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# **No Smoking Gun: Private Shareholders, Governance Rules and Central Bank Financial Behavior <sup>1</sup>**

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## Abstract

Do central banks with private shareholders differ in their financial behavior from purely public central banks? Private shareholders might bias central banks toward focusing excessively on profits, dividends and risks to their balance sheets, but their influence may also be mitigated by governance rules. We study 35 OECD central banks, including eight with private shareholders, using new data on governance rules. We find that central banks with private shareholders do not differ from their purely public counterparts in their profitability, nor are they more financially cautious in the sense of building more loss-absorbing capacity. Surprisingly, their transfers to governments out of current profits tend to be higher, not lower. We find that broader governance rules matter for financial payouts.

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## 1. Introduction

The enormous powers of central banks, manifest in the global financial crisis, have directed attention to their governance, transparency and accountability. In the U.S., some critics have called for earlier release of the full transcripts of Federal Open Market Committee meetings, while others contend that the Fed should be made to release additional balance sheet information. A bill that would have revoked audit restrictions on monetary policy decisions of the Federal Reserve was narrowly voted down in the US Senate in January 2016.<sup>2</sup>

A particular bone of contention in the U.S. case is private representation on the boards of the reserve banks (see Sanders 2016, Levin 2016, Conti-Brown 2016). The contention is that private shareholders influence decision making in a manner inconsistent with the public interest. Private shareholders drawn from the ranks of commercial banks have conflicts of interest when the question is whether to support a financial institution in distress. Private shareholders may value the profits of the central bank over its pursuit of economic and price stability. They may be interested in retaining profits in order to assure future dividends or share price increases rather than transferring them to the treasury to finance public projects.

These are not distinctively American concerns, however, since the Fed is not the only central bank with private shareholders. Many central banks originated as private banks, and in some cases this legacy persists. In addition to the United States, the central banks of Belgium, Greece, Italy, Japan, South Africa, Switzerland and Turkey all have private shareholders.<sup>3</sup>

The influence of private shareholders plausibly depends on institutional arrangements governing central bank decision making. In some cases private investors are permitted to hold only a minority of shares, while in others the government is prohibited from holding a majority.<sup>4</sup> In some cases, private shareholders have a say in board nominations, while in others they have the right to approve the bank's financial accounts. In some countries private shareholding is limited to commercial banks, while in others nonbank financial institutions and individuals also may hold shares. Some statutes allow private shareholders to receive whatever share of profits is voted by the Board, while others limit dividends to a specified proportion of share capital.

Broader governance rules may also constrain the discretion of the central bank in determining its balance-sheet profits and losses. In particular, rules constraining the central bank in its accounting, provisioning and profit distribution may be adopted as a way of protecting the public

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<sup>2</sup> The bill was introduced by Sen. Rand Paul, who argued that the Federal Reserve System was “a political, oligarchic force, and a key part of what looks and functions like a banking cartel” (Rand 2016). The bill was rejected by a vote of 53-44 with most Republicans voting in favor and most Democrats against.

<sup>3</sup> In 2016 private shareholders of the Turkish Central Bank recently protested against the low dividend distributed despite high reported profits: <http://www.bloomberg.com/news/videos/2016-05-16/turkish-central-bank-owners-in-revolt-over-payout>.

<sup>4</sup> For example, the Belgian government is required to hold 50 percent of the shares in the National Bank of Belgium, while the Greek government is prohibited from holding more than 35 percent of shares in the National Bank of Greece.

financial interest by preventing private shareholders from, *inter alia*, voting to restate reported profits. Governance rules may similarly limit the circumstances under which the treasury is permitted to recapitalize the central bank as a way of shielding the public from actual or perceived favoritism toward private shareholders.

While one can imagine various channels through which governance and private shareholdings might influence central bank policy, we focus here on the most direct and visible channel, namely their financial results. We analyze data on profits, dividends and loss-absorbing capacity from the published reports of the 35 OECD central banks. We supplement this with information from a survey of governance rules administered to those same central banks. We ask whether central banks with private shareholders and specific governance rules differ from other central banks in their financial behavior.

We are not aware of previous papers on the impact of private ownership and governance rules on central bank financial behavior.<sup>5</sup> The most closely related literature is that on central bank balance sheets, which analyzes whether these create incentives for monetary policy makers to deviate from their primary policy targets.<sup>6</sup> Although contributions to this literature consider how balance-sheet variables affect central bank behavior, they do not analyze how that behavior differs, if at all, as a function of the ownership structure and governance rules that determine the identity of the claimants to profits accruing as a result of those balance-sheet operations. The present paper addresses this question.

We find few differences in the behavior of central banks with and without private shareholders. Central banks with private shareholders are not more profitable, nor are they more financially cautious in the sense of holding larger reserves against losses. While they appear to transfer a *larger* share of their annual profits to the treasury, this result is not robust to the inclusion of controls and large one-off events like recent Swiss gold sales. In addition, we find that governance rules influence transfers by purely public central banks as well as by central banks with private shareholders.

Overall, we conclude that private shareholders have little impact on the financial behavior of central banks. More important, evidently, are accounting and governance rules.

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<sup>5</sup> We are aware of two papers (Rossouw and Breytenbach 2011 and Rossouw 2014) enumerating shareholding arrangements but which do not attempt to analyze their implications for behavior.

<sup>6</sup> Of particular concern here are threats to financial independence from changes in the size and composition of central bank balance sheets in the wake of the global financial crisis. Reis (2013) and Hall and Reis (2015) analyze the conditions under which a central bank undertaking balance-sheet operations can become technically insolvent, and how that insolvency risk may influence monetary policy. Del Negro and Sims (2015) derive conditions under which a central bank with large nominal exposure should receive a backstop from the fiscal authority to safeguard its inflation objective. In addition, previous authors have noted that foreign exchange exposure may create exchange rate risk that in turn influences central bank policy. For instance, it has been argued that the Swiss National Bank's decision in January 2015 to abandon its exchange rate floor was partly motivated by the concern about future losses on its foreign exchange holdings (Eichengreen and Weder di Mauro 2015, Amador et al. 2016). A related strand of literature asks whether the financial position (foremost the equity) of a central bank matters for the effectiveness of monetary policy. Adler et al. (2016) show that a weak financial position has a negative impact on effectiveness and Archer et al. (2013) present and discuss a series of rules, which govern central bank financial strength. Earlier work points to related questions of financial strength among central banks (Klüh et al. (2008) and Buiters (2008)).

## 2. Historical context

Central banks, starting with the Sveriges Riksbank and the Bank of England, were created as private institutions in the 17<sup>th</sup> and 18<sup>th</sup> centuries for reasons unrelated to their modern functions of stabilizing the price level, regulating monetary conditions, and fostering full employment and economic growth. Rather, early central banks were created to help governments meet their financial needs, specifically their war- and national-defense-related financial needs. The traditional interpretation emphasizes the efficiency advantages of delegating fundraising to a specialized agent, namely a private institution separate from the government that provides financial services to the sovereign on a preferential basis in return for being granted monopoly rents (an exclusive monopoly to issue currency, for example).

The modern variant emphasizes in addition control by the central bank of the sovereign's borrowing, allowing the latter to create a private constraint on its own behavior and thereby facilitating its ability to borrow. North and Weingast (1989) point to the case of the Bank of England as a privately owned institution independent of government and the exclusive conduit for loans. The Bank, they argue, had the power to embargo all new lending to the Crown if the latter failed to provide prompt interest and principal payments on prior loans. This was attractive to the government which, thereby constrained, was better able to borrow in bad times (wars) and to efficiently smooth taxation. It was attractive to investors, who enjoyed greater financial security. Broz (1998) fleshes out the story by suggesting that the collective action problem facing diverse investors could be solved by giving a subset of creditors monopoly rights, thereby incentivizing them to bear the costs of organizing the financial institution in question. These authors suggest that this model of control of government borrowing by a private institution separate from the government proved advantageous for England and was then widely adopted by other countries.

Most central banks remained partially or wholly owned by private shareholders into the 20<sup>th</sup> century. This generally remained the case even as the functions and responsibilities of those banks underwent change. With the development of modern monetary doctrine in the course of the 19<sup>th</sup> century, a growing number of central banks began to acknowledge and act on their lender-of-last-resort responsibilities (Flandreau and Ugolini (2011) date this transition as starting in the 1860s). By the turn of the 20<sup>th</sup> century, a majority of world central banks were actively managing the exchange rate and their international reserves in a manner consistent with the statutes and strictures of the gold standard (Bloomfield 1959).

World War I and then the 1920s saw the establishment of a host of new central banks (starting with the Federal Reserve System, which opened its doors in 1914). But prior to the Great Depression of the 1930s, the private or mixed ownership model of earlier years continued to dominate. This began to change in the 1930s, as a result of the deep economic crisis of that decade. De Kock (1956) argues that the trend toward nationalization reflected dissatisfaction with earlier central bank policies and, more generally, an increase in the scope of governmental functions in response to the Great Depression. The Reserve Bank of New Zealand was nationalized in 1935, as part of the expansion of government functions in that country, followed by nationalization of the Central Bank of Denmark in 1936. The desire for stronger state control may have been further

strengthened by the final demise of the gold standard in the 1930s, which gave central banks more discretion in the conduct of policy, in turn rendering policies potentially influenced by private interests less socially acceptable.

Nationalization gained momentum after World War II. Many central banks had already been brought under effective government control during the war, when they were forcibly enlisted in the war effort; in some of these cases postwar nationalization simply acknowledged the new status quo. The post-World War II period then saw a further expansion of government functions into central planning, indicative planning or industrial policy, depending on country, pursuit of which presupposed strict governmental control of credit provision. When new central banks were established by newly independent countries in the independence waves of the immediate post-World War II period and the 1960s, none had private shareholders.

By the mid-1970s the number of central banks with some form of private shareholding had fallen to 14, a level at which it has basically remained, although at least one central bank, the Austrian National Bank, which previously had private bank shareholders, was fully nationalized in 2010 (Rossouw and Breytenbach (2011). Within the OCED today, seven central banks allow private individuals or private financial institutions to hold shares.

### **3. Private shareholding today**

Several reasons are given for the existence of private shareholding today, beyond sheer persistence (historical path dependence). It is argued that private shareholders prevent governments from riding roughshod over the central bank, buttressing the de facto independence of the latter (Banca d'Italia 2014). Allowing commercial banks to hold shares in the Federal Reserve System is, or at least was, seen as a way of avoiding excessive government influence over the conduct of monetary policy (Lowenstein 2015). Allowing shares to be held by the cantons and private investors but not by the confederation is seen as a way of limiting central government influence over the Swiss National Bank.<sup>7</sup>

Private shareholding is sometimes justified as a mechanism giving observers insight into central bank policies, since central banks must report to their shareholders. It could thus be that the decline in private shareholding is a corollary of the rise of political democracy, to the extent that democracy is a mechanism for the public dissemination of information. Put simply, a government acting in the public interest can compel the central bank to share information and then share that information with the public.<sup>8</sup>

While dividend policies vary, private shareholders typically receive a very small payout compared to the governments (Figure 1). On average, dividend payments to private shareholders are less than 1 percent of total profit distributions in Turkey, Japan, Switzerland and Austria. They are

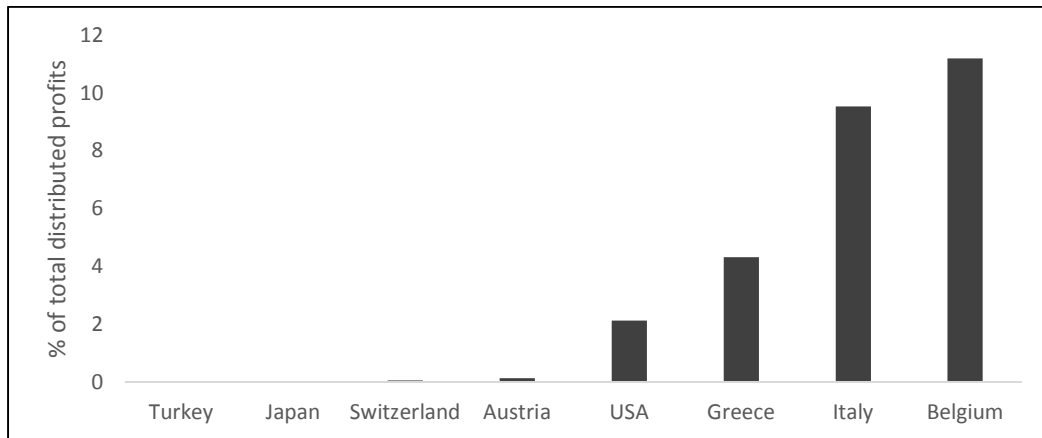
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<sup>7</sup> Similarly, the limit of 100 shares per holder is seen as a way of limiting the influence of individual entities.

<sup>8</sup> Rossouw (2014) describes the motivation for nationalizing the Danish Central Bank in 1935 as “to give the Danish parliament and government greater insight into its policies and activities. Here “greater insight” may be an anodyne way of describing greater control and enhanced ability to hold the central bank accountable for its actions, insofar as the monetary authority no longer had other stakeholders to which to report.

higher in the cases of the Federal Reserve, the Bank of Greece, the Bank of Italy and the Bank of Belgium (where they typically range from 2 to 10 percent).

**Figure 1: Average annual dividend payments as a share of total profit distribution (1994-2014, unbalanced)**



Institutional arrangements affecting private shareholders also vary across central banks, as shown in Appendix I.<sup>9</sup> In general, private shareholders have no direct participation in policy decision making, but they do possess voting and nomination rights, and they have the right to approve the central bank’s financial accounts. Voting and nomination rights range from the election of audit committee members to the selection of regents, counselors and members of the board of directors. Most central banks with private shareholders do not allow private shareholding to exceed 50 per cent of share capital, although there are exceptions to this rule as well.<sup>10</sup>

Some may argue that central banks with private shareholders are so different from one another that they cannot be treated as a group, and that the most promising empirical strategy therefore is to concentrate on case studies. We stake out an intermediate position. The premise of our approach is that much of this heterogeneity is concentrated in central banks’ different financial-participation and governance arrangements. In our baseline estimates, we test whether the presence of private shareholders, modeled as a 0/1 dummy variable, has an effect on financial behavior. In

<sup>9</sup> Overviews on dividend policies and institutional settings for central banks with private ownership have been previously presented by Bunea et al. (2016) and Archer and Moser-Boehm (2013).

<sup>10</sup> For instance, the statute of the Bank of Italy limits individual shareholding to 3 per cent of share capital. The government holds the de facto majority of shares in Austria (70% before 2010, 100% since then) and in Turkey. Shareholders of the Federal Reserve include some 3,000 commercial banks, which are required to hold 3 per cent of their capital stock in their respective reserve bank. Greece was an exception since it had few restrictions on private shareholding, instead limits public shareholding to 35% of share capital. However, since 2011 the Bank of Greece is subject to a new legislation on private shareholders’ rights: entities supervised by the central bank have been prohibited from owning shares, and voting rights of private shareholders are capped at 2 percent of share capital (Annual Report of the Bank of Greece 2012: p. 7)

further tests we then distinguish between two forms of private financial participation: dividend rules based on current or past profits, and dividend rules limited to a fixed share of paid-in capital.<sup>11</sup> Finally, we interact the presence or absence of private shareholders of these two types with different governance arrangements.

In three central banks (Belgium, Greece, and Italy until 2013) dividend policies stipulated that private shareholders should receive a specified share of profits or accumulated reserves. In Greece, shareholders receive a fixed payment plus a second dividend equivalent to 12 percent of net profits before taxes. In the case of the National Bank of Belgium, private shareholders traditionally received, in addition to a fixed dividend, a second dividend based on reserves. Before 2009, the Bank's "organic statute" limited reserve accumulation to 3 percent of annual profits, but this limit was then lifted and profit distributions for both private and public shareholders increased.<sup>12</sup> Until 2013, the Bank of Italy also based dividend payments on a percentage of nominal share capital *plus* reserves. In 2013 the law was changed, eliminating the reserve component and fixing dividends to a maximum share of capital, and dividend payouts fell abruptly.<sup>13</sup>

In the four remaining central banks with private shareholders, those of Turkey, Japan, Switzerland and Austria before 2010, payouts to private investors are limited by statutes that fix dividends to 6 to per cent of paid-in capital. If paid-in capital does not change, then the payout remains constant. In the case of the Swiss National Bank, for example, the payout has been constant over the full sample period 1993-2014 at CHF 1.5 million.<sup>14</sup> An exception is the Federal Reserve, where capital increased over time, allowing dividends to do likewise.<sup>15</sup>

#### 4. Empirical Strategy

Private shareholders are profit oriented. Our first hypothesis therefore is that central banks with private shareholders make higher profits. Profits and losses depend also on other factors; these include, *inter alia*, macroeconomic variables affecting the demand for money, asset price and exchange rate movements affecting the value of bonds and foreign exchange, and the composition of balance sheets.

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<sup>11</sup> See Appendix II for the individual dividend rules.

<sup>12</sup> Albeit more so for the treasury. Private shareholders then brought a case against the NBB before the Constitutional Court, claiming that the new distribution rule is discriminatory and has the effect of expropriating private shareholders. The Court confirmed that the legal provision of the central bank conforms with the constitution on the grounds that seigniorage earnings belong to the public.

<sup>13</sup> Shareholders of the Banca d'Italia are commercial banks (Intesa Sanpaolo and UniCredit together hold more than 40% of the share capital) (Banca d'Italia (2016)). However, the reform of 2013 caps individual shareholdings to 3 percent and has "instituted effective measure to foster a redistribution of shares to bring holdings down within that ceiling" (Banca d'Italia (2013)).

<sup>14</sup> In 2013, the SNB did not pay a dividend to shareholders due to a large loss.

<sup>15</sup> The capital of the Federal Reserve System is determined by commercial banks' own capital and surplus, which has increased over time. Member banks are required to subscribe to the capital stock of the Federal Reserve in an amount equal to 6% of their own capital and surplus (Federal Reserve, 101<sup>st</sup> Annual Report (2014), p. 358). Note that the Austrian National Bank had private share ownership until 2010 but abolished this due to concerns about conflicts of interest with the central bank's banking supervision function.



At the same time, central banks have discretion over their policies and balance sheet decisions, including the allocation of income between profits and reserves (more on this below). Hence, we start by estimating the following equation:

$$\pi_{it} = a + \beta_1 (\text{priv shares}_i) + \beta_2 (\text{balance\_sheet}_{it}) + \beta_3 (\text{macro}_{it}) + \beta_4 (\text{fiscal}_{it}) + \mu_t + \varepsilon_{it} \quad (1)$$

where  $\pi_{it}$  is the net profit of central bank  $i$  in period  $t$  (where  $t$  runs from 1993 to 2014). We use pooled OLS with year fixed effects ( $\mu_t$ ) assuming that errors are independent and normally distributed.  $\beta_1$  measures the impact of our variable of interest, private ownership, which is highly persistent, a fact that prevents us from including central bank fixed effects.

We control for balance sheet variables like the share of banknotes over total assets, a proxy for seigniorage income), and for macroeconomic conditions such as GDP growth and inflation, which can negatively impact profits by inducing a monetary contraction). The profits of central banks with large foreign reserves will be sensitive to exchange rate changes; hence we control for depreciation of the home currency against the SDR. Fiscal variables are included to control for interaction of the monetary and fiscal authorities. In particular, a central bank may have incentives to support a government burdened by more debt by providing higher profit distributions. Or the central bank may instead “play tough” in times of budgetary stress in an effort to encourage reforms. We also control for a special one-time profit-related event, the distribution of returns from the Swiss gold sales to cantons and the federal government as reported in the annual accounts for 2004.

Our second hypothesis is that central banks with private shareholders retain more profits and provision more for risk – we refer to these provisions as loss-absorbing capacity. Private investors may care not simply about current profits and dividends but also about future dividends and – in cases where the stock is publicly traded – stock prices. Consequently the presence of private shareholders may be associated with greater loss-absorbing capacity. We therefore estimate the following equation:

$$\text{lac}_{it} = a + \beta_1 (\text{priv shares}_i) + \beta_2 (\text{balance\_sheet}_{it}) + \beta_3 (\text{macro}_{it}) + \beta_4 (\text{fiscal}_{it}) + \mu_t + \varepsilon_{it} \quad (2)$$

In a similar vein, we hypothesize that central banks with private shareholders distribute a smaller share of their profits  $\pi$  to the government. The dependent variable in this case is transfers to the treasury scaled by assets. We interact  $\pi_{it}$  with the presence of private shareholders. This specification thereby controls for balance sheet and macroeconomic variables, as well as for year fixed effects. This specification with the included interaction term allows us to control also for central bank fixed effects.

$$\text{transfer gov}_{it} = \beta_1 \pi_{it} + \beta_2 (\pi_{it} \times \text{priv. share}_i) + \eta_1 x'_{it} + \mu_t + a_i + \varepsilon_{it} \quad (3)$$

In addition to distributing current profits, central banks may make transfers to government out of their loss-absorbing capacity. We hypothesize that central banks with private shareholders make fewer such transfers:

$$\text{transfer gov}_{it} = \beta_1 \pi_{it} + \beta_2 (\text{lac}_{it} \times \text{priv. share}_i) + \eta_1 x'_{it} + \mu_t + a_i + \varepsilon_{it} \quad (4)$$

We next consider institutional arrangements restricting central banks' accounting and provisioning decisions, requiring them to make mandatory transfers, and limiting their ability to incur losses. We expect central banks with private shareholders to be subject to less flexible governance and accounting rules. We expect them to have less access to a fiscal backstop (not to be subject to automatic recapitalization). We therefore estimate the following regression :

$$transfer\ gov_{it} = \beta_1 \pi_{it} + \beta_2 (\pi_{it} \times gov\text{-}rules_i) + \beta_3 (\pi_{it} \times gov\text{-}rules_i \times priv.\ share_i + \eta_1 x'_{it} + \mu_t + a_i + \varepsilon_{it} \quad (5)$$

for each of the seven governance rules described below.

## 5. Sample and Data

The sample comprises all OECD central banks plus the European Central Bank and covers the period 1994-2014<sup>16</sup> (Appendix III). Note that 15 central banks in our sample are members of the European System of Central Banks, and share a common currency. We consider them individually because their shareholding arrangements, governance rules and profit distributions all differ. Moreover, most of their profits accrue at the level of individual national central banks.

We use two main data sources: information provided publicly by central banks through their reporting of annual accounts, and our own survey of governance rules.

### *Governance rules*

Our principal variable of interest, *private shares*, takes a value of 1 if the central bank has private shareholders and 0 otherwise. For most central banks it does not change over the sample period, although for Austria it changes in July 2010.

We surveyed of all OCED central banks at the beginning of 2016 to identify governance rules affecting the relationship between central banks and their shareholders. We use responses to a number of these survey questions to code governance rules as 0-1 variables.<sup>17</sup> Since these governance rules are highly persistent, most of the variation is in the cross section. Table 1 gives an overview of the frequency distribution of these rules.

Central banks with discretion over their transfer decisions are labelled as cases of *CB discretion*. Discretion can vary from full flexibility to retain profits to requiring only a minimum, pre-defined share of profits to be retained (which can lie between 10 and 100 percent of distributable profits). Two-thirds of OECD central banks have discretion over the amount of their transfers; the same is true of central banks with private shareholders. Most central banks with private shareholders are also subject to income taxation (denoted *income tax payer*), although most central banks in the full sample are exempt from paying tax.

Central banks generally have flexibility in accounting and provisioning. The variable denoted *accounting flexibility* denotes central banks that use unrealized profits to increase their loss-absorbing

<sup>16</sup> For some central banks, published balance sheet data is shorter.

<sup>17</sup> The full questionnaire and results of the survey can be obtained from the authors.

capacity, while reporting some of their losses (if not balanced by previous gains) in the profit and loss account. In such accounting, unrealized gains and, sometimes, losses will not be visible in the accounts. Similarly, the variable *provisioning flexibility* equals 1 if the central bank can determine provisions for general risks.<sup>18</sup> Most central banks with private shareholders have discretion over either accounting or provisioning, and some have both.

Less commonly, central banks and governments have arrangements under which the treasury automatically replenishes the capital of the central bank when it goes negative (We denote this by the indicator variable *recapitalization rule*). Among the group of central banks with private shareholders, only one (Turkey) has this arrangement.

In six countries the government decides unilaterally on profits to be transferred. We indicate these as cases where *Gov discretion* equals 1. Again only one central bank with private shareholders, the Bank of Greece, is subject to this rule.

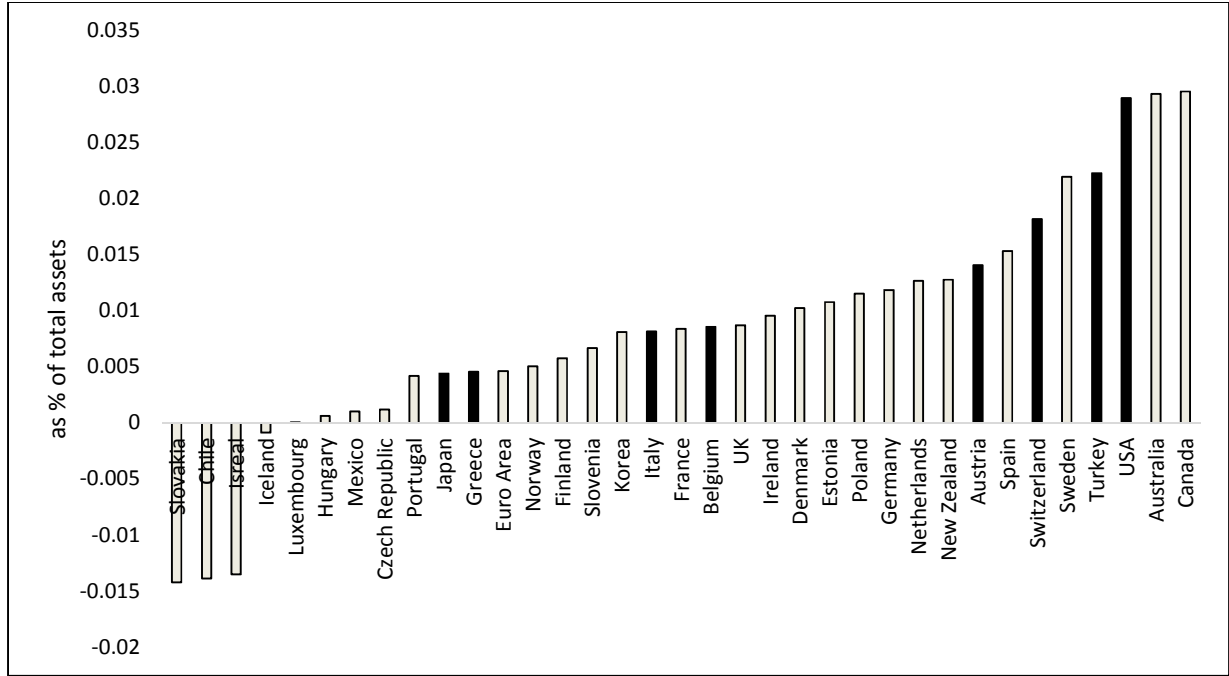
Two central banks have multi-year profit-sharing and profit-smoothing arrangements with their governments (we denote these as *profit smoothers*); one of them, the Swiss National Bank, also has private shareholders.<sup>19</sup>

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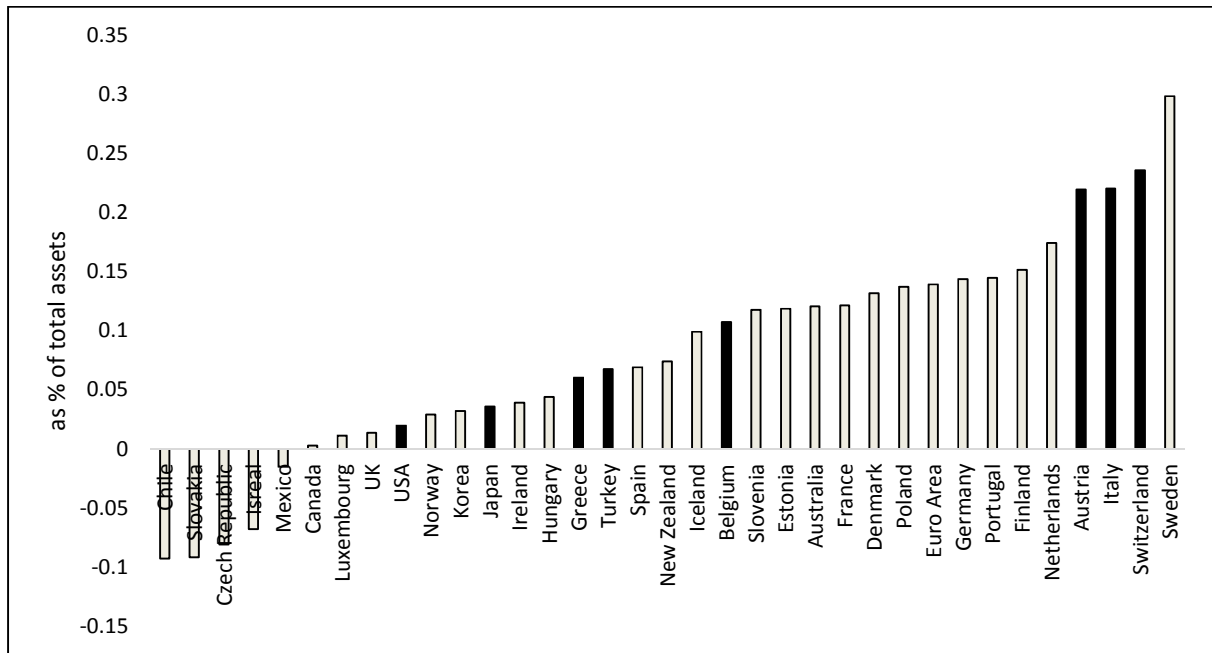
<sup>18</sup> All central banks build provisions for future pensions of their employees, which are small compared to other balance sheet items and the overall loss-absorbing capacity. However, statutes allow some central banks to build up additional provisions for general risks on the balance sheet (for example exchange rate risks or losses on bond transactions). In their statutes, central banks still have to justify the need for additional provisions by presenting value-at-risk calculations (see for instance the German Bundesbank). Such provisions can greatly increase the loss absorbing capacity of the central bank (as well as reduce the reported current profits). In the balance sheet variables defined below provisions for general risk are included in the loss absorbing capacity.

<sup>19</sup> Denmark became the third profit-smoothing central bank effective from 2015 (Annual Report 2014, p. 33).

**Figure 2a: Net profits (to total assets)**  
 central banks with private shareholders in red, averages 1993-2014



**Figure 2b. Loss absorbing capacity (to total assets),**  
 central banks with private shareholders in red, averages 1993-2014



### *Balance sheet variables*

Balance sheet variables are taken from annual reports of central banks (Appendix IV contains descriptive statistics). We define net profits as total profits plus income tax.<sup>20</sup> Figure 2a shows period-average net profits by bank.

*Loss absorbing capacity*, shown in Figure 2b, is equity plus required reserves, provisions, revaluation reserves, retained earnings and other risk reserves. Notice that a few central banks (those of Chile, the Czech Republic, Slovenia, Israel and Mexico) had negative loss-absorbing capacity (in effect, negative capital) on average over the period.

We calculate *transfers to government* by adding transfers via income tax payments to other transfers and deducting recapitalizations and other flows from the government to the central bank. Recapitalization and other flows from the treasury to the central bank can be large. Appendix V shows that in the case of Iceland, for example, they came to about 9 percent of assets. The Chilean Central Bank received funds from the treasury of a similar magnitude, cumulatively over three years. The Bank of Italy booked a sizable deferred tax asset from 2002 to 2004 due to an accounting loss from converting public sector claims into marketable bonds.<sup>21</sup>

Figure 3a shows transfers to the government scaled by the total assets of the central bank. The negative value for Iceland is due to a large capital injection by the government following the banking crisis in 2007. Figure 3b shows transfers to the government as a share of annual profits.<sup>22</sup> Note that a number of central banks have transfer-to-profit ratios of nearly one. The German Bundesbank has transferred nearly 100 percent of its profits to the treasury over this period. The Swedish Riksbank has actually transferred more than it made in profits, largely due to one-time transfers out of loss-absorbing capacity.

As additional controls we include *banknotes* in circulation as a share of assets and a set of macroeconomic variables (GDP per capita, the GDP growth rate and inflation, all from the IMF's *World Economic Outlook* data base). We include the exchange rate regime (according to the IMF's 2014 de facto classification), the multilateral exchange rate (from the IMF's *International Financial Statistics*), and two fiscal variables (the budget balance and public debt relative to GDP, both from *WEO*). We distinguish emerging markets, countries so classified by the IMF for more than 50 percent of the sample period. Chile, Hungary, Mexico, Poland, Turkey, the Slovak Republic (until 2009) and Slovenia (until 2007) qualify.

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<sup>20</sup> We use reported net profits after flows to/from provisions and revaluation accounts.

<sup>21</sup> However, the Banca d'Italia is subject to income taxation and adding both flows leads to a positive net transfer from the central bank to the government.

<sup>22</sup> In this figure, we do not show Slovakia because it would distort the picture (it is included in the estimates below). The National Bank of Slovakia has a large negative value because the central bank experienced large losses between 2002 and 2011 due to the appreciation of the koruna. For the same reason, we exclude the Banco de Mexico and the Central Bank of Iceland, which also experienced significant losses. The losses led to a higher average of transfers than distributable profits over the sample period. The negative ratio on average is due to the even larger positive transfers to the government in the years before the loss period.

Figure 3a. Transfers to government (to total assets),  
central banks with private shareholders in red, averages 1993-2014

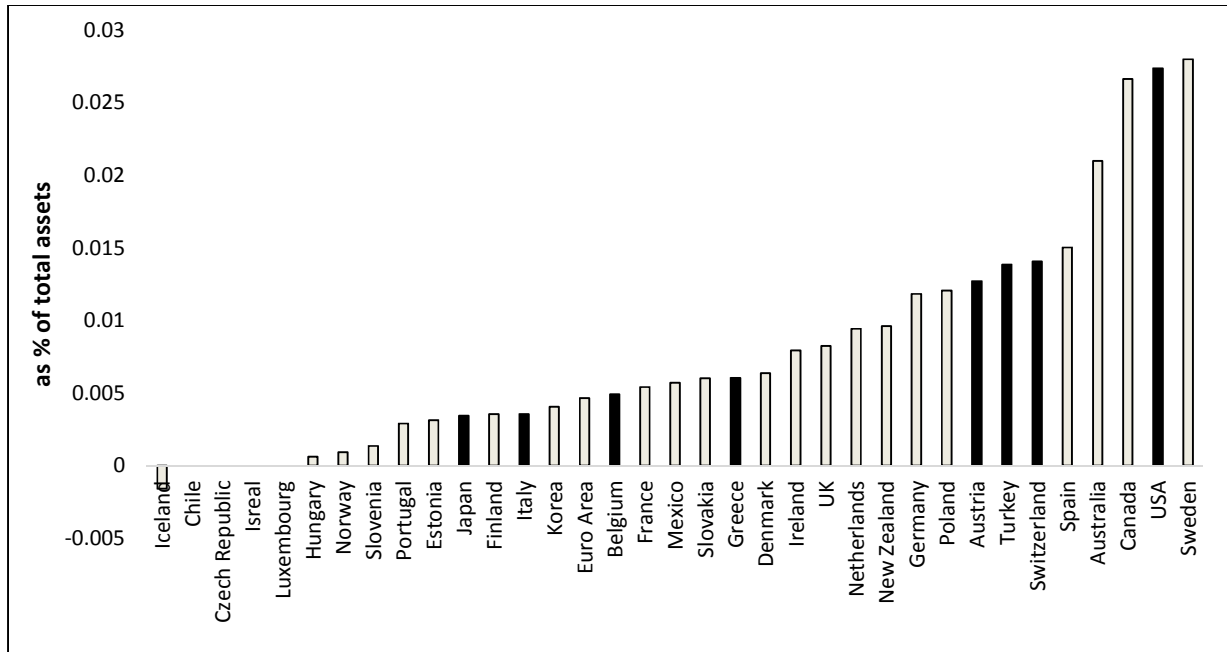
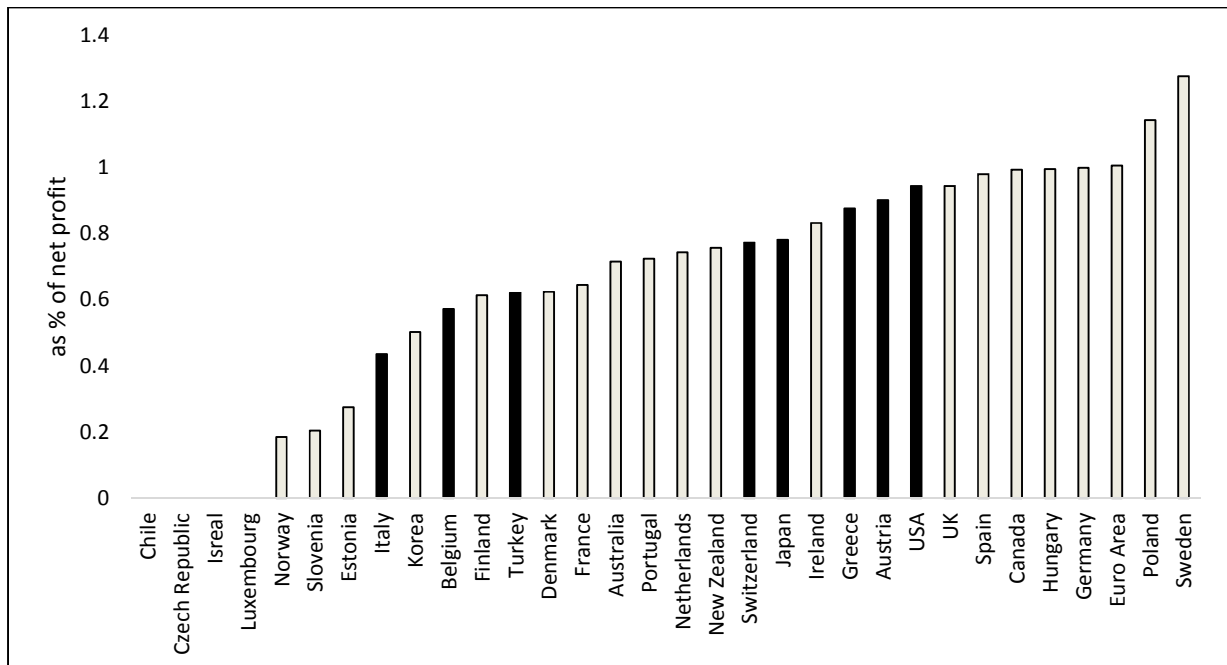


Figure 3b. Transfers to government (to net profits),  
central banks with private shareholders in red, averages 1993-2014



## 6. Ownership

According to Table 2, central banks with private shareholders are neither more nor less profitable than purely public central banks. The dummy for private shareholders remains insignificant when we distinguish large one-time positive shocks to profits (distribution of Swiss gold sale revenues for example).

Most control variables have their expected signs. The stock of banknotes is positively associated with net profits, presumably because it increases seigniorage. Inflation is positively associated with net profits (and statistically significant at the 90 per cent confidence level); this variable is plausibly capturing another dimension of seigniorage. The fiscal balance is also positively associated with net profits. Although this may, in principle, reflect the contribution of profits to the budget, any such effect is not large (i.e. typically 6% of the fiscal balance). Alternatively, central banks report lower profits in times of budgetary stress as a way of encouraging fiscal reforms. Finally, central banks in emerging markets have lower profits, other things equal.

In Table 3 the dependent variable is loss-absorbing capacity relative to total assets. Again there are no significant differences between central banks with private shareholders and purely public central banks. Central banks in emerging markets again look different; they have lower loss absorbing capacity. This is mostly due to sporadic large losses that led to an erosion of equity, which in some cases remains negative (Chile, Slovak Republic). Countries with flexible exchange rates have a less loss absorbing capacity, while central banks with fixed rates hold higher foreign exchange reserves and build provisions against foreign exchange rate risk. The fiscal balance is positively related to loss-absorbing capacity, as if governments inclined toward fiscal prudence also care about the financial condition of the central bank.

Table 4 considers the determinants of transfers to the government scaled by total assets. Intuition suggests that, for a given level of profits, central banks with private shareholders make smaller transfers to the government, retaining more for themselves. To the contrary, we find that the total effect – private shareholders and the interaction between profits and private shareholders – is positive and significant. But columns (2) through (6) show that this pattern is heavily related to the distribution of the returns from the gold sales of the Swiss National Bank, which were largely paid out to the treasury. The latter can be considered an extraordinary event, since the Swiss National Bank has a profit sharing agreement with the government under which payouts are smoothed (usually for 5 years). The difference in the effect of profits on transfers between public central banks and those with private shares becomes insignificant when we control for the distribution of the returns from the Swiss gold sales, reported in the annual accounts of 2004. Adding more control variables does not alter this result.

Table 5 tests whether transfers to the treasury out of loss-absorbing capacity are smaller for central banks with private shareholders. The results again show no tendency for central banks with private shareholders to behave differently.

## 7. Governance Rules

We now explore broader governance rules and their relationship to ownership, asking whether they matter for outcomes.

Table 6 shows that governance rules indeed matter for profit distributions. Central banks with discretion over profit distribution (those whose governance rules authorize them to retain some of their profits) distribute less to governments, as one would expect. However, this is not true for the subset of central banks with private shareholders: they tend to transfer more rather than less, though the total effect (the coefficient on the direct effect plus that on the interaction term with private shareholders) is not significant.

Five central banks with private shareholders possess this discretion, those of Belgium, Italy, Japan, Turkey, and Austria until 2010. It is probably not a coincidence that these institutions are also subject to income tax, since this is one way for governments to secure a share of profits. Recall from Table 1 that 25 of our 35 central banks are exempt from income taxation. But the probability that a central bank with private shareholders is subject to income taxation is higher (5 out of 10). Table 7 confirms that central banks with private owners and subject to income tax transfer a larger share of their profits to the government (the total effect, that is, the coefficient on the direct effect plus that on the interaction term with private shareholders) is positive and significant).

Tables 8 and 9 focus on the central bank's flexibility in reporting profits. Accounting flexibility refers to the ability to place unrealized gains and losses into a revaluation account, thus sheltering them from distribution. 15 of our 35 central banks have this ability, including 4 with private shareholders. But rather than using this flexibility to reduce their transfers to the government, these central banks actually transfer a larger share of profits to the government. Table 8 shows that the total effect (again, the coefficient on the direct effect plus that on the interaction term with private shareholders) is positive and significant in all specifications. The same holds for the ability to provision without limit (Table 9). Note that the two groups of central banks with private shareholders and either accounting or provisioning flexibility are overlapping are not the same. For instance, the Swiss National Bank has provisioning but not accounting flexibility, while the Banca d'Italia has the reverse.

Only one central bank with private shareholders has flexibility with regard to profit smoothing, recapitalization and government discretion, while only two central banks (the Swedish Riskbank and National Bank of Switzerland) have multiyear arrangements to smooth profit transfers to their governments, and only one of these two has private shareholders. These observations suggests generalizing with caution. For what it is worth, the total effect in Table 10 (the coefficient on the direct effect of profit-smoothing provisions plus that on the interaction term with private shareholders) shows that central banks with private shareholders subject to this rule transfer more than other central banks both public and private.<sup>23</sup> But the effect is largely driven by the distribution

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<sup>23</sup> Kudos to the Swiss National Bank.



of the returns from the gold sales in 2004 (compare columns 1 and 2), which were not subject to the smoothing arrangement.

In 7 countries the government is required to recapitalize the central bank immediately if capital goes negative. While central banks with this guarantee might be less concerned about risks to their balance sheets and to make larger transfers to their governments in good times, this does not seem to be case. Table 11 shows that central banks subject to this recapitalization rule transfer less to the government, possibly because recapitalization is costly politically or reputationally. Only one central bank with a recapitalization rule also has private shareholders (Turkey's), and the total effect is not significant.

Finally, in six cases the government unilaterally determines profit distributions. One would expect higher transfers, and this seems to be the case, as shown in Table 12. The only central bank with private shareholders and this arrangement is that of Greece, and here also this has resulted in higher transfers (the total effect is positive and highly significant).

Overall, these results suggest that governance arrangements *do* impact the financial behavior of central banks. This is in contrast with the insignificant results for private share ownership. Evidently, governance arrangements in general and not private ownership per se are what matter for central bank behavior.

## 8. Additional Tests

As a robustness check, we estimated the transfer equation distinguishing the subset of central banks with *private shareholders with profit participation*. As noted above, one might expect this distinction to amplify any impact of private shareholders on central bank behavior. The results remain unchanged, however: central banks with profit participating private shareholders do not transfer more out of current profits (Appendix VI Table AVI 1.)

As an alternative to the profit-transfer equations in Table 3, we estimated a two-stage model. In the first stage, we take profits as a function of banknotes over total assets, the central bank policy rate, and the log of GDP per capita; in the second stage, where financial transfers were the dependent variable, we then interacted these estimated profits with private shareholders. The findings were again the same, namely that private shareholders do not lead to higher financial transfers than among public central banks (see Appendix VI Table AVI 2).<sup>24</sup>

We also examined the direct relationship between governance rules and private shareholders (used governance rules as the dependent variable in regression analysis, where regressions are estimated by probit, given the binary nature of the dependent variables). Since the dependent variables are largely time invariant, we are only able to exploit their cross-section variation. We therefore analyze the impact of the balance sheet and macroeconomic variables separately. The probit estimates show little correlation between governance rules and ownership. The exception is

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<sup>24</sup> The different size of the coefficients compared to those in Table 3 is possibly due to the instruments used, which explain only about 10 percent of the variation in profits.

that central banks with private shareholders are more likely to be subject to income taxation. We interpret this as counterbalancing the presence of private shareholders by guaranteeing a share of earnings for the government (see the discussion above and Appendix VI Table AVI 3).

Finally, we considered additional institutional variables highlighted in related literatures. For example, we tested the indices of legal independence and central bank transparency as constructed by Cukierman (1992) and Dincer and Eichengreen (2014), asking whether they are explained by the presence of private shareholders.<sup>25</sup> Once again, there does not appear to be any significant impact of private ownership on these variables.

## 9. Conclusions

We find that the central banks with private shareholders do not differ markedly from purely public institutions in their financial behavior.<sup>26</sup> Central banks with private shareholders do not report higher profits. Nor are they more financially cautious in the sense of building more loss-absorbing capacity. If anything, they transfer a larger share of their profits to the treasury compared to purely public central banks. However, this result is not always robust. In particular, it is not robust to controlling for large one-off events like the 2004 Swiss gold sales.

In contrast, governance arrangements *do* impact the financial practices of central banks; although there is again no evidence that governance arrangements differ significantly between central banks with and without private shareholders. Evidently, it is governance in general and not private ownership per se that matters for central bank behavior.

This paper is only a first attempt at testing whether private shareholders influence central bank financial behavior. We cannot rule out the possibility that private shareholders influence other aspects of central bank behavior, for example their supervisory or interest-rate-setting decisions. But financial behavior is arguably the most direct channel of influence. Moreover, it is readily observable. It continues to vary across individual members of the European System of Central Banks, providing more observations and identifying variation (not so for, *inter alia*, interest-rate setting).

Be this as it may, future research should analyze whether shareholding arrangements and governance rules also affect these other decisions.

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<sup>25</sup> We have relatively few degrees of freedom since all euro area central banks are consolidated in this data.

<sup>26</sup> It may still be that central banks with private shareholders differ in their supervisory functions or in their interest rate setting behavior. Whether this is the case is a topic for future research.

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**Table 1: Governance Variables derived from Central Bank Survey**

Survey Question	Answer YES  (=1)	Answer NO  (=0)	YES for private shares	Central Banks
Does the central bank have private shareholders?	8	27	8/7	Austria*, Belgium, Greece, Italy, Japan Switzerland, Turkey, US
The central bank can retain a fixed share of profits (up to 100%) <i>(Central Bank Discretion)</i>	23	12	5	Austria*, Belgium, Italy, Japan, Turkey
Is the central bank required to pay income tax? <i>(Income Tax Payer)</i>	10	25	5	Austria*, Belgium, Italy, Japan, Turkey
Are unrealized profits (losses) placed in a revaluation account (on the income statement)? <i>(Accounting flexibility)</i>	20	15	4	Austria*, Belgium, Greece, Italy
Is the central bank allowed to build-up risk provisions without limits? <i>(Provision flexibility)</i>	18	17	5	Austria*, Belgium, Greece, Switzerland, Turkey
Profit distributions are smoothed across several years, based on agreements with the government <i>(Profit Smoothing)</i>	2	33	1	Switzerland
Is the government obliged to recapitalize the central bank if capital becomes negative? <i>(Recapitalization Rule)</i>	7	28	1	Turkey
The government decides unilaterally on profit distributions <i>(Profit Distribution: Government Discretion)</i>	6	29	1	Greece

Notes: Austria abolished private shareholding in 2010

**Table 2: Net Profits and Private Shareholders of Central Banks**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Net Profit	Net Profit	Net Profit	Net Profit	Net Profit	Net Profit	Net Profit
Private Shares	0.00137 (0.37)	0.0000220 (0.01)	-0.00143 (-0.40)	-0.00217 (-0.60)	-0.000285 (-0.08)	0.00102 (0.29)	0.000988 (0.29)
Depreciation	0.0415 (1.08)	0.0485 (1.25)	0.0989* (2.38)	0.0498 (0.73)	0.00525 (0.08)	-0.00372 (-0.06)	-0.00516 (-0.08)
Banknotes	0.0315*** (5.46)	0.0324*** (5.75)	0.0335*** (7.00)	0.0339*** (6.75)	0.0369*** (7.18)	0.0386*** (7.81)	0.0386*** (7.79)
Growth	-0.0648 (-1.62)	-0.0581 (-1.46)	-0.0141 (-0.45)	-0.0488 (-0.88)	-0.0926 (-1.67)	-0.102 (-1.93)	-0.103 (-1.97)
Swiss Gold Sale 2004		0.172*** (48.19)	0.173*** (46.85)	0.172*** (44.47)	0.170*** (44.22)	0.169*** (45.84)	0.169*** (39.44)
Emerging Markets			-0.0105* (-2.47)	-0.0109* (-2.45)	-0.00874 (-2.01)	-0.0102* (-2.43)	-0.0103* (-2.48)
Inflation				0.000598 (1.05)	0.00106 (1.82)	0.00111 (1.91)	0.00111 (1.93)
Fiscal Balance					0.00104** (3.19)	0.000882* (2.61)	0.000872* (2.55)
log Public Debt						-0.00266 (-1.06)	-0.00267 (-1.05)
Flexible X- Rate							0.000259 (0.18)
Constant	0.00806 (1.35)	0.00780 (1.38)	0.00517 (1.11)	0.00618 (1.39)	0.00801 (1.62)	0.0169 (1.75)	0.0166 (1.77)
Observations	577	577	577	577	577	577	577
Adj. R-sq.	0.141	0.192	0.208	0.209	0.224	0.224	0.223
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of private shares in central banks on distributable profits (including taxes). The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for year fixed effects but not for central bank fixed effects because the dummy variable for private shares is time-invariant (except for one change in Austria when the government took over 100% of the share capital in 2010). The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 3: Loss-absorbing Capacity and Private Shareholders of Central Banks**

	(1)	(2)	(3)	(4)	(5)	(6)
	Loss-abs. cap.	Loss-abs. cap.	Loss-abs. cap.	Loss-abs. cap.	Loss-abs. cap.	Loss-abs. cap.
Private Shares	0.0545 (1.33)	0.0424 (1.03)	0.0421 (1.00)	0.0545 (1.43)	0.0490 (1.13)	0.0520 (1.17)
Depreciation	-0.543* (-2.43)	-0.129 (-0.62)	-0.148 (-0.55)	-0.439 (-1.73)	-0.401 (-1.72)	-0.265 (-1.21)
Banknotes	-0.0466 (-0.67)	-0.0376 (-0.46)	-0.0375 (-0.46)	-0.0176 (-0.20)	-0.0248 (-0.29)	-0.0228 (-0.27)
Growth	-0.579* (-2.62)	-0.215 (-1.15)	-0.229 (-1.00)	-0.514* (-2.33)	-0.475* (-2.37)	-0.390 (-2.02)
Emerging Markets		-0.0862* (-2.18)	-0.0863* (-2.16)	-0.0722 (-1.79)	-0.0660 (-1.71)	-0.0620 (-1.58)
Inflation			0.000235 (0.10)	0.00325 (1.59)	0.00305 (1.58)	0.00253 (1.55)
Fiscal Balance				0.00685** (3.24)	0.00754** (3.56)	0.00845*** (4.17)
log Public Debt					0.0113 (0.42)	0.0124 (0.50)
Flexible X-Rate						-0.0243 (-1.59)
Constant	0.256* (2.53)	0.234* (2.09)	0.235* (2.11)	0.247* (2.24)	0.209 (1.38)	0.238 (1.51)
Observations	570	570	570	570	570	570
Adj. R-sq.	0.111	0.185	0.184	0.228	0.229	0.256
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of private shares in central banks on the loss-absorbing capacity (sum of CB equity, CB reserves, provisions and revaluation accounts). The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for year fixed effects but not for central bank fixed effects because the dummy variable for private shares is time-invariant (except for one change in Austria when the government took over 100% of the share capital in 2010). The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 4: Government Transfers out of profits in Central Banks with Private Shareholders**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.211* (2.16)	0.200* (2.09)	0.200* (2.09)	0.200* (2.10)	0.200* (2.14)	0.202* (2.13)
Net Profit x Private Shares	0.390*** (4.05)	0.0729 (0.45)	0.0689 (0.42)	0.0689 (0.42)	0.0703 (0.42)	0.0574 (0.34)
Depreciation	-0.0225 (-1.51)	-0.0120 (-0.68)	-0.0188 (-0.80)	-0.0193 (-0.79)	-0.0146 (-0.58)	-0.0216 (-0.82)
Banknotes	0.0189* (2.21)	0.0225** (2.79)	0.0228** (2.85)	0.0227** (2.81)	0.0225* (2.68)	0.0231** (2.79)
Growth	-0.0241 (-1.60)	-0.0222 (-1.40)	-0.0271 (-1.24)	-0.0276 (-1.21)	-0.0226 (-0.96)	-0.0282 (-1.14)
Swiss Gold Sale 2004		0.150*** (7.02)	0.151*** (7.08)	0.151*** (7.08)	0.149*** (6.74)	0.151*** (7.07)
Inflation			0.0000936 (0.37)	0.0000997 (0.38)	0.0000682 (0.27)	0.000151 (0.52)
Fiscal Balance				0.0000223 (0.10)	0.000224 (1.09)	0.000249 (1.22)
log Public Debt					0.00647** (3.34)	0.00671** (3.37)
Flexible X-Rate						0.00564 (1.37)
Constant	0.0120 (1.79)	0.0111 (1.60)	0.0111 (1.59)	0.0112 (1.61)	-0.00621 (-0.67)	-0.0206 (-1.35)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.601</b>	<b>0.273</b>	<b>0.269</b>	<b>0.269</b>	<b>0.270</b>	<b>0.260</b>
<b>t-statistics</b>	<b>18.92</b>	<b>2.03</b>	<b>2.00</b>	<b>2.00</b>	<b>1.93</b>	<b>1.92</b>
Adj. R-sq.	0.548	0.617	0.616	0.615	0.621	0.624
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of private shares in central banks on transfers to the government. We use an interaction term (*net profit x private shares*) in order to identify the change in transfers due to a change in profits among central banks with private shares. The total effect of profits on transfers among CBs with private shares (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.



**Table 5: Government Transfers out of loss-abs. capacity in Central Banks with Private Shareholders**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Loss-abs. cap.	0.0288 (1.80)	0.0257 (1.63)	0.0256 (1.64)	0.0254 (1.65)	0.0281 (1.97)	0.0317* (2.19)
Loss-abs. cap. x Private Shares	0.0307 (1.37)	0.00695 (0.21)	0.00689 (0.21)	0.00727 (0.22)	0.00139 (0.04)	-0.00256 (-0.07)
Depreciation	-0.00512 (-0.24)	-0.00373 (-0.18)	-0.0202 (-0.74)	-0.0216 (-0.78)	-0.0166 (-0.60)	-0.0246 (-0.86)
Banknotes	0.0259** (3.00)	0.0277** (3.39)	0.0281** (3.40)	0.0280** (3.34)	0.0280** (3.17)	0.0287** (3.27)
Growth	-0.0361 (-1.96)	-0.0339 (-1.82)	-0.0456 (-1.62)	-0.0471 (-1.63)	-0.0416 (-1.41)	-0.0477 (-1.54)
Swiss Gold Sale 2004		0.193*** (65.23)	0.192*** (63.42)	0.192*** (63.31)	0.191*** (59.36)	0.191*** (62.70)
Inflation			0.000223 (0.78)	0.000241 (0.82)	0.000207 (0.73)	0.000296 (0.98)
Fiscal Balance				0.0000645 (0.31)	0.000270 (1.11)	0.000299 (1.18)
log Public Debt					0.00680* (2.32)	0.00723* (2.47)
Flexible X-Rate						0.00683 (1.61)
Constant	0.00832 (0.78)	0.0129 (1.68)	0.0130 (1.66)	0.0133 (1.71)	-0.00534 (-0.46)	-0.0233 (-1.56)
Observations	575	575	575	575	575	575
<b>Linear Comb.</b>	<b>0.0595</b>	<b>0.0326</b>	<b>0.0325</b>	<b>0.0327</b>	<b>0.0295</b>	<b>0.0291</b>
<b>t-statistics</b>	<b>3.43</b>	<b>1.15</b>	<b>1.14</b>	<b>1.14</b>	<b>0.93</b>	<b>0.99</b>
Adj. R-sq.	0.369	0.542	0.542	0.541	0.547	0.551
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of private shares in central banks on transfers. We use an interaction term (*loss-absorbing capacity (LAC) x private shares*) in order to identify the change in transfers due to a change in the LAC among central banks with private shares. The total effect of the LAC on transfers among CBs with private shares (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 6: Government Transfers, Private Ownership and Central Bank Discretion**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.448*** (5.27)	0.360*** (4.52)	0.361*** (4.64)	0.361*** (4.64)	0.358*** (4.56)	0.359*** (4.53)
CB Discretion x Net Profit	-0.403*** (-4.20)	-0.324** (-3.44)	-0.330** (-3.56)	-0.330** (-3.60)	-0.324** (-3.46)	-0.324** (-3.43)
CB Discretion x Net Profit x Priv. Shares	0.0134*** (6.50)	0.0133*** (6.55)	0.0135*** (6.57)	0.0138*** (7.50)	0.0137*** (7.30)	0.0129*** (6.71)
Depreciation	-0.00525 (-0.29)	-0.00358 (-0.20)	-0.0269 (-1.46)	-0.0293 (-1.56)	-0.0259 (-1.35)	-0.0326 (-1.66)
Banknotes	0.0234* (2.51)	0.0246** (2.75)	0.0252** (2.81)	0.0250** (2.78)	0.0260** (2.92)	0.0267** (3.02)
Growth	-0.0121 (-0.88)	-0.0145 (-1.04)	-0.0312 (-1.72)	-0.0338 (-1.79)	-0.0305 (-1.58)	-0.0357 (-1.83)
Swiss Gold Sale 2004		0.136*** (10.41)	0.136*** (10.56)	0.136*** (10.55)	0.136*** (10.49)	0.135*** (10.24)
Inflation			0.000318 (1.85)	0.000350 (1.96)	0.000326 (1.83)	0.000401* (2.09)
Fiscal Balance				0.000112 (0.53)	0.000183 (0.78)	0.000213 (0.87)
Public Debt					0.0000566 (1.31)	0.0000664 (1.47)
Flexible X-Rate						0.00577 (1.60)
Constant	-0.00292 (-0.41)	0.00287 (0.47)	0.00287 (0.47)	0.00344 (0.55)	0.00224 (0.36)	-0.0119 (-1.03)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.0584</b>	<b>0.0492</b>	<b>0.0450</b>	<b>0.0444</b>	<b>0.0474</b>	<b>0.0482</b>
<b>t-statistics</b>	<b>1.05</b>	<b>0.94</b>	<b>0.88</b>	<b>0.88</b>	<b>0.92</b>	<b>0.91</b>
Adj. R-sq.	0.597	0.675	0.676	0.676	0.676	0.679
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of discretion (flexibility to retain or distribute profits) and private ownership in central banks on transfers to the government. The sample consists of five CBs with private shares and discretion (Austria, Belgium, Italy, Japan and Turkey). We use two interaction terms (*net profit x CB discretion*) and (*net profit x CB discretion x private shares*) in order to identify the change in transfers due to a change in profits among central banks with discretion and private shares. The total effect of profits on transfers among CBs with private shares and discretion (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 7: Government Transfers, Privates Ownership and Income Tax Requirement**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.209 (2.01)	0.132 (1.99)	0.132 (2.01)	0.132 (2.01)	0.130* (2.08)	0.131* (2.06)
Tax Payer x Net Profit	0.337*** (3.61)	0.396*** (5.44)	0.403*** (5.55)	0.404*** (5.44)	0.411*** (5.85)	0.410*** (5.76)
Tax Payer x Net Profit x Priv. Shares	0.00131 (0.91)	0.00152 (1.08)	0.00132 (0.89)	0.00114 (0.83)	0.00101 (0.75)	0.000338 (0.24)
Depreciation	-0.0194 (-1.35)	-0.0167 (-1.12)	-0.00378 (-0.17)	-0.00203 (-0.09)	0.00558 (0.23)	-0.000918 (-0.04)
Banknotes	0.0157 (2.02)	0.0169* (2.20)	0.0165* (2.16)	0.0166* (2.15)	0.0188* (2.46)	0.0195* (2.62)
Growth	-0.0177 (-1.09)	-0.0185 (-1.14)	-0.00915 (-0.44)	-0.00719 (-0.33)	0.000512 (0.02)	-0.00455 (-0.21)
Swiss Gold Sale 2004		0.172*** (16.01)	0.172*** (16.05)	0.172*** (16.33)	0.171*** (16.67)	0.170*** (16.21)
Inflation			-0.000177 (-0.96)	-0.000201 (-1.06)	-0.000253 (-1.31)	-0.000179 (-0.83)
Fiscal Balance				-0.0000832 (-0.36)	0.0000814 (0.32)	0.000110 (0.43)
Public Debt					0.000131* (2.61)	0.000140* (2.69)
Flexible X-Rate						0.00554 (1.37)
Constant	0.0106 (1.19)	0.0167* (2.62)	0.0168* (2.63)	0.0164* (2.58)	0.0134 (1.98)	-0.000168 (-0.01)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.548</b>	<b>0.530</b>	<b>0.536</b>	<b>0.537</b>	<b>0.542</b>	<b>0.541</b>
<b>t-statistics</b>	<b>14.45</b>	<b>17.34</b>	<b>17.85</b>	<b>18.23</b>	<b>18.38</b>	<b>18.90</b>
Adj. R-sq.	0.544	0.673	0.673	0.672	0.678	0.681
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of the CB's obligation to pay income tax and private ownership in central banks on transfers to the government. The sample consists of 5 CBs with private shares and an income tax requirement (Austria, Belgium, Italy, Japan and Turkey). We use two interaction terms (*net profit x tax*) and (*net profit x tax x private shares*) in order to identify the change in transfers due to a change in profits among central banks with a tax requirement and private shares. The total effect of profits on transfers among CBs with private shares and a tax requirement (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 8: Government Transfers, Private Ownership and Flexible Accounting**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.279*** (11.43)	0.199*** (8.92)	0.198*** (8.81)	0.198*** (8.80)	0.198*** (8.85)	0.201*** (9.00)
Flex Account. x Net Profit	-0.0586 (-1.29)	0.00820 (0.20)	0.0110 (0.27)	0.0108 (0.27)	0.00837 (0.21)	0.00165 (0.04)
Flex Account. x Net Profit x Priv. Shares	0.477** (3.06)	0.452** (3.31)	0.457*** (3.34)	0.457*** (3.33)	0.465*** (3.41)	0.436** (3.19)
Depreciation	-0.0109 (-0.54)	-0.00805 (-0.45)	-0.0209 (-0.89)	-0.0214 (-0.90)	-0.0151 (-0.63)	-0.0207 (-0.86)
Banknotes	0.0199*** (3.31)	0.0218*** (4.12)	0.0221*** (4.17)	0.0221*** (4.15)	0.0241*** (4.49)	0.0248*** (4.63)
Growth	-0.0189 (-1.10)	-0.0202 (-1.35)	-0.0295 (-1.59)	-0.0300 (-1.56)	-0.0237 (-1.23)	-0.0281 (-1.45)
Swiss Gold Sale 2004		0.162*** (12.48)	0.162*** (12.47)	0.162*** (12.46)	0.160*** (12.41)	0.159*** (12.36)
Inflation			0.000175 (0.85)	0.000181 (0.84)	0.000141 (0.66)	0.000203 (0.94)
Fiscal Balance				0.0000224 (0.10)	0.000165 (0.74)	0.000194 (0.87)
Public Debt					0.000112* (2.51)	0.000120** (2.69)
Flexible X-Rate						0.00510* (1.98)
Constant	0.00605 (0.53)	0.0112 (1.12)	0.0113 (1.13)	0.0114 (1.14)	0.00880 (0.88)	-0.00376 (-0.32)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.698</b>	<b>0.660</b>	<b>0.666</b>	<b>0.666</b>	<b>0.671</b>	<b>0.639</b>
<b>t-statistics</b>	<b>4.59</b>	<b>4.95</b>	<b>4.98</b>	<b>4.98</b>	<b>5.04</b>	<b>4.78</b>
Adj. R-sq.	0.511	0.624	0.623	0.623	0.627	0.629
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of the CB's flexibility in accounting (ability to build more revaluation reserves) and private shares on transfers to the government. The sample consists of 4 CBs with private shares and an provision flexibility (Austria, Belgium, Greece and Italy). We use two interaction terms (*net profit x acc. flex.*) and (*net profit x acc. flex. x private shares*) in order to identify the change in transfers due to a change in profits among central banks with flexible accounting and private shares. The total effect of profits on transfers among CBs with private shares and flexible accounting (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 9: Transfers, Private Ownership and Flexible Provisioning**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.168 (1.65)	0.160 (1.59)	0.160 (1.58)	0.159 (1.58)	0.148 (1.51)	0.152 (1.51)
Flex Provision x Net Profit	0.103 (0.55)	0.0989 (0.54)	0.0979 (0.53)	0.0999 (0.54)	0.124 (0.68)	0.119 (0.65)
Flex Provision x Net Profit x Priv. Shares	0.328* (2.07)	-0.0110 (-0.06)	-0.0141 (-0.07)	-0.0150 (-0.08)	-0.0254 (-0.13)	-0.0356 (-0.18)
Depreciation	-0.0258* (-2.16)	-0.0135 (-0.88)	-0.0191 (-0.85)	-0.0211 (-0.94)	-0.0160 (-0.69)	-0.0225 (-0.91)
Banknotes	0.0193* (2.30)	0.0220* (2.64)	0.0222* (2.69)	0.0220* (2.63)	0.0215* (2.45)	0.0221* (2.55)
Growth	-0.0271* (-2.08)	-0.0240 (-1.72)	-0.0280 (-1.35)	-0.0303 (-1.47)	-0.0249 (-1.13)	-0.0300 (-1.29)
Swiss Gold Sale 2004		0.154*** (7.65)	0.155*** (7.73)	0.155*** (7.84)	0.153*** (7.24)	0.154*** (7.61)
Inflation			0.0000775 (0.32)	0.000105 (0.42)	0.0000619 (0.26)	0.000139 (0.52)
Fiscal Balance				0.000101 (0.55)	0.000354 (1.94)	0.000372 (1.86)
log Public Debt					0.00767** (2.74)	0.00785* (2.71)
Flexible X-Rate						0.00520 (1.34)
Constant	0.0130 (1.97)	0.0125 (1.81)	0.0125 (1.80)	0.0131 (1.92)	-0.00711 (-0.75)	-0.0203 (-1.42)
Observations	572	572	572	572	572	572
<b>Linear Comb.</b>	<b>0.598</b>	<b>0.247</b>	<b>0.244</b>	<b>0.244</b>	<b>0.247</b>	<b>0.236</b>
<b>t-statistics</b>	<b>18.70</b>	<b>1.95</b>	<b>1.92</b>	<b>1.95</b>	<b>1.84</b>	<b>1.83</b>
Adj. R-sq.	0.550	0.621	0.620	0.619	0.627	0.629
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of the CB's flexibility to build provisions and private shares on transfers to the government. The sample consists of 5 CBs with private shares and an provision flexibility (Austria, Belgium, Greece, Switzerland and Turkey). We use two interaction terms (*net profit x prov. flex.*) and (*net profit x prov. flex. x private shares*) in order to identify the change in transfers due to a change in profits among central banks with flexible provisioning and private shares. The total effect of profits on transfers among CBs with private shares and flexible provisioning (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 10: Government Transfers, Private Ownership and Profit Smoothing**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.211* (2.07)	0.204 (2.02)	0.203 (2.03)	0.203 (2.03)	0.205* (2.06)	0.205* (2.05)
Profit smoothing x Net Profit	0.306* (2.39)	0.0237 (0.17)	0.0258 (0.19)	0.0262 (0.19)	0.00875 (0.06)	0.0159 (0.12)
Profit smoothing x Net Profit x Priv. Shares	-0.00686 (-1.65)	-0.00785* (-2.50)	-0.00786* (-2.52)	-0.00791* (-2.52)	-0.0107** (-3.33)	-0.0109** (-3.42)
Depreciation	-0.00962 (-0.54)	-0.00988 (-0.56)	-0.0198 (-0.86)	-0.0204 (-0.85)	-0.0142 (-0.57)	-0.0214 (-0.85)
Banknotes	0.0234* (2.52)	0.0232* (2.66)	0.0235* (2.71)	0.0234* (2.69)	0.0253** (2.97)	0.0261** (3.11)
Growth	-0.0202 (-1.31)	-0.0215 (-1.36)	-0.0287 (-1.33)	-0.0293 (-1.31)	-0.0230 (-0.99)	-0.0287 (-1.22)
Swiss Gold Sale 2004		0.157*** (10.02)	0.157*** (9.91)	0.157*** (9.91)	0.158*** (10.62)	0.156*** (9.71)
Inflation			0.000135 (0.65)	0.000143 (0.68)	0.0000992 (0.48)	0.000183 (0.82)
Fiscal Balance				0.0000272 (0.12)	0.000160 (0.69)	0.000195 (0.83)
Public Debt					0.000108* (2.38)	0.000118* (2.49)
Flexible X-Rate						0.00620 (1.67)
Constant	0.00797 (1.14)	0.0103 (1.72)	0.0104 (1.73)	0.0105 (1.73)	0.00789 (1.24)	-0.00719 (-0.61)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.510</b>	<b>0.220</b>	<b>0.221</b>	<b>0.221</b>	<b>0.203</b>	<b>0.210</b>
<b>t-statistics</b>	<b>5.78</b>	<b>2.31</b>	<b>2.31</b>	<b>2.31</b>	<b>2.25</b>	<b>2.16</b>
Adj. R-sq.	0.534	0.616	0.615	0.615	0.618	0.622
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of profit smoothing (profit distributions to the gov. are smoothed across several years) and private ownership in central banks on transfers to the government. The sample consists of 1 CB with private shares and smoothing (Switzerland). We use two interaction terms (*net profit x smoother*) and (*net profit x smoother x private shares*) in order to identify the change in transfers due to a change in profits among central banks with smoothing and private shares. The total effect of profits on transfers among CBs with private shares and smoothing (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 11: Government Transfers, Private Ownership and Recapitalization Rule**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.356** (3.36)	0.285** (3.12)	0.286** (3.15)	0.286** (3.18)	0.285** (3.25)	0.288** (3.25)
Recap. Rule x Net Profit	-0.379** (-3.38)	-0.317** (-3.06)	-0.327** (-3.26)	-0.333** (-3.42)	-0.330** (-3.41)	-0.336** (-3.42)
Recap. Rule x Net Profit x Priv. Shares	0.00732* (2.11)	0.00583 (1.64)	0.00382 (1.20)	0.00427 (1.35)	0.00221 (0.78)	0.00148 (0.56)
Depreciation	-0.0103 (-0.53)	-0.00766 (-0.40)	-0.0336 (-1.80)	-0.0386 (-2.01)	-0.0329 (-1.63)	-0.0416 (-1.96)
Banknotes	0.0195* (2.29)	0.0216* (2.63)	0.0222* (2.72)	0.0218* (2.66)	0.0236** (2.88)	0.0244** (3.05)
Growth	-0.0226 (-1.51)	-0.0234 (-1.62)	-0.0421* (-2.30)	-0.0476* (-2.44)	-0.0419 (-2.03)	-0.0487* (-2.27)
Swiss Gold Sale 2004		0.148*** (9.68)	0.147*** (9.68)	0.148*** (9.76)	0.147*** (10.00)	0.145*** (9.74)
Inflation			0.000353 (1.81)	0.000420 (2.03)	0.000382 (1.87)	0.000483* (2.15)
Fiscal Balance				0.000228 (1.24)	0.000352 (1.75)	0.000395 (1.88)
Public Debt					0.0000983 (2.02)	0.000110* (2.23)
Flexible X-Rate						0.00722 (1.93)
Constant	0.00391 (0.56)	0.00866 (1.51)	0.00875 (1.51)	0.00991 (1.70)	0.00761 (1.31)	-0.0100 (-0.88)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>-0.0157</b>	<b>-0.0266</b>	<b>-0.0379</b>	<b>-0.0424</b>	<b>-0.0425</b>	<b>-0.0468</b>
<b>t-statistics</b>	<b>-0.27</b>	<b>-0.50</b>	<b>-0.80</b>	<b>-0.96</b>	<b>-0.92</b>	<b>-1.02</b>
Adj. R-sq.	0.563	0.657	0.659	0.659	0.662	0.667
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of a recapitalization rule (the central banks is recapitalized when it has negative capital) and private ownership in central banks on transfers to the government. The sample consists of 1 CB with private shares and smoothing (Turkey). We use two interaction terms (*net profit x recap.*) and (*net profit x recap. x private shares*) in order to identify the change in transfers due to a change in profits among central banks with a recap. rule and private shares. The total effect of profits on transfers among CBs with private shares and a recap. rule (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table 12: Government Transfers, Private Ownership and Government Discretion**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.207 (1.98)	0.128 (2.02)	0.128 (2.00)	0.128 (2.01)	0.128* (2.06)	0.129* (2.05)
Gov. Discretion x Net Profit	0.347*** (3.79)	0.411*** (6.32)	0.411*** (6.24)	0.411*** (6.18)	0.408*** (6.31)	0.408*** (6.22)
Gov. Discretion x Net Profit x Priv. Shares	-0.00382 (-1.32)	-0.00226 (-0.95)	-0.00249 (-1.00)	-0.00251 (-1.02)	-0.00567 (-1.66)	-0.00279 (-0.75)
Depreciation	-0.0147 (-0.83)	-0.0108 (-0.59)	-0.0196 (-0.89)	-0.0191 (-0.83)	-0.0141 (-0.58)	-0.0205 (-0.87)
Banknotes	0.0213* (2.66)	0.0234** (3.08)	0.0237** (3.14)	0.0237** (3.11)	0.0256** (3.32)	0.0263** (3.50)
Growth	-0.0174 (-1.06)	-0.0178 (-1.08)	-0.0242 (-1.14)	-0.0235 (-1.06)	-0.0185 (-0.79)	-0.0234 (-1.03)
Swiss Gold Sale 2004		0.173*** (16.46)	0.173*** (16.36)	0.173*** (16.67)	0.171*** (16.62)	0.171*** (16.23)
Inflation			0.000119 (0.57)	0.000112 (0.50)	0.0000786 (0.36)	0.000156 (0.72)
Fiscal Balance				-0.0000263 (-0.13)	0.000103 (0.45)	0.000134 (0.56)
Public Debt					0.000102 (1.97)	0.000110* (2.04)
Flexible X-Rate						0.00600 (1.64)
Constant	-0.00441 (-0.59)	-0.000888 (-0.14)	-0.000835 (-0.13)	-0.000976 (-0.15)	-0.00331 (-0.49)	-0.0179 (-1.91)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.550</b>	<b>0.537</b>	<b>0.536</b>	<b>0.536</b>	<b>0.531</b>	<b>0.534</b>
<b>t-statistics</b>	<b>16.55</b>	<b>20.71</b>	<b>19.76</b>	<b>19.85</b>	<b>20.37</b>	<b>20.61</b>
Adj. R-sq.	0.545	0.675	0.674	0.674	0.677	0.680
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of government discretion (flexibility by the government to retain or distribute profits) and private ownership in central banks on transfers to the government. The sample consists of 1 CB with private shares and gov. discretion (Greece). We use two interaction terms (*net profit x gov. discretion*) and (*net profit x gov. discretion x private shares*) in order to identify the change in transfers due to a change in profits among central banks with gov. discretion and private shares. The total effect of profits on transfers among CBs with private shares and gov. discretion (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for private shares is equal to one when a central bank has private shareholders. We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.



### Appendix I: Institutional arrangements of central banks with private shareholders

Bank Name	Date of Foundation	Shareholder represented in the Board of Directors?	Shareholder Rights			Shareholder Structure			
			Nomination/ Election	Approval of		Distribution of shares		Shareholder eligibility	Limits on shares per shareholder
				Accounts	Profits	Private	Public		
Austrian National Bank	1 June 1816	YES	Auditor	YES	YES	29.7% since 2006, 0% since 2010	70.3% since 2006, 100% since 2010	Austrian citizenship or resident companies	no restriction
National Bank of Belgium	5 May 1850	NO (for shares issued after April 2011) <sup>y</sup>	Regents, Censors, Auditor	NO <sup>ii</sup>	NO	200 000	200 000	NO restrictions	NO
Bank of Greece <sup>iii</sup>	10 November 1927	NO <sup>v</sup>	General Council, Auditor	YES	YES	19 864 886 shares in total	not published	Yes <sup>v</sup>	Upper limit for public shares: 35% (Statute, Art. 8)
Bank of Italy	10 August 1893	NO <sup>vi</sup>	Board of Auditors, Board of Directors	YES	YES	283 000 <sup>vii</sup>	17 000	Yes <sup>viii</sup>	Upper limit on shares: 3% of the share capital
Bank of Japan	10 October 1882 <sup>x</sup>	NO	NO	NO	NO	47 632	52 368	No restrictions	Government: 55% required shares, current ownership by public institutions: 73.8%
Swiss National Bank	16 January 1906 <sup>s</sup>	YES <sup>xi</sup>	Bank council, Audit Board	YES	YES	34 972	52 405 <sup>xii</sup>	NO	Yes <sup>xiii</sup>
Central Bank of the Rep. of Turkey	11 June 1930	NO <sup>xiv</sup>	Board members, Audit Committee	YES	YES	61 370 <sup>xv</sup>	188 630	Yes <sup>xvi</sup>	Yes <sup>xvii</sup>
The Federal Reserve	23 December 1913	NO <sup>xviii</sup>	NO	NO	NO	571 435 966	none	Private member banks are required to hold shares of regional Fed's	Limited to 6 percent of the capital plus surplus of the bank

Footnotes to Appendix II:

<sup>i</sup> “Since 1 April 2011, the Bank's code of ethics has prohibited the Governor, Vice-Governor and Directors from holding shares issued by the Bank or by enterprises subject to the Bank's control, or derivative instruments with such shares as the underlying security, except for shares which they already held when taking office” (NBB Report 2014, p.40).

<sup>ii</sup> Statute of the NBB, Art. 61: “It shall hear the Annual Report on the past year's operations.”

<sup>iii</sup> Information regarding Bank of Greece's shareholder rights and structure (except for the distribution of shares) are taken from Bank of Greece Statute (9<sup>th</sup> ed.) and amendments regarding the 9<sup>th</sup> ed. However, a 10<sup>th</sup> ed. has been published in July 2013 which is currently not available in English.

<sup>iv</sup> Statute of the Bank of Greece until July 2013, Article 8: "No shares of the Bank may be held by persons that are subject to supervision by the Bank under Article 55a or a provision of law, by affiliated companies and members of the Board of Directors or administrators of such persons, as well as by their spouses and relatives up to the second degree. In the event that shares of the Bank are acquired by any of the persons referred to in the preceding sentence, all administrative and financial rights deriving from such shares shall be suspended for as long as the shares remain in their ownership" (see also Amendments to the 9th edition (2000) of the statute of the Bank of Greece in July 2013 after ratification by the Government in December 2012)

<sup>v</sup> No Persons subject to supervision by the Bank, by affiliated companies and members of the Board of Directors or administrators of such persons, as well as by their spouses and relatives up to the second degree.

<sup>vi</sup> Statute of the Bank of Italy, Article 16 (2d): "The nomination committee shall check the possession of the eligibility requirements of candidates prior to their presentation to the Shareholders' meeting, based in part on the candidates' own statements, which must show that the person: [...] d) does not hold and has not held within the past two years positions with banks or companies operating in the financial or insurance sector or with other entities that by reason of their nature, activity or other circumstances, even contingent, are subject to the powers of control, supervision or authorization of the Bank of Italy; [...] f) is not, for any personal or professional reason, in a position of conflict, even only apparent or potential, with the Bank of Italy."

<sup>vii</sup> Private Shareholders refer to SpAs engaged in banking, including companies and insurance companies whereas the social security institution owns the remaining 17 000 shares.

<sup>viii</sup> Banks and insurance and re-insurance firms, legally registered and with had office in Italy, social security institutions and insurance companies and institutions with head office in Italy and pension funds

<sup>ix</sup> began operating on October 1882, but officially established under the Bank of Japan Act promulgated in June 1882 (<https://www.boj.or.jp/en/about/outline/history/index.htm/>)

<sup>x</sup> was founded by the virtue of the Federal Act on the Swiss National Bank, which entered into force on 16 January 1906. Business was started on 20 June 1907.

<sup>xi</sup> Federal Act on the Swiss National Bank (National Bank Act), Section 3, Art. 40: "To be eligible for election as members of the Bank Council, persons must have Swiss citizenship, an impeccable reputation and a recognised knowledge of the fields of banking and financial services, business administration, economic policy, or an academic field. They need not be shareholders."

<sup>xii</sup> Distribution of shares by December 31, 2015 (SNB Annual Report 2015, p. 178)

<sup>xiii</sup> The SNB limits the voting right to a maximum of 100 shares except for Swiss public-law corporations and institutions or to cantonal banks

<sup>xiv</sup> The Law on the Central Bank of the Republic of Turkey, Part 1, Article 19: "[...] furthermore, these members (governors) may not engage in trade, nor may they become shareholders of banks or companies."

<sup>xv</sup> Under the assumption that no state-owned entity is captured under the “other category” (CBRT Annual Report 2014, p. 79). See also <http://www.allaboutturkey.com/banks.htm> for the classification into state-owned banks.

<sup>xvi</sup> Governors, Members of the audit committee are not allowed to be shareholders

<sup>xvii</sup> Max of 15,000 shares allocated to the banks other than the national banks and to privileged companies

<sup>xviii</sup> Federal Reserve Act, Section 10, 4: "[...] No member of the Board of Governors of the Federal Reserve System shall be an officer or director of any bank, banking institution, trust company, or Federal Reserve Bank or hold stock in any bank, banking institution, or trust company [...]"

## Appendix II. Dividend Rules for Central Banks with Private Shares

Central Bank	Dividend Rule
<b>Profit Participating Private Shareholders</b>	
National Bank of Belgium	Private Shareholders receive a fixed dividend of 6% of the share capital plus a second dividend, “ <i>forming a minimum of 50% of the net proceeds from the assets forming the counterpart to the reserve fund and available reserve</i> ” (Annual Report 2014, p. 49)
Bank of Greece	Shareholders receive a fixed gross dividend of 12% of the share capital plus a second dividend such “ <i>that the total amount of dividends distributed to the shareholders is equal to 12% of the total net profits for that financial year</i> ” (before taxes). This second payment will not be paid if “ <i>the regular reserve fund has become equal to the capital,...</i> ” (Statute of the Bank of Greece, Section XIII, Article 71).
Banca d’Italia (until 2013)	Before 2013, “ <i>...in addition to dividends (up to 10%) shareholders also received an amount proportional to the Bank’s statutory reserves, which were bound to increase indefinitely owing to the automatic reinvestment of the return on them and the allocation to reserves of a part of each year’s profits</i> ” (Annual Report 2013, p. 165). Since 2013, private shareholders receive a fixed dividend of up to 6% of the share capital.
<b>Private Shareholders based fixed percentages of share capital</b>	
Oesterreichische Nationalbank (until 2010)	Private shareholders (before 2010) receive a fixed dividend of <b>10% of the share capital</b>
Bank of Japan	“ <i>Dividend payments as a proportion of paid-up capital are limited to 5 percent or below in each fiscal year</i> ” (Annual Report 2014, p. 11).
Swiss National Bank	The “ <i>dividend may not exceed 6% of the share capital</i> ” (Annual Report 2014, p. 163).
Central Bank of the Republic of Turkey	Shareholders receive “ <b>6 percent of the nominal value of its share capital</b> to the shareholders as the first dividend” and a “ <i>second dividend (...) in the ratio of a maximum of 6 percent of the nominal value of its share capital by a decision of the General Assembly</i> ” (Law on the Central Bank of the Republic of Turkey, Article 60).
Federal Reserve System	“ <i>After all necessary expenses of a Federal reserve bank have been paid or provided for, the stockholders of the bank shall be entitled to receive an annual <b>dividend of 6 percent on paid-in capital stock</b></i> ” (Federal Reserve Act, Section 7 (a)).

### Appendix III: Country sample and coverage of balance sheet variables

Country	Coverage	Private Shares?	Country	Coverage	Private Shares?
Austria	1996-2014	Y/N	Mexico	2000-2014	N
Australia	1996-2014	N	Netherlands	1997-2014	N
Belgium	1997-2014	YY	New Zealand	1996-2014	N
Canada	1995-2014	N	Norway	1997-2014	N
Chile	1997-2014	N	Poland	1997-2014	N
Czech Republic	1997-2014	N	Portugal	1998-2014	N
Denmark	1997-2014	N	Slovakia	1997-2014	N
Estonia	1993-2014	N	Slovenia	1997-2014	N
Finland	1996-2014	N	Spain	1998-2014	N
France	1996-2014	N	Sweden	1995-2014	N
Germany	1993-2014	N	Switzerland	1993-2014	Y
Greece	1997-2014	YY	Turkey	1996-2014	Y
Hungary	2000-2014	N	United Kingdom	1996-2014	N
Iceland	2000-2014	N	United States	1994-2014	Y
Ireland	1997-2014	N	Euro Area	1999-2014	N
Israel	2003-2014	N			
Italy	1997-2014	YY			
Japan	2003-2014	Y			
Korea	1994-2014	N			
Luxembourg	1997-2014	N			

Notes: YY Refers to central banks in which private shareholders have profit participating rights. Austria abolished private shareholding in 2010 (Y/N)

**Appendix IV: Descriptive statistics balance sheet variables**

<b>Balance Sheet Variables</b>	<b>Observations</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Min</b>	<b>Max</b>
Net profit (% of assets)	577	0.012	0.031	-0.15	0.20
Transfer gov (% of assets)	577	0.011	0.019	-0.87	0.20
Loss-absorbing capacity (% of assets)	577	0.1	0.12	-0.23	0.49
Banknotes and Coins (% of assets)	577	0.33	0.20	0.02	0.97
Total CB assets (% of GDP)	577	0.26	0.32	0.01	3.01
Depreciation of SDR exchange rate	577	-0.002	0.069	-0.19	0.47
Inflation (% change)	577	0.031	0.045	-0.017	0.55
Economic Growth (% change)	577	0.062	0.11	-0.33	0.56
Government Debt (in logs)	577	3.80	0.77	1.30	5.52
Net Fiscal Balance (% of GDP)	577	-0.02	0.045	-0.32	0.18

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Source: Annual Reports

**Appendix V. Recapitalizations and other contributions  
from the Treasury to the Central Bank**

Country	Year	Nominal value in domestic currency	Transfer gov as % of assets	Description
Chile	2006	322,745.7 million	2.17%	Capital contribution by the Treasury
	2007	407,956.3 million	3.73%	
	2008	435,571.1 million	2.42%	
Iceland	2007	44.000 million	9.23%	Capital contribution by the Treasury
Italy	2002	7.161 million	4.86%	Deferred tax asset
	2003	1.085 million	0.75%	
	2004	243 million	0.15%	
New Zealand	2009	600 million	1.95%	Capital injection from the government

**Details on the above cash flows:**

**Chile:** In 2006, the Chilean Treasury made a capital contribution to the Bank of Ch\$322,745.7 million (US\$605.9 million) that became a part of the Bank's international reserves.<sup>27</sup> In 2007, the Ministry of Finance made a capital contribution to the Bank of Ch\$386,688.5 million (US\$736.0 million) that became part of the Bank's international reserves. The amount of the contribution made by the General Treasury in June 2007, restated as of 31 December 2007 amounted to Ch\$407,956.3 million (price-level restatement).<sup>28</sup> In 2008, the General Treasury made a contribution to the Bank equity which amounted to Ch\$428,199.1 million (US\$730.7 million) that became part of Central Bank of Chile international reserves. The amount of the contribution made by the General Treasury in 2008, adjusted as of 31 December 2008, amounted to Ch\$435,571.1 million (price-level restatement).<sup>29</sup>

**Iceland:** In May 2007, a 44 b.kr. equity capital contribution paid to the Bank by the Treasury.<sup>30</sup>

**Italy:** The Banca d'Italia received a deferred tax asset for three consecutive years to compensate for the conversion of a claim against the public sector which led to a loss of €21,837 million. The remaining loss was compensated by a revaluation of Gold assets and utilization of risk provisions.<sup>31</sup>

**New Zealand:** The Central Bank of New Zealand received a capital contribution of \$600 million on 2 July 2008.<sup>32</sup>

<sup>27</sup> Annual report 2006, p. 76

<sup>28</sup> Annual report 2007, p.110

<sup>29</sup> Annual report 2008, p.142

<sup>30</sup> Annual Report 2007, p. 34

<sup>31</sup> Annual Report 2002, p. 309

<sup>32</sup> Annual Report 2009, p. 81

## Appendix VI: Additional Tests

**Table AVI 1: Government Transfers of Profits in Central Banks with Profit-Participating Private Shareholders**

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.269* (2.54)	0.207* (2.33)	0.206* (2.33)	0.206* (2.34)	0.205* (2.36)	0.207* (2.35)
Net Profit x Profit Part. Shares	0.505 (1.72)	0.485 (1.72)	0.503 (1.78)	0.503 (1.78)	0.504 (1.89)	0.524 (1.68)
Depreciation	-0.0144 (-0.83)	-0.0110 (-0.62)	-0.0221 (-0.93)	-0.0225 (-0.91)	-0.0164 (-0.64)	-0.0237 (-0.89)
Banknotes	0.0206* (2.44)	0.0226** (2.77)	0.0229** (2.83)	0.0229** (2.79)	0.0248** (3.02)	0.0256** (3.17)
Growth	-0.0213 (-1.31)	-0.0224 (-1.41)	-0.0304 (-1.38)	-0.0309 (-1.34)	-0.0248 (-1.04)	-0.0304 (-1.24)
Swiss Gold Sale 2004		0.161*** (10.87)	0.160*** (10.81)	0.161*** (10.87)	0.159*** (10.90)	0.158*** (10.62)
Inflation			0.000150 (0.67)	0.000156 (0.68)	0.000117 (0.51)	0.000200 (0.80)
Fiscal Balance				0.0000202 (0.09)	0.000159 (0.67)	0.000193 (0.81)
Public Debt					0.000109* (2.41)	0.000120* (2.54)
Flexible X-Rate						0.00624 (1.63)
Constant	0.00575 (0.75)	0.0106 (1.77)	0.0107 (1.77)	0.0108 (1.76)	0.00826 (1.29)	-0.00696 (-0.58)
Observations	577	577	577	577	577	577
<b>Linear Comb.</b>	<b>0.774</b>	<b>0.691</b>	<b>0.709</b>	<b>0.709</b>	<b>0.710</b>	<b>0.730</b>
<b>t-statistics</b>	<b>2.50</b>	<b>2.43</b>	<b>2.45</b>	<b>2.45</b>	<b>2.59</b>	<b>2.28</b>
Adj. R-sq.	0.504	0.617	0.617	0.616	0.620	0.623
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Central Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* This table presents pooled OLS estimates of the effect of profit-participating private shares in central banks on transfers to the government. We use an interaction term (*net profit x profit-part. private shares*) in order to identify the change in transfers due to a change in profits among central banks with private shares. The total effect of profits on transfers among CBs with profit-part. private shares (linear combination) is marked in bold numbers at the end of the table. The sample consists of 35 central banks observed between 14 and 21 years (unbalanced). The dummy variable for profit-part. private shares is equal to one when a central bank has profit-part. private shareholders (Belgium, Greece, Italy). We control for the full set of central bank and year fixed effects. The t-statistics are presented in parentheses and standard errors are clustered on central bank level.

**Table AVI 2: Government Transfers from Central Banks with Private Ownership  
(2SLS with instrumented profits)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Net Profit	0.582 (1.80)	0.676* (2.01)	0.676* (2.01)	0.776 (1.80)	0.823 (1.67)	1.143 (1.36)	0.690 (1.17)
<b>Net Profit x PrivateShare</b>	<b>0.0797 (0.26)</b>	<b>-0.321 (-1.07)</b>	<b>-0.321 (-1.07)</b>	<b>-0.415 (-1.06)</b>	<b>-0.456 (-1.02)</b>	<b>-0.732 (-0.98)</b>	<b>-0.335 (-0.64)</b>
Depreciation	-0.0233 (-0.74)	-0.00877 (-0.26)	-0.00877 (-0.26)	-0.0292 (-0.48)	-0.0292 (-0.47)	-0.0420 (-0.48)	-0.0263 (-0.40)
Growth	0.0372 (1.12)	0.0487 (1.40)	0.0487 (1.40)	0.0427 (1.06)	0.0486 (1.05)	0.0728 (1.02)	0.0365 (0.92)
Swiss Gold Sale 2004		0.135*** (5.64)	0.135*** (5.64)	0.133*** (4.89)	0.132*** (4.45)	0.119** (2.67)	0.134*** (4.68)
Emerging Markets			0.00345 (0.29)	0.00535 (0.39)	0.00620 (0.42)	0.00956 (0.46)	0.00142 (0.09)
Inflation				0.000205 (0.44)	0.000175 (0.37)	0.000225 (0.35)	0.000101 (0.23)
Fiscal Balance					-0.000194 (-0.39)	-0.000192 (-0.29)	0.0000517 (0.13)
Public Debt						0.000177 (0.99)	0.000102 (0.85)
Flexible X-Rate							0.0208 (0.93)
Constant	-0.00126 (-0.06)	-0.00337 (-0.15)	-0.00337 (-0.15)	-0.00738 (-0.28)	-0.0103 (-0.34)	-0.0280 (-0.57)	-0.0465 (-0.64)
Observations	423	423	423	423	423	423	423
<b>Linear Comb. z-statistics</b>	<b>0.662 10.16</b>	<b>0.355 3.75</b>	<b>0.355 3.75</b>	<b>0.361 3.40</b>	<b>0.368 3.20</b>	<b>0.412 2.41</b>	<b>0.355 3.19</b>
Exc. Instr. F- stat.	1.154	1.204	1.204	0.932	0.792	0.507	0.404
Hansen p- value	0.614	0.527	0.527	0.664	0.713	0.993	0.195
Adj. R-sq.	0.0841	-0.0434	-0.0434	-0.331	-0.483	-1.754	-0.0681
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CentralBank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: We use GDP per capita, banknotes as percentage of total assets and the policy rate as instruments for central bank net profits. The Hansen test indicates that the instruments are exogenous to transfers across all specifications. The first-stage results show that the instruments explain more than ten percent of the variation of profits (see also the Cragg-Donald Wald F-statistic for weak instruments). Standard errors are not clustered due to insufficient clusters to calculate a robust covariance matrix..



**Table AVI 3: Central Bank Governance and Private Shareholders**

<b>Panel A</b>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Recap. Rule	Recap. Rule	Income Tax Payer	Income Tax Payer	Provision Flexibility	Provision Flexibility	Accounting Flexibility	Accounting Flexibility
Private Shares	-0.101 (-0.12)	-1.855 (-0.68)	1.317* (2.33)	1.286* (2.23)	0.374 (0.67)	0.297 (0.54)	-0.268 (-0.51)	-0.0570 (-0.11)
Banknotes avg.	-10.48** (-2.94)		-1.275 (-0.69)		-0.260 (-0.15)		0.399 (0.26)	
CB assets avg.	-2.882 (-1.30)		-1.007 (-0.56)		2.500 (0.87)		1.453 (0.76)	
GDP p.c. avg.		-0.134 (-0.25)		-0.287 (-0.57)		0.175 (0.35)		-0.373 (-0.87)
CPI, avg.		0.140 (1.24)		0.00289 (0.05)		0.0745 (0.66)		-0.0597 (-0.97)
Constant	2.678* (2.23)	0.00748 (0.00)	-0.256 (-0.29)	1.970 (0.38)	-0.552 (-0.51)	-2.082 (-0.39)	-0.238 (-0.29)	4.210 (0.94)
Observations	35	35	35	35	35	35	35	35
Chi2 H-L-Test	22.57	25.54	34.54	34.67	33.89	34.10	34.23	34.81
Corr. predicted	82.86	80	77.14	77.14	51.43	57.14	57.14	62.86

<b>Panel B</b>	(1)	(2)	(3)	(4)	(5)	(6)
<b>Profit Rules</b>	Central Bank Discretion	Central Bank Discretion	Profit Smoothing	Profit Smoothing	Government Discretion	Government Discretion
Private Shares	-0.305 (-0.49)	-0.221 (-0.40)	0.721 (0.89)	-3.852 (-0.69)	0.289 (0.41)	0.0811 (0.12)
Banknotes avg.	-3.257 (-1.39)		-0.377 (-0.13)		-1.159 (-0.52)	
CB assets avg.	5.480 (1.49)		-1.393 (-0.30)		-3.360 (-0.85)	
GDP p.c. avg.		0.250 (0.51)		3.989 (0.96)		-0.603 (-0.72)
CPI, avg.		0.0679 (0.71)		-3.623 (-0.91)		-0.197 (-0.79)
Constant	0.434 (0.34)	-2.335 (-0.45)	-1.377 (-0.83)	-37.31 (-0.98)	-0.167 (-0.12)	5.514 (0.61)
Observations	35	35	35	35	35	35
Chi2 H-L-Test	31.08	34.04	30.37	7.221	34.06	31.35
share of corr. predictions	80	65.71	94.29	91.43	88.57	88.57

*t* statistics in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Note: Probit estimates, macro variables are period averages.