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Research Summaries

Tax Revenue Response to the Business Cycle

Cemile Sancak, Ricardo Velloso, and Jing Xing



The recent global financial crisis confirms that long-run revenue elasticities do not hold well during sharp expansions and contractions. Tax revenue rises more strongly than the tax base during economic booms, and revenue collapses more sharply during recessions. As long-run revenue elasticities are commonly used in revenue projections, there is a tendency to overestimate revenue during contractions, and vice-versa. This article reviews a recent paper by the same authors that proposes to improve revenue forecasting by incorporating into the framework estimations of the relationship between tax revenue efficiency and the output gap. In the case of the value-added tax (VAT), the paper finds that a 1 percentage point increase in the output gap corresponds to a 1¼ percentage point increase in the efficiency of this tax or, equivalently, to a 1¾ percent increase in VAT collections.

The literature does not offer a systematic attempt to examine the response of tax revenue to the business cycle. Some studies have *(continued on page 2)*

Banking Crisis Resolution: Was this Time Different?

Luc Laeven and Fabian Valencia


While there are commonalities between the recent financial crisis and past crises both in terms of underlying causes and policy responses, the scale and scope of interventions differ. Direct fiscal costs to support the financial sector were smaller this time as a consequence of swift policy action and significant indirect support from expansionary monetary and fiscal policy, the widespread use of guarantees on liabilities, and direct purchases of assets. While these policies have reduced the real impact of the current crisis, they have increased the burden of public debt and the size of government contingent liabilities, raising concerns about fiscal sustainability in some countries.

The global financial crisis that started in the United States in 2007 has resulted in systemically important banking crises and large output losses in a number of countries despite extraordinary policy interventions. *(continued on page 4)*

Tax Revenue Response to the Business Cycle

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explored the long-term, structural determinants of the efficiency of tax collections (Agha and Haughton, 1996; De Mello, 2009), and a few others have looked into the relationship between tax compliance and the business cycle (Plumley, 1996; Cai and Liu, 2009). The paper that is the subject of this article, Sancak, Velloso, and Xing (2010), aims to fill the gap in the literature by estimating the relationship between tax revenue efficiency and the output gap, as well as the response of tax revenue collections to changes in the tax base and output gap.

The paper draws on uniquely detailed databases covering recent years. These databases allow for exploring the annual and quarterly behavior of tax collections, particularly VAT collections, for a large group of advanced and developing economies. Three data sets are used in the estimations. The first consists of annual data from 1995 to 2008 for 32 European Union (EU) countries, and the second of annual data for the same period for 84 advanced and developing economies. The third data set is comprised of quarterly data from the first quarter of 1999 to the first quarter of 2009 for 37 advanced and developing economies.

First, a simple, fixed-effects regression model is estimated—using panel data on advanced and developing economies—where tax revenue efficiency is a (linear) function of the output gap. In some specifications, the paper explores whether this association might be stronger in good times or bad times, which are defined, respectively, as periods when actual real GDP growth is above or below potential real GDP growth. A positive and significant correlation between tax revenue efficiency and the output gap raises the question of whether a decline in tax revenue efficiency during bad times might be fully reversed during good times. In other words, is the impact of bad times on tax revenue efficiency permanent? The paper tries to answer this question by interacting a "bad times" dummy variable with the output gap. In other estimates, the paper tests whether changes in tax revenue efficiency during the business cycle are more pronounced in developing than in advanced economies by interacting an advanced economy dummy variable with the output gap.

In the case of the VAT, the paper finds that a 1 percentage point increase in the output gap corresponds to a 1¼ percentage point increase in the efficiency of this tax. These results are consistent for quarterly and annual data, across advanced and developing economies, and in both good and bad times (as defined above).

Next, the paper introduces to the model above additional explanatory variables, which may affect tax revenue efficiency and provide explicit channels through which the output gap variable has an impact on tax revenue efficiency. The first such variable, the share of necessity goods in total consumption, is a proxy for shifts in consumption patterns. As incomes decline, the share in the total consumption of necessity goods—usually zero-rated or taxed at lower rates than the standard rate—increases, while the share of luxury goods decreases. Another variable, the ability to control tax evasion, is a proxy for tax compliance. During downturns, compliance may suffer as, for example, credit-constrained and financially distressed taxpayers fail to pay taxes fully. The paper also tests for possible determinants of tax evasion, such as the legal system and its observance, and the level of the tax burden.

"A key implication of this research is that—particularly during major economic booms and sharp economic downturns—policymakers should be encouraged to look beyond long-run revenue elasticities and incorporate into their analysis the effects of the economic cycle on tax revenue efficiency."

The paper finds that a worsening (improvement) in the VAT efficiency is driven by shifts in consumption patterns toward goods and services with lower (higher) VAT rates and increases (decreases) in tax evasion during contractions (expansions). Indeed, shifts in consumption patterns and tax evasion appear to be the main channels through which the output gap has an impact on the efficiency of the VAT. A closer examination of the determinants of tax evasion reveals that the VAT efficiency is positively correlated with stronger institutional underpinnings of the revenue administration, and negatively correlated with the overall tax burden in the economy.

Finally, the paper explicitly estimates tax revenue elasticities by moving the left-hand side variables in the denominator of the tax revenue efficiency ratio (i.e., the tax base and the standard tax rate) to the right-hand side. While the tax revenue response to the business cycle is presented in a simple conceptual manner in the models above, many practitioners use tax revenue elasticities for revenue forecasting.

In the case of the VAT, the paper finds that a 1 percentage point increase in the output gap corresponds to a 1¾ percent increase in VAT collections.

While the paper's main focus is on the VAT, it also examines the behavior of the efficiency of the personal income tax (PIT) and social security contributions (SSC). Measuring the efficiency of the PIT and SSC is significantly more challenging given that data for their base (wages and salaries) are not readily available (especially for developing economies); those tax handles usually have multiple tax brackets; and the presence of zero-rating and basic allowances imply different unweighted average tax rates (even though they may lead to the same level of tax collection). Estimation results for the EU countries, however, show that PIT and SSC efficiency are positively correlated with the output gap.

A key implication of this research is that—particularly during major economic booms and sharp economic downturns—policymakers should be encouraged to look beyond long-run revenue elasticities and incorporate into their analysis the effects of the economic cycle on tax revenue efficiency. Improvements in revenue forecasting would help governments have a better understanding of the likely evolution of fiscal balances and financing needs during the business cycle, thereby minimizing the potential need for abrupt corrective measures.

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IMF Economic Review

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Introduction: Economic Linkages, Spillovers, and the Financial Crisis—1
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Demand Spillovers and the Collapse of Trade in the Global Recession
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Banking Crisis Resolution: Was this Time Different?

(continued from page 1)

With the recovery from this crisis under way, questions about its causes, consequences, and resolution naturally arise.

The underlying causes of the recent crisis are still being debated, though there appears to be broad agreement that financial innovation in the form of asset securitization, government policies to increase home ownership, global imbalances, and lax monetary policy were all contributing factors to the buildup of vulnerabilities and the unfolding of the crisis (De Nicoló and others, 2010; Keys and others, 2010; Obstfeld and Rogoff, 2009; and Taylor, 2009).

A number of papers have documented stylized facts about banking crises. Caprio and others (2005) present a database on systemic and nonsystemic banking distress episodes, focusing on the costs of the crises; Duttagupta and Cashin (2008) analyze factors that generally precede a banking crisis; Laeven and Valencia (2008) improve upon existing data by adding detailed information on policy responses during systemic banking crises; and Reinhart and Rogoff (2009) present an analysis of the stages of financial crises (banking, currency, and sovereign) with data going back to the 1800s. Laeven and Valencia (2010) present new and comprehensive data on the starting dates and characteristics of systemic banking crises over the period from 1970–2009, including detailed information on policy interventions. An uncontroversial definition of a systemic banking crisis is a situation where a large fraction of banking system capital has been depleted (Caprio and others, 2005; Laeven and Valencia, 2008; and Reinhart and Rogoff, 2009). However, implementing this definition implies relying on qualitative information, given the difficulty in measuring economic losses. Laeven and Valencia (2010) propose a crisis definition based on the range and scale of policy interventions that improves upon this qualitative strategy.

Laeven and Valencia (2010)'s definition requires the fulfillment of two conditions: significant signs of financial distress in the banking system (i.e., significant bank runs, losses, and liquidations) and significant banking policy intervention measures in response to losses in the banking system, where the last component is satisfied when at least three of six conditions are met: significant liquidity support, guarantees on bank liabilities, asset purchases, nationalizations, restructuring costs, and deposit freezes and bank holidays (see Laeven and Valencia, 2010, for definitions). The year that both criteria are met marks the beginning of a systemic banking crisis.

Based on this definition, 13 countries experienced a systemic banking crisis during 2007–09: Austria, Belgium, Denmark, Germany, Iceland, Ireland, Latvia, Luxembourg, Mongolia, the Netherlands, Ukraine, United Kingdom, and the United States. Ten additional countries are listed as borderline cases, representing episodes where the definition is almost met: France, Greece, Hungary, Kazakhstan, Portugal, Russia, Slovenia, Spain, Sweden, and Switzerland. Several other countries also announced policy packages in response to the crisis, but usage of those packages was small or policy actions were not significant enough to meet the criteria. Some of the borderline cases (notably Greece) have since taken systemic proportions.

Containing and Resolving Banking Crises: Past and Present

Using the database collected by Laeven and Valencia (2010), one can compare the policy responses and costs between the current crisis and past banking crises. A first difference between the current crisis and previous ones is the predominance of high-income countries, while past crises affected mainly emerging and low-income economies. The large international networks and cross-border exposures of financial institutions in high-income countries helped propagate the crisis to other countries. Failure of any of these large financial institutions could have resulted in the failure of other systemically important institutions, either directly by imposing large losses through counterparty exposures or indirectly by causing a panic and bank runs. This prompted large-scale government interventions in the financial sector, including preemptive measures in some countries.

The policy responses during 2007–09 were qualitatively similar to those in the past. First, liquidity pressures were contained through liquidity support and guarantees on bank liabilities, and often were followed by the announcement of recapitalization packages. Quantitatively, however, liquidity support was notably lower this time around, while overall monetary expansion was substantially larger. For the current crisis, the median of liquidity support reached 5.5 percent, while the historical median is about 10 percent of deposits and foreign liabilities in the system. Lower liquidity support can in part be explained by larger financial systems this time around. Monetary expansion has been six times the median in previous crises of 1 percent—measured as the change in the ratio of the money base to GDP. The concentration of past crises among emerging and low-income countries, generally with less space to expand monetary policy without the concern of a currency crisis, explains this finding. (Jacome

(2008) presents stylized facts showing a correlation between monetary expansion and currency crises in Latin America.)

We have no records of the use of bank holidays during the recent wave of crises, while a deposit freeze was used only in the case of Latvia for deposits in Parex Bank. All resolution policies used in the current crisis (notably bank recapitalizations) were also used in past crises, although they were put in place quicker in the recent crisis. The median difference between the time it took to implement public recapitalization programs and the time that liquidity support became extensive (that is, when liquidity support exceeded 5 percent) is no months for the recent crisis compared to 12 months for past crises.

What Is the Damage?

The economic cost of the recent crisis is on average much larger than that of past crises, both in terms of output losses and increases in public debt. The median output loss for the current crisis is 25 percent, exceeding the historical median by about 5 percent. Similarly, we estimate the median increase in public debt for the recent crisis at 24 percent, while the historical median is 16 percent. Direct fiscal costs to support the financial sector (such as those arising from recapitalizations) were smaller this time at 5 percent of GDP, compared to 10 percent for past crises. These differences in part reflect differences in the size of the initial shock to the financial system, an increase in the size of financial systems over time, and the fact that the recent crisis was concentrated in high-income countries, with better financing options to expand fiscal policy and allow automatic stabilizers to operate. The capacity to conduct expansionary monetary policy, combined with relatively swift policy action regarding bank recapitalization, the widespread use of guarantees on liabilities, and asset purchases that helped sustain asset prices, allowed countries to keep direct outlays in support to the financial sector relatively low. Of course, the crisis is not over yet, and the final tab will have to be recomputed in the years ahead.

An additional consequence of the crisis has been a reorganization of the world financial map, with large players becoming significantly smaller, allowing new players to gain importance. Countries with a systemic banking crisis in 2007–09 had dominated the banking arena in 2006, with a share of close to 60 percent of the total, of which two-thirds corresponded to U.S. banks. Today, however, U.S. banks' participation reaches only 21 percent and Australia, China, Brazil, and Sweden appear now on the top-30 list.

To summarize, we first find that, unlike past crises, the recent crisis was concentrated in advanced economies, in particular those with large financial systems. Second, the speed of intervention was faster and the range of policy measures broader. Third, the costs of the recent crisis are higher in terms of output losses and increases in public debt, though direct fiscal costs associated with financial sector interventions are lower. The bias toward high-income countries during the recent crisis, with greater institutional quality, made possible a broader menu of policy options, including unconventional monetary policy, asset purchases and guarantees, and significant fiscal stimulus packages. These large-scale interventions, together with faster implementation of recapitalization programs, help explain the lower fiscal costs.

Notwithstanding the role of a large-scale policy intervention in avoiding a Great Depression, the burden of public debt and the size of government contingent liabilities increased substantially, raising concerns about fiscal sustainability in a number of countries. Moreover, the crisis is ongoing in several countries and its ultimate impact will have to be reassessed in the future.

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