries

The CARES Act provides up to $25 billion for loans and loan guarantees to passenger air carriers, repair station operators certified under 14 CFR part 145, and ticket agents; up to $4 billion for loans and loan

[53] Specifically, principal amortization was 15% at the end of the third year, 15% at the end of the fourth year, and there was a balloon payment of 70% at maturity at the end of the fifth year.

[54] See Bräuning, Falk, and Teodora Paligorova (2021). "Uptake of the Main Street Lending Program," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, April 16, 2021, https://doi.org/10.17016/2380-7172.2897.

[55] The calculation assumes a guarantee ratio of 100% of principal.

guarantees to cargo air carriers; and up to $17 billion for loans and loan guarantees to businesses critical to maintaining national security. Those programs were administered by the U.S. Treasury.

Borrowers had to agree to maintain employment levels as of March 24, 2020 to the extent practicable, and in any case not reduce their employment levels by more than 10 percent from the levels on such date, until September 30, 2020. There were also certain restrictions on employee compensation and capital distributions (repurchases and dividends) for a period of time.

In compensation for the credit support, Treasury would receive a warrant or equity instrument in the borrower, or a senior debt instrument. Warrants were mostly used for public companies; private companies provided bonds with PIK interest rate payments.

Summary information is publicly available on borrower identities, loan amounts, and contractual terms.[56] The precise terms were varied to some extent across deals. For example, Treasury agreed to lend American Airlines up to USD 7.5 billion at LIBOR + 3.5% for 5 years. American initially drew USD 550 million and took no subsequent draws. Treasury would receive warrants equal to 10% of the total loan amounts drawn. Agreements we looked at for other commercial airlines had similar terms. The rate spread for the defense industries was higher at LIBOR + 5.5%, and in place of warrants was a PIK bond that appears to have added a 3% payment to Treasury at loan maturity. We assume the loans amortized over 5 years but did not find information to verify this.

The programs had a total envelope of USD 46 billion. Approvals totaled $21.89 billion, but loan disbursements totaled only $2.678 billion. Most of the program participants borrowed the entire approved loan amount. However, the large excess of approvals over disbursements is because many of the largest and mid-size commercial airlines borrowed only a small fraction of the amounts approved.

These are direct loans, so there are no lender payments or subsidies. We assume a fair market rate for the loans was 7.5%, higher than the assumed rate on other programs geared to large corporations because of the high potential for financial distress in the airline industry. Other assumptions include a warrant value equal to 3 percent of loan principal, a subsidy on undrawn funds of 50 bps, a rate charged on drawn funds of 3.45 percent.

[56] https://home.treasury.gov/policy-issues/coronavirus/assistance-for-industry/loans-to-air-carriers-eligible-businesses-and-national-security-businesses

Annex II. Further considerations in applying fair value principles

This Annex elaborates on the conceptual and practical considerations that favor a fair value approach to estimating the cost of government credit support and addresses some of the objections that have been raised to its adoption.

A2.1 Distinction between fair value and market value

It is useful to clarify the distinction between market value and fair value. In a well-functioning financial market, fair values are calculated with reference to observed market prices or interest rates. However, sometimes even in a well-functioning market no directly comparable market data are available. For example, the government can offer loans on terms that are not available in the private sector. Less frequently, market prices or rates are judged to be poor indicators of fundamental asset value, such as during periods of financial distress or when competition between lenders becomes very limited or when credit availability altogether dries up. In such cases, the concept of fair value allows for the use of interpolation and model-based approximations. Such approximations represent a best estimate of what a price or discount rate would have been in a well-functioning financial market. Adopting a fair value rather than a market value approach for evaluating the cost of government credit support allows for adjustments to ensure that cost estimates are not inflated by distress premiums, which some would argue should not be included in legitimate costs to governments.[57]

A2.2 Recap of the conceptual case

We begin by recapping and expanding on the case outlined in Section 3 that a fair value approach is the best way to achieve grant equivalence among the leading alternatives for assessing cost. Specifically, we explain why using government rates for discounting understates the cost of credit support, and why the cost of capital for governments is similar to the cost for the private sector. Recall that the goal is to provide an upfront estimate of program cost on an accrual basis. When the present value of cash inflows to the government falls short of the present value of outflows, the difference represents the cost to the government and the subsidy to program participants.[58]

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[57] An alternative view is that one should always use market prices, even if they include a distress premium, because they are a measure of opportunity cost. Had the government sold the support for its market price, it could have used the receipts for other purposes.

[58] For direct loans cash Inflows to the government include interest payments, fees, and repayments of principal. Outflows include principal loaned out plus associated administrative costs. For guarantees, inflows include fees and recoveries, and outflows include reimbursed default losses net of collection costs and administrative expenses.

For loans and loan guarantees, uncertain default losses are often the largest source of risk. When credit is provided by a private sector institution, default losses are absorbed to the extent possible by the institution's equity holders, after which any remaining losses are borne by its debt holders. For a loan made or guaranteed by the government, taxpayers and other government stakeholders are in a first-loss position, absorbing losses either by higher future taxes or reductions in future government services. In the developed countries considered here, public debtholders are unlikely to be affected by default losses to government credit programs. That is because the public debt is protected by the government's ability to raise taxes and a credible commitment to repayment; it is not linked to any specific government activity.

The safety of government debt increases its value to investors and allows debt to be issued at relatively low interest rates. Government interest rates, like the prices of government securities, are largely unaffected by the risk of the credit support that the government extends. Using a rate inferred from the market price of a safe asset, (i.e., government debt), to assign value to a risky asset (i.e., a government loan or guarantee) is at odds with the most basic principles of economic valuation. Discounting at government rates also has the effect of treating taxpayer equity as requiring no compensation for market risk, thereby understating the full economic cost of credit support. The size of the bias will differ across credit programs, with the largest discrepancies arising for credit programs that entail the largest taxpayer exposures to market risk.

This line of reasoning leads to two main conclusions: (1) taxpayers and other government stakeholders function as equity holders in risky investments made by governments; and (2) the interest rate on the public debt is not the correct rate to use for valuing risky government investments.

A2.3 Resisting the gravitational pull of cash

Most items in government budgets are recorded on a cash rather than an accrual basis, and in the public sector the idea of cost tends to be equated to cash outlays. For many expenditures, costs on a cash or accrual basis are largely equivalent. However, when accruals and cash accounting don't agree, the reflex to equate economic cost with cash outlays can be misleading. That's because an accrual by construction represents the economic or opportunity cost of an activity, whereas a sum of outlays in different years and with different associated risks has no direct economic interpretation.

This tension between cash and economic cost tends to arise for goods and services that the government produces itself rather than buys, such as credit guarantees and loans. Some opponents of a fair value approach have expressed the view that budgetary costs should include cash outlays but not non-cash or opportunity costs. For government-produced credit assistance, default losses affect cash flows but the risk-premium is a non-cash cost. Hence, they conclude that risk premiums should not be factored into cost estimates, which precludes using a fair value approach.

A logical problem with this argument is that, if one accepts that the cost of credit assistance cannot be accurately measured by simply adding up cash flows and that an accrual approach is required, then one has already abandoned the idea that all budget-relevant costs involve actual cash flows. In fact, all discounting incorporates a non-cash charge for time value, including discounting at government rates. Furthermore, risky government investments may impose a significant non-cash cost for risk-bearing on the public, and including such costs is consistent with budgets serving as a comprehensive record of the government's draw on economic resources.

For goods and services purchased by the government, cash expenditures and fair values are generally equal. Cash and fair value cost are also equal when the government purchases credit guarantees on behalf of program beneficiaries from competitive private-sector financial intermediaries. Risk charges are routinely included in budgetary costs because they are reflected in prices charged by suppliers. When a government buys an office building or a fighter jet or a coffee maker, the price paid includes a charge for the cost of risk associated with the capital used in production. When the price of market risk is excluded from cost estimates, then it will frequently appear cheaper for the government to provide risk-bearing services than to purchase them, even when private providers have an efficiency advantage.

A2.4 All discount rates come from market prices

Despite the above observations, some still question the relevance of market prices to government discounting. However, relying on market values appears to be unavoidable, the choice is only over which market prices or rates will be used as the point of reference. Government interest rates are the leading alternative to fair market rates for calculating accruals. If market rates cannot be trusted to be reflective of social cost, neither can government interest rates, which are determined by supply and demand in the capital market. The specialness of government bonds casts doubt on the idea that the interest rates they bear should be interpreted as reflecting a pure rate of social time preference. Government bonds sell at high prices in part because of their liquidity and usefulness as collateral, and in some jurisdictions for the preferential tax treatment they receive. Government bond markets are dominated by large investors whose preferences may not be representative of those of the government or of the population at large. In sum, government interest rates reflect the value to investors of the particular characteristics of government debt and the participants in debt markets, but not the specific characteristics of the risky loans that the government invests in through its credit support programs.

A2.5 Non-risk factors in market rates

Some have suggested that while a market risk premium that compensates for undiversifiable market risk may be a legitimate government cost, some of the other factors that affect observed market rates (e.g., liquidity premiums), should not be included in government costs. That raises the possibility of risk-adjusting discount rates, but not necessarily equating risk adjustment with the use of fair value estimates.

There are conceptual and practical reasons to avoid that alternative. Conceptually, if competitive market prices are generally accepted as the best available indicators of economic value, and also from a government opportunity cost perspective, such adjustments are unnecessary and would cause cost estimates to be less comprehensive. From a practical perspective, there are no established procedures for making adjustments to isolate a pure market risk premium from observed rates and prices. The academic literature that has attempted to break down market interest rates into their component parts—pure time value, expected losses, risk premium, taxes, liquidity--has attributed widely varying weights to those different elements. A fair value standard imposes a well-established set of rules and discipline on analyst cost estimates that would be lost were other sorts of adjustments incorporated.

A2.6 Implications of market incompleteness

The issue of market incompleteness is also frequently mentioned as casting doubt on the adequacy of a fair value approach for estimating value from a government perspective. When markets are incomplete, as they undoubtedly are, purely private transactions at market prices need not result in an efficient allocation of resources, nor are market prices necessarily an accurate reflection of social value. Nevertheless, governments rely on market prices to measure the cost of most of their non-credit activities, and it is not clear how cost estimates for credit support or for other activities should be adjusted to correct for the effects of incompleteness.

However, where adjusting for incompleteness clearly becomes important is in assessing the value of program benefits. Government credit support can create value by making markets more complete, countering the effects of market frictions. For instance, limited information may shut some borrowers out of public credit markets although the social benefits of providing them market access is high. However, valuing the social benefits of the credit assistance programs created during the pandemic is outside of the scope of this analysis.

A2.7 Practical considerations

Producing transparent and credible cost estimates for credit support involves practical challenges that differ across cost accounting regimes. In most countries, limited resources are made available for cost evaluation, and staff may lack the relevant training for assessing credit programs. Although accrual estimates are intrinsically more complicated to produce than cash estimates, the task of calculating accruals can be made more manageable by standardizing procedures, investing in basic training for staff, and possibly centralizing or outsourcing that portion of the cost estimation function. Different accrual approaches differ in the complexity of execution. Superficially, it may seem that discounting at government rates is simplest because it avoids having to identify different discount rates for different programs. However, not only does discounting at government rates cause costs to be systematically understated, but it can actually entail greater complexity because it requires forecasting the probability

distribution of future cash flows. The complication of cash flow prediction can sometimes be avoided with a fair value approach, as illustrated by the estimation approach taken in this paper. Discounting at government rates also makes it harder to assess the accuracy of estimates, since there are no available comparison points in financial market data. An advantage a fair value approach is that a robust accounting infrastructure has been developed that is available to governments, and that serves to harmonize practices across reporting entities, disseminate best practices, and provide audit and other services.

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