

## A MACRO-ECONOMIC CONSEQUENCE OF THE CENTRAL BANK'S RESERVE FUND: A POLITICAL-ECONOMIC PERSPECTIVE \*

ILJOONG KIM

*Department of Economics, SungKyunKwan University*  
*Seoul 110-745, Korea*  
ijkim@skku.edu

AND

INBAE KIM \*\*

*Department of Economics, Ewha Womans University*  
*Seoul 120-750, Korea*  
ibkim@ewha.ac.kr

Received May 2010; Accepted April 2011

### *Abstract*

Academic attention to the central bank's retained profits has been scarce, although their magnitudes are nontrivial. This paper confirms that the profits retained as a reserve fund, *if* combined with unconstrained bureaucratic discretion, can engender inflationary bias. This result is intriguing because the previous literature emphasizes a similar distortion in monetary policy for the opposite case where those profits are turned over to the Treasury. We therefore propose that some external changes in central-banking institutions alone may not warrant their desired 'outcome' *without* reining in excessive discretion. This proposition can provide a beneficial implication for establishing the meaningful independence of central banks.

*Keywords:* retained profits, central banking, transparency, bureaucratic discretion, inflationary bias

*JEL Classification:* D73, K42, E58

### I. *Introduction*

Most central banks in the world at least partially retain their profits inside. Our pilot

---

\* We appreciate productive comments and encouragement by the referee, the editor of this *Journal*, and many commentators participating in, among others, the Western Economic Association Meetings in Waikiki and the Korean Economics Association Meetings in Seoul. Also, we are grateful for capable research assistance provided by Yoonsup Kwon, Hyunseok Kim, Soomin Chun and Kyungwha Han. The usual caveat applies.

\*\* Corresponding author.

survey reveals that many central banks have large amounts of retained profits, although they officially use different titles for that fund, for instance, reserve fund, general reserve, or rest fund (the *reserve fund* hereafter). More specifically, the amounts of the reserve fund in some countries were huge (for instance, as a 'proportion to the monetary base'), but the worldwide distribution of the proportion was dispersed: As of 2005, Iceland (38%), the UK (3%) and Germany (1%) in Europe, Indonesia (14%), Japan (2%), Korea (13%) and Philippines (51%) in Asia, and Venezuela (5%), the US (2%) and Australia (20%) in America and Oceania, to name a few. It seems, however, that few researchers have paid attention to this chunk of central bank-led funds.

Relevant statutory provisions of the central banks in many countries usually identify the role of this monetary institution as "*preparing for potential losses*." Nonetheless, we find them unconvincing to a certain extent. Firstly, we suspect that the current balances of the reserve fund in some countries might be too large for the actual losses.<sup>1</sup> Secondly, and far more importantly, we contend that even on the occurrence of losses the government, rather than its central bank, should in principle be responsible for them from the conventional public-finance perspective.<sup>2</sup> In fact, a simple T-account analysis shows that there is no change in the size of the monetary base whether the central bank or the government makes up the losses. This result insinuates that it makes essentially no difference to the credibility of the central bank.<sup>3</sup>

Intriguingly enough, we have noticed that the reserve fund in the central bank is not just sitting in its vault, but is continuously managed in and out. In an ensuing inquiring process from the political-economic standpoint,<sup>4</sup> we encountered an intriguing argument by Chant and Acheson (1972) made already in the early 1970s.<sup>5</sup> All these ultimately led us to a hypothesis that the incentive to expand the reserve fund might cause inflationary bias, at the margin, *if* combined with unconstrained bureaucratic discretion concerning its management.

The purpose of the current comparative analysis lies in a first-time verification of the relationship between the central bank reserve fund and inflation. We believe that this research will provide useful insights to a host of countries. In particular, meaningful 'transparency' in central-banking institutions will be highlighted.<sup>6</sup>

<sup>1</sup> According to our extended survey of 61 countries to be explained later, the Bank of Korea, for instance, had a reserve fund of \$4,154 million in 2001, which was 17% of the monetary base. However, the total accumulation of ten-time actual losses, incurred over 40 years since the reserve fund's introduction, had been only \$2,953 million up to the moment of completing the collection of our data to be used in Section III.

<sup>2</sup> For instance, § 38 of the Law of the People's Bank of China stipulates: "*Losses sustained by the People's Bank of China shall be made up by appropriations from the State Treasury.*"

<sup>3</sup> As for this T-account analysis, refer to Kim and Kim (2007) highlighting the relevant institutions of Korea, while its analytic result can be generalized with no difficulty.

<sup>4</sup> The overall political-economic perspective on central banking was launched in full force from the 1970s, and the literature generally distinguishes these political-economic models into four different types; public interests models, presidential partisan models, congressional partisan models, and public choice models. The current paper might be regarded as belonging to the public choice models, the related examples of which would include Chant and Acheson (1972), Toma (1982), Kane (1982), Shughart and Tollison (1983), Boyes et al. (1988), Havrilesky and Granato (1993), Caporale and Grier (1998), Broz and Frieden (2001), van Rixtel (2002), Bearce (2003), Kim and Kim (2005, 2008), Crowe and Meade (2008), and de Haan et al. (2007, 2008), etc.

<sup>5</sup> "*The theory of bureaucracy traditionally assumes that a bureau is concerned with prestige and self-preservation .... [Accordingly,] a preference ordering that stresses these concerns to a central bank throws considerable light on the actual operation of monetary policy.*" (Chant and Acheson, 1972, p.14, [ ] added).

<sup>6</sup> See a special issue of *The Manchester School* (2003, v.71, issue 5) and a more recent one of *European Journal of*

For this purpose, in Section II we first examine the (orthodox) notion that such reserve funds *should* be completely independent of any inflationary bias, at least from a legislative point of view. We then submit the hypothesis that, if the discretionary power of central bank authorities is not effectively controlled, the incentive to expand reserve funds can result in inflationary bias. In Section III, we test, using international data, the main hypothesis that an increase in the reserve fund causes inflationary bias *ceteris paribus*. Finding solid evidence to support this hypothesis could cast critical implications for establishing meaningful independence of many central banks, i.e., including independence from the 'internal bureaucratic distortion,' not just from the (usual) 'external pressures.' That would reinforce the argument underlying, for instance, Crowe and Meade (2008) and de Haan *et al.* (2008), that the central bank independence, as part of central bank's governance arrangements, needs to be complemented by transparency and accountability for its effective working. Finally, Section IV summarizes the discussions and suggests imminent future studies.

## II. *Retained Profits and Inflationary Bias: A Potential Nexus*

### 1. **Their Mutual Independence Conjectured by Relevant Legal Provisions**

From the legislative point of view, the central bank's retained profits as a reserve fund should be independent of any inflationary or deflationary bias. TABLE 1 reports our own pilot survey of thirty countries where their relevant legal documents were available in English. We first detect that the selected countries, at the major statutory-Acts level governing their own central banks, provide the official titles of retained profits, their purposes, or allocation formula from annual profits. Some countries such as Croatia, Indonesia, and Korea define more than a single-type reserve fund.

Only thirteen out of the thirty countries explicitly identify the goals of their reserve fund. They are mostly associated with "*covering some types of losses*." The losses are not completely detailed out in the relevant clauses, but appear to be understood as including a very broad set of losses from varying operations of central banking. As to the other seventeen countries in TABLE 1 that do not specify explicit purposes, although we exerted efforts to scrutinize the entire Acts to deduce some implicit intention, we could not identify any. The use of this fund seems to be rather a mystery. Thus, at least from reading these legal provisions, we draw the conclusion that the purpose of this monetary institution (i.e., reserve fund) *should* 'neither' lie in any intention to change the domestic inflation level 'nor' relate to an inflationary effect.

### 2. **Evaluating the Argument for the Inflation-Deterring Effect**

Due to language barriers, it was inherently difficult to investigate legal documents below the Act level in many countries regarding this public fund's purpose. However, we discovered a somewhat provocative argument in a major publication by the Bank of Korea (BOK). Although

---

*Political Economy* (2007, v.23, issue 1) for this topic. Gerrats (2006), in an excellent survey paper on central bank transparency, defined the transparency as the absence of asymmetric information between monetary policy makers and the private sector. An excessive discretionary power is a major cause of asymmetric information after all.

TABLE 1. LEGAL TITLES AND LEGISLATIVE PURPOSES OF CENTRAL BANK RETAINED PROFITS FOR THIRTY SELECTED COUNTRIES

Country	Legal Provision	Official Title	Purpose of Reserves
Albania	Law on the Bank of Albania § 9	General Reserve Fund	<i>n.a.</i>
Australia	Reserve Bank Act 1959 § 29	Reserve Fund	<i>“set aside for contingencies”</i>
Barbados	Central Bank of Barbados Act § 9	General Reserve & Special Funds	<i>n.a.</i>
Belgium	Organic Act of the National Bank of Belgium § 30~33	Special Reserve Fund	<i>“compensating for losses in capital stock”</i>
Bulgaria	Law on the Bulgarian National Bank § 7~8	Statutory Fund & Reserve Fund	<i>“Cover uncollectable and doubtful receivables, and the Bank’s losses”</i>
Canada	Bank of Canada Act § 27	Rest Fund	<i>n.a.</i>
Chile	Constitutional Organic Act of the Central Bank of Chile § 77	Reserves	<i>“Offset any deficit”</i>
China	Law of the People’s Bank of China § 38	General Reserve	<i>n.a.</i>
Croatia	Law on The Croatian National Bank § 51~53	General & Specific Reserves	<i>“Cover general operating risks &amp; identified losses”</i>
Czech Rep.	Czech National Council Act No. 6/1993 § 25~26	Minimum Reserve	<i>n.a.</i>
Estonia	Law on the Central Bank of the Republic of Estonia § 25, 27	Reserve Capital, Special Capital and Special Funds	<i>n.a.</i>
Germany	Bundesbank Act § 27	Statutory Reserve	<i>“offset falls in value and cover other losses”</i>
Iceland	Act on the Central Bank of Iceland § 34	Reserve	<i>n.a.</i>
Indonesia	Act No.23/ 1999 on Bank Indonesia § 62	General & Special Purpose Reserves	<i>n.a.</i>
Jamaica	Bank of Jamaica Act § 9	General Reserve Fund	<i>“Charge any net losses”</i>
Japan	Bank of Japan Law § 53	Reserve Fund	<i>n.a.</i>
Korea	Bank of Korea Act § 99~100	Legal & Specific Purpose Reserves	<i>“recouping losses”</i>
Lithuania	Republic of Lithuania Law on the Bank of Lithuania § 20, 23	Reserve Capital	<i>“Cover the loss”</i>
Luxembourg	Law Concerning the Monetary Status and the Central Bank of Luxembourg § 31	Reserve Fund	<i>n.a.</i>
Malaysia	Central Bank of Malaysia Act 1958 § 7	General Reserve Fund	<i>n.a.</i>
Mexico	Banco de Mexico Law § 53	Reserve	<i>n.a.</i>
Netherlands	Bank Act 1998 Articles of Association of De Nederlandsche Bank n.v., § 19	Reserve from Profits	<i>n.a.</i>
Poland	Act on The National Bank of Poland § 60~62	Reserve Capital	<i>n.a.</i>
Romania	National Bank of Romania Act § 44	Statutory Reserves	<i>“Cover the loss”</i>
Singapore	Monetary Authority of Singapore Act § 6	General Reserve Fund	<i>n.a.</i>
Slovenia	Bank of Slovenia Act § 6	General Reserve & Special Reserve	<i>“Cover general risks, exchange rate and price risks”</i>
Sweden	Sveriges Riksbank Act, Chap.10 § 4	Reserve Fund	<i>n.a.</i>
Switzerland	National Banking Law § 25~27	Reserve Fund	<i>n.a.</i>
Thailand	Bank of Thailand Act B.E. 2485 § 9~12	Ordinary & Other Reserves	<i>“cover possible losses”</i>
Turkey	Law on The Central Bank of Turkey § 59	Provisions & Special Reserves	<i>“meet contingent risks”</i>

the BOK Act formally identified, as the reserve fund's goal, "*preparing for losses*" in TABLE 1, BOK assigned another goal: "*The monetary base is scaled down by the retained profits, while the fiscal use of them [if transferred to the Treasury as general taxes] increases the monetary base* (BOK, 1999, p.277, [] added)." Nonetheless, the conventional T-account examination has persuaded us that BOK's so called 'inflation-detering effect' is groundless.<sup>7</sup>

In summary, one might derive a normative conclusion that the central bank's retained profits are not supposed to influence inflation in any systematic way. In other words, it should not change the monetary base, according to this conventional scrutiny in the current subsection, as well as the legislative intents illustrated in Section II.1. We now turn to observations by which one can reasonably suspect that there exists an undeniable caveat against this traditional wisdom. The aforementioned normative conclusion then becomes rather sophomoric.

### 3. Bureaucratic Discretion, Reserve Fund, and Inflationary Bias

The existence of excessive discretion is recognized in much of the literature on political-economic analyses of central banks mentioned in the Introduction. The early work by Chant and Acheson (1972) was illuminating in that they provided vivid examples concerning why and how such uncontrolled discretion is actually exercised in everyday operation within the central bank.<sup>8</sup>

From the current paper's theme in particular, Shugart and Tollison (1983) is another inspiring study. They showed how central bank bureaucrats' incentives were used to benefit themselves in allocating the Fed's earnings each year. Central bank profits, after paying out expenses, can be either turned in to the Treasury or retained inside. The US is a representative example of the former.<sup>9</sup>

Shugart and Tollison plead that the constraint of returning profits to the Treasury since 1947 has induced the Fed to 'pad' its operating expenditures by increasing the number of employees on its payroll or by over-purchasing amenities. In order to support these bureaucratic incentives, the authors articulate, the Fed will try to maximize its revenues by the expansionary open market operations, resulting in inflationary bias. They then empirically proved that "*one*

<sup>7</sup> Refer to Kim and Kim (2007) also for this T-account analysis refuting the BOK's claim.

<sup>8</sup> For instance, the Bank of Canada used to utilize government deposits for maintaining and strengthening its discretionary power: its use of arbitrary transfers of government deposits between itself and the chartered banks. Chant and Acheson (1972, p.28) argue that the practice has a clearer rationale in terms of bureaucratic behavior rather than in relation to monetary control. In particular, we were inspired by the authors' assertions that a significant advantage of this practice is 'greater covertness' relative to open market operations, and that this greater covertness renders a higher degree of discretionary power. Meanwhile, we believe that such covertness (and informality) can be greatly reinforced by practices such as *amakudari* from the central bank to private banks. See, for example, van Rixtel (2002) and Cho and Kim (2001) for pervasive *amakudari* especially up to the 1990s in Japan and Korea, respectively.

<sup>9</sup> The Federal Reserve Act of 1914 stated that the Fed first were to use earnings for paying their expenses and for paying dividends to member banks. Then, half of their yearly net earnings were to be paid to the government in the form of a franchise tax. The other half could be retained by the Fed as long as its surplus was less than 40% of paid-in capital. However, over the period of 1933-1947, all earnings could legally be spent or retained by the Fed (Toma, 1982, p.165). According to Toma (1982, p.166), these excess earnings sparked congressional interest, which the Fed feared might be expressed in the form of a legislative measure, mandating a particular disposition of excess earnings; this fear, at least partially, accounted for the Fed's 'voluntary' transfer of a large portion of its revenue to the Treasury in 1947. Boyes et al. (1988, pp.182-183) argue that, fearing legislative sanctions, the Fed began to submit most of its earnings above system expenses to the Treasury, a practice that continues to this day.

*motivation for expansions in the money supply is to finance the growth of the Fed's bureaucracy*" (Shugart and Tollison, 1983, p.291). Furthermore, in a similar context, Toma (1982, p.190) contends that *"Federal Reserve officials benefit from inflation. As a supply side phenomenon, inflation is a predictable consequence of an institutional structure that ties Fed revenue to bond holdings."*

Intriguingly enough, we propose that inflationary bias can also take place in the polar-opposite case of the related institution. The size of this reserve fund is enormous in many countries and, as discussed before, there certainly exists ambiguity in its actual use. Naturally, to the extent that central bank bureaucrats possess enough discretionary power, the reserve fund can equally be utilized to maximize their own private interests at the margin. One representative way is by arbitrarily allocating the fund to discounted loans, which have been shown in the literature to be under significant influence by the monetary authority's discretion in a way to meet its bureaucratic incentives (representatively, Poole, 1990; Schwartz, 1992).<sup>10</sup> This being the case, a very similar argument regarding inflationary bias above would hold: they would try to maximize profits by expansionary monetary policy to have a larger reserve fund, and it can result in inflationary bias.

#### 4. Central Bank's Governance and Excessive Discretionary Power

As mentioned before, the reserve fund is incessantly managed in and out. If its usage in normal times is not being stipulated by the Acts, one may presume that the bureaucratic incentives might intervene after all. We thus particularly underscore that bureaucrats would prefer a bigger size of the reserve fund *only if* they possess the leeway to utilize it to their own benefit. To put it differently, substantial discretionary power is a pre-requisite for the reserve fund to embark on the inflationary-bias-triggering nexus. In that context, we conjecture that the magnitude of discretionary power is directly related to the 'overall governance' of central banks.<sup>11</sup>

In fact, central banks have become more independent over the past two decades as documented persuasively by Cukierman (2008). In response to this change, the demand for transparency has also increased to reconcile the imperative of accountability consideration with the need to guide the expectations of financial market participants. Of course, all these 'transparency and accountability' measures would largely characterize the overall governance. Consequently, many central banks these days, if to varying degrees, are indeed constrained by their publicly-announced policy objectives (notably concerning the monetary index or targeted rate of inflation) or obligations to explain to the public what they do and why.

Nonetheless, there are countries where such measures are yet to be sufficient.<sup>12</sup> After all, we always have to be aware of the 'discretion-maximizing motive,' which is the fundamental

<sup>10</sup> In fact, Kim and Kim (2007), based on about 40-year time series data of the Bank of Korea, verified such causal relationship between the reserve fund and discount windows.

<sup>11</sup> The literature on central bank's governance has grown rapidly from the early 2000s. See, among others, Schiffman (2004), Lybek and Morris (2004), Tuladhar (2005), Amtenbrink, F. (2005), Crowe and Meade (2007), Kaufmann and Kraay (2008), Kaufmann et al. (2009), and Ortiz (2009).

<sup>12</sup> Refer, for example, Crowe and Meade (2007) for a comprehensive survey. Even in the presence of proper *de jure* measures, however, there can be wide gaps between the expected and actual operations if either the government will not support the laws or the central bank itself does not comply with them.

aspect that crosscuts all bureaus, as has been argued persuasively *à la* Niskanen (1975).<sup>13</sup> Central banks are not an exception as clearly observed by the many public-choice models focusing on central banks that were introduced in Section I. The bottom line is that a non-trivial number of central banks can and may possess excessive discretionary power if the strict transparency and accountability measures are not imposed effectively.

Moreover, another problem still looms large. We submit that corruption also would make bureaucratic discretion 'more permissible' as part of the social culture or norms: corruption would pervade an epidemic of bureaucratic discretion. This submission is based on a casual observation that people in a corrupt society tend to have uncertainty in every aspect of their businesses that involves any government regulation. In a sense, this speculation of ours of a cultural nature might be consistent with Klitgaard's (1988, p.41) keen-edged economic account of the 'nefarious incentive effect' throughout an entire society. It is in this very context that Kaufmann *et al.* (2009, p.6), in accurately evaluating the central bank's governance, emphasized the aspect of 'control of corruption' that captures the perceptions of the extent to which public power is exercised for private gain.

In conclusion, the degree of discretionary power is believed to be mainly determined by 'transparency' and 'accountability' measures on the one hand, and the general level of 'corruption' in the society on the other. Further, the degree appears to be essential in explaining the relationship between the reserve fund and the inflationary bias. All in all, we posit that the supposedly 'independent' relationship between the two variables, which was derived in the earlier subsections, might not be warranted in practice. It thus provides an explicit motivation for the ensuing section, viz., that an empirical investigation utilizing the aforementioned primary determinants of discretionary power is imperative.

### III. *Empirical Analysis by International Comparisons*

#### 1. The Data

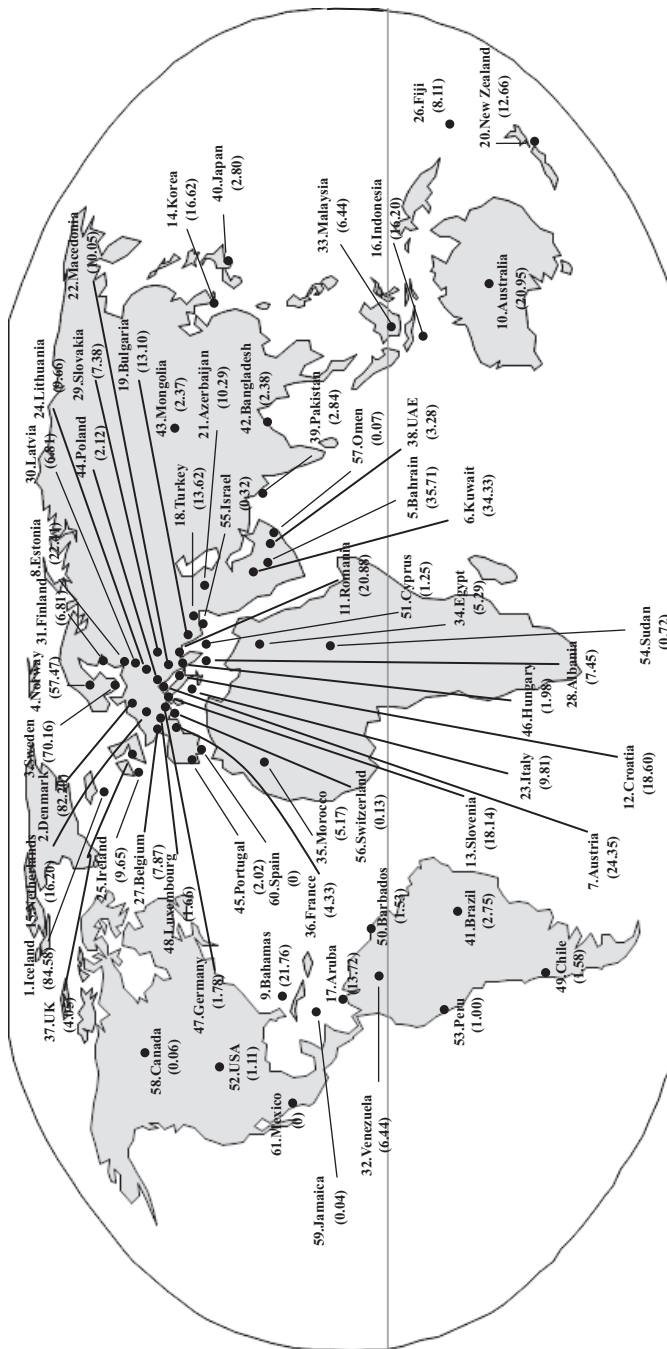
We now empirically test the hypothesis that a bigger reserve fund, *if* combined with discretionary power, could cause inflationary bias.<sup>14</sup> To be sure, controlling for such

<sup>13</sup> In this regard, for instance, it is shown theoretically in Berger et al. (2001) that even an *independent* central bank, if it has the same preferences as the government, will behave in the same way. While such emphasis on the central bank's 'preference,' originating representatively from scholar such as Rogoff (1985), is relevant to our argument in question, we believe, on the contrary, that the assumption of identical preferences usually holds just because of the very nature of bureaucracy.

<sup>14</sup> One can alternatively think of testing the relationship between profits and inflation, so that it would encompass both Shughart and Tollison's hypothesis (i.e., *turning in profits to the Treasury causes inflationary bias*) and our hypothesis (i.e., *retaining profits inside causes inflationary bias*). However, we focus on the hypothesis in the text for the following two reasons. First, we intend to verify the effect of the reserve fund *per se* which could be hardly inferred from legislative documents as shown in TABLE 1. Secondly, our own scrutiny suggests that the bureaucratic discretionary power can be better exercised with a stock variable (i.e., reserve fund) than with a flow variable (i.e., profits). This is mainly because bureaucrats can get away with a 'publicity and/or outside monitoring constraint' more effectively through using the reserve fund as a safe harbor. Such constraints to bureaucrats are believed to exist obviously; for instance, the Monetary Authority of Singapore Act § 15 strictly rules that "*No salary fee wage or other remuneration or allowance paid by the Authority shall be computed by reference to the profits of the Authority.*"



FIG. 1. WORLDWIDE DISTRIBUTION OF THE RESERVE FUND/MONETARY BASE RATIOS (%) IN 2001



Note: The prefixed country number indicates the ranking of the reserve fund/MB ratio in the parenthesis.

Furthermore, as explained in Section II, the Fed's voluntary decision to transfer profits to the Treasury was also due to congressional monitoring and accompanying political burdens after all.



bureaucratic discretion (i.e., accountability, transparency, and corruption) to substantiate its effect on inflation will be a major tenet of our empirical task.

APPENDIX.1 describes the data collection process, sources, and major sampling rules for the reserve fund variable across 61 countries for fiscal years 2000 and 2001.<sup>15</sup> The reason for choosing this data period is also explained. For other variables, detailed explanations regarding, for instance, the sources and calculations are provided in APPENDIX.2.

FIG.1 displays the ratio of the reserve fund to the monetary base of the 61 countries. It is clear that the existence of the reserve fund is universal, and that the worldwide distribution of the reserve fund ratios is fairly broad. Our early attempts to categorize the ratios by region or economic development levels were not particularly productive. For instance, the top-ten ratio sub-sample includes five developed countries as defined by the IMF (i.e., Iceland, Denmark, Sweden, Norway and, Austria), while there are also five developed countries (i.e., Spain, Canada, Switzerland, Israel and, the US) in the bottom-ten ratio sub-sample.

## 2. Estimation Results

### The Basic Model

To test the main hypothesis with this data, we start from the basic regression equation of inflation with the traditional fundamentals adopted from the literature as control variables (*Fundamentals*), and add to them the reserve fund variable (*Reserve*) as in equation (1). *Time* is a dummy to control the year difference.

$$\text{Inflation}_{i,t} = \alpha + \beta \cdot \text{Fundamentals}_{i,t} + \gamma \cdot \text{Reserve}_{i,t} + \delta \cdot \text{Time}_t + \varepsilon_{i,t} \quad (1)$$

where  $i$  = each country, and  $t$  = 2000 and 2001.

In the existing research on the cross-sectional inflation performance, the following six economic or political factors seem to be typically present, and are thus included in *Fundamentals*.<sup>16</sup> i) Trade-openness (*Trade\_openness*): Romer (1993) argues that the benefits of surprise inflation are a decreasing function of the degree of trade openness. ii) Exchange rate regime (*Ex.rate\_peg*): Exchange rate pegs act as a disciplining device, allowing policy makers in countries with a high inflation propensity to import credibility and, hence, lower inflation from abroad (Husain et al., 2005).<sup>17</sup> iii) Per-capita income (*Per.capita\_income*): Higher income per capita as a general measure of development is likely to be accompanied by a more sophisticated tax system and a more developed financial system, both of which imply lower optimal inflation tax (Campillo and Miron, 1996). iv) Political stability (*Political\_stability*): Cukierman et al. (1992) find that inflation is high on average in countries that are politically less stable because the decreased stability reduces policy makers' ability to pre-commit economic policies. v) Government budget balance (*Gov\_budget*): Deficit governments have incentive to monetize government spending (Al-Mahrubi and Willett, 1995). vi) Central bank

<sup>15</sup> Detailed information on each country's reserve fund variable is available upon request.

<sup>16</sup> Only one representative paper for each variable will be referred to because of a good accumulation of the related literature.

<sup>17</sup> There is also a public-choice view that the exchange rate regime can be endogenously determined by bureaucrats' private interest, rather than the traditional view taking it as exogenous. See Kim and Kim (2005) for its empirical verification and more literature.

independence (*CB\_independence*): Klomp and de Haan (2010) among many others validates the negative relationship between inflation and central bank independence using a meta-regression analysis based on the existing 59 studies on this topic.

*Inflation* is transformed into the form of  $Inflation = \pi / (1 + \pi)$  (where  $\pi$  is consumer price index inflation) to reduce not only the heteroskedasticity of the regression error but the influence of a few high inflation countries. *Trade\_openness* is the sum of exports and imports relative to GDP. *Ex.rate\_peg* is a dummy that has the value of 1, 2 or 3 for the floating, the intermediate, and the fixed exchange rate regime, respectively, according to the IMF criteria.<sup>18</sup> *Per.capita\_income* is the log of per-capita GDP in the constant US dollars of 1995. *Political\_stability* measures political stability facing each country where a higher score is associated with lower political risk. *Gov\_budget* represents government fiscal balance relative to GDP. *CB\_independence* is central bank independence index where a higher score is assigned to a more independent central bank. Regarding *Reserve*, we tried two different measures of the relative magnitude of the reserve fund. One is the amount relative to M2 ( $= Reserve_M$ ), and the other is the amount relative to the monetary base ( $= Reserve_{MB}$ ). Expected signs of coefficient estimates for *Trade\_openness*, *Ex.rate\_peg*, *Per.capita\_income*, *Political\_stability*, *Gov\_budget*, and *CB\_independence* are all negative whereas, if our hypothesis holds, those for *Reserve* variables ( $Reserve_M$  or  $Reserve_{MB}$ ) should be positive.

It is noted that, for the eleven euro-countries in our data, the monetary policy is formulated by the Governing Council of European Central Bank (ECB) and executed by the national central banks under uniform terms and conditions; an individual central bank does not have much discretion in monetary policy. Therefore, we treat those euro-countries as one entry in estimation by averaging out for each variable, which consequently reduces the number of observations from 61 to 51.

Before undertaking estimation, we first checked the correlation coefficients among the explanatory variables to avoid a possible multicollinearity problem. TABLE 2 shows the correlation coefficients. Most of them seem to be acceptable except the rather high figure between *Per.capita\_income* and *Political\_stability*. It was well expected, however, so we will take this into account in our estimation.

TABLE 3 reports the various estimation results of equation (1). Models 1 to 4 show the results when only the traditional fundamental variables are included (of course, a constant and *Time* are included but not reported). In Model 1, because of multicollinearity, *Per.capita\_income* instead of *Political\_stability* is used. Out of the five traditional variables included in *Fundamentals*, three reveal statistical significance with the expected signs, while the coefficient estimates of *Trade\_openness* and *CB\_independence* are not significant. We tried a different measure of trade openness, the ratio of imports to GDP (*Trade\_openness1*), in Model 2 as in Romer (1993), but the result did not change.<sup>19</sup> Model 3 and Model 4 parallel Model 1 and

<sup>18</sup> The exchange rate regime classification is obtained from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*.

<sup>19</sup> In contrast to the papers in favor of Romer (1993), there is also a collection of research not supporting Romer's finding empirically and theoretically (Temple, 2002; Granato et al., 2007, etc.). For example, Granato et al. (2007) argue that the negative openness-inflation relation is not always found, depending on the government's aggressiveness in economic stabilization. We also made efforts to make sure of the accuracy of the *CB\_independence* coefficient. Cukierman et al. (2002) could not find the negative relationship between independence and inflation in developing countries, so they emphasized the merit of distinguishing countries by economic developments in estimation. Following

TABLE 2. CORRELATION COEFFICIENTS AMONG THE VARIABLES

	<i>Trade_</i> <i>openness</i>	<i>Ex.rate_peg</i>	<i>Per.capita_</i> <i>income</i>	<i>Political_</i> <i>stability</i>	<i>Gov_budget</i>	<i>CB_inde-</i> <i>pendence</i>	<i>Reserve<sub>M</sub></i>	<i>Reserve<sub>MB</sub></i>
<i>Trade_openness</i>	1.00	0.46	0.08	0.10	0.05	0.16	0.17	0.05
<i>Ex.rate_peg</i>		1.00	-0.14	-0.16	0.08	-0.27	0.23	0.05
<i>Per.capita_</i> <i>income</i>			1.00	0.81	0.38	0.19	0.02	0.39
<i>Political_</i> <i>stability</i>				1.00	0.30	0.34	0.08	0.37
<i>Gov_budget</i>					1.00	0.04	0.06	0.26
<i>CB_inde-</i> <i>pendence</i>						1.00	0.01	-0.05
<i>Reserve<sub>M</sub></i>							1.00	0.79
<i>Reserve<sub>MB</sub></i>								1.00

Model 2, respectively, except that *Political\_stability* is substituted for *Per.capita\_income*.

Overall, among the four equations from Models 1 to 4, Model 1 seems to fit best because it shows the highest adjusted  $R^2$  and more significance for each individual variable. Therefore, Model 1 will be used as the 'base equation' for further study of the influence of the reserve fund below.

We checked for the possibility of the endogeneity problem with the regressors, based on Durbin-Wu-Hausman (*DWH*) test. Among the traditional regressors, *Trade\_openness*, *Ex.rate\_peg*, and *Per.capita\_income* have been typical exogenous regressors in the panel-data analyses of the inflation in the literature (e.g., Crowe and Meade, 2008; Hussain *et al.*, 2005; Romer, 1993; etc.). Therefore, we focused rather on the other variables, *Gov\_budget* and *CB\_independence*, in Model 1.

First, we instrumented the government budget balance (*Gov\_budget*) through the use of a lagged *Gov\_budget* and the ratio of the government consumption to GDP, since the latter, which represents the size of the government, would be correlated with *Gov\_budget*. The *DWH* statistic ( $\chi^2_{(1)}$ ) was 0.41 and its p-value was 0.52. Second, as for central bank independence (*CB\_independence*), we used as instruments the variables of *Law and Order (LAW)* and *Bureaucracy Quality (BQ)* from the *PRS Group's International Country Risk Guide (ICRG)* database. The variable, *LAW*, is an assessment of the strength and impartiality of the legal system and popular observance of law. The variable, *BQ*, measures the institutional strength and quality of the bureaucracy. The *DWH* statistic ( $\chi^2_{(1)}$ ) then was 1.68 and its p-value was 0.19. Upon these *DWH* tests, no endogeneity problem with the regressors was corroborated.

In Models 5 and 6, *Reserve<sub>M</sub>* and *Reserve<sub>MB</sub>* are added respectively to the base equation, Model 1, in order to test the hypothesis that a larger reserve fund causes inflationary bias. Our main focus is on the coefficients of *Reserve<sub>M</sub>* and *Reserve<sub>MB</sub>*, expectedly with a positive sign. The absence of any endogeneity problem related to the reserve fund variables is confirmed by

---

their findings, we added to the equation an interaction variable of the advanced-country dummy and *CB\_independence*, but it was not fruitful and the advanced-country dummy interaction seemed to only cause the multicollinearity problem with *Per.capita\_income*.

TABLE 3. REGRESSIONS ON THE RESERVE FUND IN SEARCH OF THE BASIC MODEL

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
<i>Trade_openness</i>	0.026 (0.019)		0.026 (0.020)		0.020 (0.019)	0.022 (0.019)
<i>Trade_openness1</i>		0.051 (0.040)		0.068 (0.041)		
<i>Ex.rate_peg</i>	-0.021*** (0.008)	-0.022** (0.009)	-0.017* (0.009)	-0.019** (0.010)	-0.023*** (0.008)	-0.020** (0.008)
<i>Per.capita_income</i>	-0.013*** (0.005)	-0.012** (0.005)			-0.013*** (0.005)	-0.016*** (0.005)
<i>Political_stability</i>			-0.001* (0.001)	-0.001** (0.000)		
<i>Gov_budget</i>	-0.208* (0.123)	-0.181 (0.125)	-0.282** (0.126)	-0.233* (0.130)	-0.224* (0.118)	-0.231* (0.123)
<i>CB_independence</i>	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
<i>Reserve<sub>M</sub></i>					0.623*** (0.232)	
<i>Reserve<sub>MB</sub></i>						0.046 (0.031)
<i>Adj. R<sup>2</sup></i>	0.184	0.183	0.155	0.166	0.245	0.197

Note: Standard errors are in parentheses. \*, \*\*, and \*\*\* represent the 10%, 5%, and 1% significance, respectively. The constant and *Time* coefficients are not reported. *Trade\_openness* is the sum of exports and imports relative to GDP while *Trade\_openness1* is the imports relative to GDP.

the *DWH* test.<sup>20</sup> The traditional fundamental variables do not change in their signs and significance levels upon including *Reserve<sub>M</sub>* or *Reserve<sub>MB</sub>*. However, the influence of the reserve fund turns out to be mixed: Model 5 with *Reserve<sub>M</sub>* supports the hypothesis, while Model 6 with *Reserve<sub>MB</sub>* does not.

This result appears to be unsatisfactory at first glance. Upon further inspection, however, it could have been well anticipated. In our hypothesis submitted earlier, the bureaucratic discretionary power plays a key role working on the reserve fund, but it has not been taken account of in our estimation yet. Incorporating it into the regression below comes as quite a natural step for completely testing our main hypothesis.

#### Controlling for Discretionary Power: The Essence of the Argument

We now take up the important issue of bureaucratic discretionary power, which constitutes a critical facet in our hypothesis: substantial discretionary power is imperative for the reserve fund to embark on inflationary bias. We undertake this task by estimating equation (1) with the reserve fund variable therein interacted with a ‘discretionary country’ dummy, i.e., a dummy for

<sup>20</sup> In Model 5, we instrumented *Reserve<sub>M</sub>* using a lagged *Reserve<sub>M</sub>* and a lagged *Inflation*. Then, the *DWH* statistic ( $\chi^2_{(1)}$ ) and its p-value were 0.0002 and 0.99, respectively. Again in Model 6, we instrumented *Reserve<sub>MB</sub>* using a lagged *Reserve<sub>MB</sub>* and a lagged *Inflation*. The *DWH* statistic ( $\chi^2_{(1)}$ ) and its p-value were then 0.6799 and 0.41, respectively.

the group of countries with relatively more discretionary central banks. To define the 'discretionary country', we need first a potentially good proxy of discretionary power.

We recognize that a standardized proxy of central bank discretionary power, which can be unanimously acknowledged among scholars in the field, will be unavailable for the time being. Nevertheless, given this empirical barrier, we have experimentally chosen to utilize three potential proxies, if not perfectly distinctive and/or exhaustive. They are directly capturing our earlier discussion in Section II which bears on the main sources of such power.

First, a central bank transparency measure (*Less\_transparent*: higher scores imply 'less transparency') from Fry *et al.* (2000, *TABLE A.7: Policy explanation*) is used as a proxy for the discretionary power.<sup>21</sup> *Less\_transparent* underscores the information published by the central bank that can help the public to understand its policy, analysis, and forecasts.<sup>22</sup> It is thus conjectured that the less information is revealed, the more discretionary power will be exercised.

Second, higher accountability that is statutorily imposed upon central banks would tend to constrain the scope and degree of bureaucratic discretionary power. Again Fry *et al.* (2000, *TABLE A.6: Accountability of the central bank to government/parliament*) measured how far the central bank as a government bureau has legal or informal responsibility to explain and defend its policies to other government bodies. We use this accountability measure (*Less\_accountable*: higher scores imply 'less accountability') as another proxy for the discretionary power.

Lastly, we exploit the *Corruption Perceptions Index* (*Corrupt*: higher scores imply 'more corruption') from *Transparency International*,<sup>23</sup> under the aforementioned proposition that that a society's widespread corruption would pervade an epidemic of bureaucratic discretion among most government agencies and officials.<sup>24</sup> We thus hypothesize that bureaucratic discretionary power at central banks is likely to be positively correlated with this index.

Now, we make the 'discretionary country' dummies,  $D_{less\_transparent}$ ,  $D_{Less\_accountable}$  and  $D_{corrupt}$ , taking one if a country's *Less\_transparent*, *Less\_accountable* and *Corrupt* exceed their respective averages of the sample, and zero otherwise. Then, these dummies will be exploited one by one, interacted with the reserve fund to test our hypothesis as in equation (2). *Dummy* is the alternative 'discretionary country' dummy ( $D_{less\_transparent}$ ,  $D_{Less\_accountable}$  or  $D_{corrupt}$ ). We also include *Dummy* itself as a regressor in equation (2), because it would be reasonable to

<sup>21</sup> Fry *et al.* (2000) provide measurements of a very extensive range of monetary framework characteristics of each central bank, for example, policy focus on particular objectives, central bank independence, transparency, accountability, etc. from their survey of 94 central banks.

<sup>22</sup> de Haan *et al.* (2007) provides a good summary of the current state of knowledge in the field of central bank transparency and the effectiveness of central bank communication.

<sup>23</sup> We use the *Corruption Perceptions Index* of the year 2003 for two reasons. First, the *Index* is based on a moving average of the previous three years. We thus believe that it does no harm to use the *Index* of 2003 because fundamental changes in the level of corruption in a country evolve only slowly. The second, more importantly, is that the *Index* of 2003 provides information on many more countries (133 countries) than the 2002 *Index* (102 countries), which helped us to minimize the number of missing values for our sample.

<sup>24</sup> Cho and Kim (2001) provide empirical evidence to infer this assumption at least for the case of the Bank of Korea officials. Meanwhile, one might argue that the central bank independence index can be also a possible proxy most probably working in the opposite direction. However, we dropped the option, because, first at a conceptual level, the bureaucratic discretionary power in question would sometimes rise with the extent of central bank independence instead, and also, the independence index has already been included as a fundamental variable in equation (1).

suspect that countries with a relatively more discretionary central bank might experience higher inflation on average than the rest of the countries *ceteris paribus*.<sup>25</sup>

$$\begin{aligned} Inflation_{i,t} = & \alpha + \beta \cdot Fundamentals_{i,t} + \lambda \cdot Dummy_{i,t} + \gamma \cdot Reserve_{i,t} \\ & + \theta \cdot Dummy_{i,t} \cdot Reserve_{i,t} + \delta \cdot Time_t + \varepsilon_{i,t}. \end{aligned} \quad (2)$$

#### Refined Results: A Macro-Economic Consequence of the Reserve Fund

TABLE 4 provides the estimation results of equation (2), with  $Reserve_M$  as the *Reserve* variable. That is, TABLE 4 summarizes the results of varying extensions of Model 5 of TABLE 3 by adding the alternative ‘discretionary country’ dummy and its interaction term with  $Reserve_M$ .

First, Models 1 and 2 use  $D_{less\_transparent}$  as the ‘discretionary country’ dummy without and with, respectively, the interaction term between  $D_{less\_transparent}$  and  $Reserve_M$ . In Model 1, the coefficient of  $D_{less\_transparent}$  is positive but not significant while the coefficient of  $Reserve_M$  turns out to be significantly positive. In Model 2, when compared to Model 1, the coefficient of  $Reserve_M$  is insignificant, while the coefficient of the interaction term shows significance with the expected positive sign. This means that the positive effect of  $Reserve_M$  on inflation in Model 1 is mostly from the ‘discretionary countries’ that are defined through  $D_{less\_transparent}$ . As for the other coefficients, there is no visible change from the results of TABLE 3 except that the coefficient of  $Per.capita\_income$  loses significance.

Second, Models 3 and 4 use  $D_{Less\_accountable}$  as the ‘discretionary country’ dummy. In both models, the coefficient of  $D_{Less\_accountable}$  is significantly positive, which implies higher inflation in countries featuring ‘less accountability,’ as the literature would predict conventionally. The coefficient estimates of  $Reserve_M$  are also significantly positive. In Model 4, however, the coefficient of the interaction term is not significant. Literally speaking, the interaction effect of the reserve fund with  $D_{Less\_accountable}$  appears to be limited.

Lastly, Models 5 and 6 exploit  $D_{corrupt}$  as the ‘discretionary country’ dummy. Intriguingly enough, as in the case of  $D_{less\_transparent}$ , the coefficient of  $D_{corrupt}$  itself is not significant in spite of a strong effect of  $Reserve_M$ . In Model 6, the significance of  $Reserve_M$  in Model 5 disappears, and the interaction term bounces back with a significantly positive sign.

In summary, the estimation results of TABLE 4 shed the following insights. The reserve fund variable itself becomes insignificant when interacted with the ‘discretionary country’ dummy, viz., either  $D_{less\_transparent}$  or  $D_{corrupt}$ , while the interaction term takes up statistical significance instead. As such, through both the accumulation and use of the reserve fund, we confirm the role of bureaucratic discretionary power in causing an inflationary bias. In this context, we can infer that the previously positive coefficients of  $Reserve_M$  in Model 5 of TABLE 3 must have — at least to a nontrivial extent — stemmed spuriously from the countries with both a high value of  $Reserve_M$  and substantial discretionary power. In the case of  $D_{Less\_accountable}$ , we cannot find such a role of bureaucratic discretion, even though the reserve fund itself still has a positive effect on inflation. Overall, TABLE 4 is believed to provide rather firm evidence for our main proposition that discretionary power is in fact the driving vehicle in

<sup>25</sup> We are grateful to an anonymous referee for pointing out this important tenet imbedded in our panel data, and advising the kind of a ‘difference-in-difference’ model as undertaken in the text. It certainly has allowed us to test our hypothesis more rigorously.

TABLE 4. REGRESSIONS ON THE RESERVE FUND ( $RESERVE_M$ ) WITH DISCRETIONARY POWER

	$D_{Less\_transparent}$		$D_{Less\_accountable}$		$D_{Corrupt}$	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Trade_openness</i>	0.020 (0.018)	0.024 (0.018)	0.018 (0.018)	0.018 (0.018)	0.016 (0.019)	0.021 (0.018)
<i>Ex.rate_peg</i>	-0.026*** (0.008)	-0.027*** (0.008)	-0.023*** (0.007)	-0.023*** (0.008)	-0.023*** (0.008)	-0.027*** (0.008)
<i>Per.capita_income</i>	-0.008 (0.005)	-0.008 (0.005)	-0.011** (0.004)	-0.011** (0.004)	-0.006 (0.008)	-0.002 (0.008)
<i>Gov_budget</i>	-0.234** (0.120)	-0.220* (0.118)	-0.289*** (0.118)	-0.289*** (0.120)	-0.255** (0.122)	-0.259** (0.118)
<i>CB_independence</i>	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
$D_{Less\_transparent}$	0.020 (0.014)	0.001 (0.017)				
$D_{Less\_accountable}$			0.034*** (0.012)	0.033** (0.017)		
$D_{Corrupt}$					0.020 (0.021)	0.003 (0.022)
$Reserve_M$	0.627*** (0.245)	0.263 (0.311)	0.727*** (0.228)	0.723*** (0.243)	0.605*** (0.232)	0.098 (0.310)
$D_{Less\_transparent}$ * $Reserve_M$		0.895* (0.485)				
$D_{Less\_accountable}$ * $Reserve_M$				0.031 (0.725)		
$D_{Corrupt}$ * $Reserve_M$						1.109** (0.466)
<i>Adj. R<sup>2</sup></i>	0.256	0.280	0.301	0.291	0.244	0.288

Note: Standard errors are in parentheses. \*, \*\*, and \*\*\* represent the 10%, 5%, and 1% significance, respectively. The constant and *Time* coefficients are not reported.

our hypothesis.

In TABLE 5, we follow the same procedure as in TABLE 4, except that  $Reserve_{MB}$  is used instead for examining if we can warrant the robustness of the results in TABLE 4. In other words, TABLE 5 extends Model 6 of TABLE 3 by including the 'discretionary country' dummies in question and their interaction terms with the reserve fund. Overall, the results equally confirm the leveraging role of the bureaucratic discretion in the inflationary bias caused by the reserve fund: in two out of the three cases ( $D_{less\_transparent}$  and  $D_{corrupt}$ ), the interaction term turns out to be significantly positive (Model 2 and Model 6). Thus, we once again conjecture that the previously insignificant coefficient estimate of  $Reserve_{MB}$  in Model 6 of TABLE 3 resulted mainly because we did not properly encompass the function of discretionary power at all.

Therefore, based on the new estimation results reported in TABLES 4 and 5, we have now



TABLE 5. REGRESSIONS ON THE RESERVE FUND ( $RESERVE_{MB}$ ) WITH DISCRETIONARY POWER

	$D_{Less\_transparent}$		$D_{Less\_accountable}$		$D_{Corrupt}$	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Trade_openness</i>	0.023 (0.019)	0.019 (0.019)	0.020 (0.019)	0.020 (0.019)	0.018 (0.019)	0.022 (0.018)
<i>Ex.rate_peg</i>	-0.023*** (0.008)	-0.025*** (0.008)	-0.020*** (0.008)	-0.020*** (0.008)	-0.020*** (0.008)	-0.023*** (0.008)
<i>Per.capita_income</i>	-0.011* (0.006)	-0.013** (0.006)	-0.014*** (0.005)	-0.013*** (0.005)	-0.008 (0.009)	-0.012 (0.009)
<i>Gov_budget</i>	-0.241* (0.127)	-0.298** (0.130)	-0.292** (0.124)	-0.345*** (0.136)	-0.263** (0.126)	-0.366*** (0.126)
<i>CB_independence</i>	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
$D_{Less\_transparent}$	0.021 (0.014)	-0.001 (0.019)				
$D_{Less\_accountable}$			0.028** (0.013)	0.019 (0.016)		
$D_{Corrupt}$					0.022 (0.022)	-0.020 (0.026)
$Reserve_{MB}$	0.047 (0.036)	0.034 (0.036)	0.050* (0.030)	0.037 (0.033)	0.042 (0.031)	0.025 (0.030)
$D_{Less\_transparent}$ * $Reserve_{MB}$		0.161* (0.094)				
$D_{Less\_accountable}$ * $Reserve_{MB}$				0.075 (0.077)		
$D_{Corrupt}$ * $Reserve_{MB}$						0.271*** (0.097)
<i>Adj. R<sup>2</sup></i>	0.208	0.228	0.232	0.232	0.196	0.263

Note: Standard errors are in parentheses. \*, \*\*, and \*\*\* represent the 10%, 5%, and 1% significance, respectively. The constant and *Time* coefficients are not reported.

come to a rather stronger conviction that the mixed findings concerning the reserve fund in Models 5 and 6 of TABLE 3 were in fact due primarily to the inadequate treatment of discretionary power in estimation. In conclusion, the empirical work thus far strongly suggests that a larger reserve fund can cause inflationary bias, when institutionally coupled with unconstrained bureaucratic discretion. Accordingly, our result, combined with the previous literature on the US case of returning profits to the Treasury, implies that 'unconstrained bureaucratic discretion' most probably causes inflationary bias, *regardless of* how the central bank profits are disposed.

#### IV. Conclusion

There exists peculiarity in the central bank's reserve fund especially in terms of its

declared goal. Given that academic attentions to this monetary institution were scarce, we have investigated its macro-economic consequence. Our empirical verification regarding the main hypothesis indicates that monetary policy can be tampered with *at the margin*, when the central bank profits are retained inside as well as oppositely when they are turned in to the Treasury. Unconstrained bureaucratic discretion has been shown to be the pivotal force underlying this rather surprising discovery. It appears that, if there is any excessive leeway, the bureaucrats' incentive always comes into play quite innovatively to maximize their own interests, *regardless of* the 'nominal' direction of an institutional change. In fact, this finding turns out to conform profoundly to the proposition early made by Toma (1982, p.189) that future research efforts should be directed toward providing additional evidence concerning the importance of the 'discretionary profit' motive of many central banks.

We therefore propose that some 'external' changes in 'monetary institutions' alone would not warrant their desired 'economic outcome' *without* the bureaucratic discretion in proper check. From the public-choice perspective, a more fundamental task to ensure the desired efficiency, after all, must be the extensive scrutiny on how to balance such powers of discretion with 'effective accountability measures' and 'incentive-compatible conditions' simultaneously. This proposition should provide a critical implication for optimally establishing the central bank independence from not only external (political) but internal (bureaucratic) pressures in a host of countries.<sup>26</sup>

It is also left as a future study to examine, with varying specifics and much rigor, how the retained reserves are being actually utilized allegedly to serve bureaucratic interests (e.g., discretionary loans to selected groups through discount windows). We speculate that there will be diverse and sometimes very complicated methods of such utilization across countries, depending on economic development, overall political accountability, interest group activities, or more importantly, the relative discretionary power of the central bank within the entire government sector. Such studies, however, seem to be significantly merited.

## APPENDIX

### 1. Collecting Procedure of the Reserve Fund Data

Our data collecting work started in 2004, but it took much longer than we had expected to complete the reserves data. In order to get the reserve fund data for the most recent 5 years, we were first able to send email questionnaires to 119 central banks out of the 133 countries listed on the website of the Bank

<sup>26</sup> A referee, in relation to the downsides to retained profits discussed so far, accordingly suggested a disciplinary device of utilizing stocks of the central bank, specifically conjecturing that "*if a majority of stocks is owned by a central government, then the government has explicit and implicit power to urge the bank to reimburse retained earnings for the former interest.*" In fact, we also initially figured that outside stockholders of the central bank might be able to facilitate constraints on internal discretionary. However, according to the survey of the yet relatively scant literature such as Lybek and Morris (2004) Tuladhar (2005, p.3), and Ortiz (2009, p.11) along with our own scrutiny, we have reached a slightly different conclusion. First of all, the capital structure is already highly concentrated on the central government. Nonetheless, this high concentration does not seem to become an effective disciplining device against the central bank's excessive discretionary power; the case is overwhelming for the worldwide trend of allowing a very limited role to major shareholders themselves in order to preserve the autonomy of central banking. Therefore, we submit — if rather tentatively — that it would be more effective to include directly into the central bank law (or bylaws), independently of stock ownership, a clause explicitly stipulating its 'purpose and management rule.'

for International Settlements (*BIS*, [www.bis.org](http://www.bis.org)). We re-sent the questionnaires three to four times to the many countries which we thought were experiencing some problem in the network. 39 central banks ultimately replied: some with precise numbers and others with instructions to refer to their websites.

Our data-collecting task was thus forced to steer toward the *Annual Report* at each central bank website. Nonetheless, we encountered two (in fact, well-expected) major obstacles: the unavailability of an English version in many countries, and the use of different titles and accounts for the reserve fund fitting the definition of our paper. We started from the countries which had replied with the precise numbers earlier so as to compare them with our own website numbers, thereby acquiring acquaintance and confidence. Next, we continued to obtain the data, based on all the relevant explanations and supplementary notes accompanied in the *Annual Reports* and financial statements (e.g., the balance sheets and the profit/loss accounts). At a later stage of this process, we additionally received central bank officials' confirmation for several countries where ambiguity seemed larger concerning the reserve fund definition.

We initially tried to collect the most recent 5-year data as of 2004. But with the passage of our collecting time, it turned out that, before and after the two specific years (2000 and 2001), the number of observations dropped significantly due mainly to unavailability of financial statements on websites and the consistent accounting rules explained below. Also, another severe constraint was imposed, as we had to rely on the data offered in Fry et al. (2000) for the very important discretionary power proxies, *Less\_transparent* and *Less\_accountable*, in our estimation. Therefore, the final data set consists of 61 countries for fiscal years 2000 and 2001.

※ **A Few Representative Rules for Sampling (i.e., the Accounting Rules)**

- ① To minimize arbitrariness, only reserve funds in the *Capital and Reserve* account of the Balance Sheet are included, although a few countries list seemingly related items in other liability accounts as well.
- ② In countries where profits are retained in the following year according to their own accounting rule, the next year's figure is recorded as the current reserve fund in our data set.
- ③ In a small number of countries where the fiscal year is not defined as January to December (e.g., March to next February), the figure of, for example, the balance sheet at the end of February, 2001 is recorded as the year 2000 reserve fund in our data set.

## 2. The Variables and Their Sources

Variables	Sources <sup>a)</sup> and Special Notes
GDP	<ul style="list-style-type: none"> <li>· Measured in domestic currency.</li> <li>· <i>World Bank Database</i> for Albania.</li> <li>· Annual Report at the central bank website for Aruba, Azerbaijan, Bahamas, UAE, Macedonia, Fiji, Mongolia, Sudan.</li> <li>· Changed to Euro using domestic currency/Euro conversion rate for ESCB countries.</li> </ul>
CPI (1995=100)	<ul style="list-style-type: none"> <li>· Annual Report at the central bank website for Aruba, Azerbaijan, Sudan, UAE.</li> </ul>
GDP Per Capita	<ul style="list-style-type: none"> <li>· Measured in constant US\$ of 1995.</li> <li>· Calculated as <math>GDPC^* (100/CPI)^* e_{1995}^{-1}</math> where <math>GDPC = GDP/Population</math> (from IFS), and <math>e</math> is the domestic currency/US\$ exchange rate. However, <math>e_{1995}^{-1} = (US\\$/the\ domestic\ currency\ exchange\ rate\ in\ 1995)</math> (the domestic currency/Euro conversion rate) for ESCB countries.</li> </ul>
Export & Import	<ul style="list-style-type: none"> <li>· Measured in domestic currency.</li> <li>· Annual Report at the central bank website for Aruba, Azerbaijan, Peru, UAE.</li> <li>· Changed to domestic currency from US\$ for Slovenia, Turkey, Brazil, Sudan, Mexico, Romania, Chile, Croatia, Macedonia, Indonesia, Israel, Mongolia, Korea, Canada, Azerbaijan.</li> <li>· Changed to domestic currency from US\$ using the Euro/US\$ exchange rates and the domestic currency/Euro conversion rates for ESCB countries.</li> </ul>
Exchange Rate	<ul style="list-style-type: none"> <li>· IFS</li> </ul>
Monetary Base	<ul style="list-style-type: none"> <li>· Measure in domestic currency.</li> <li>· ESCB countries have not reported MB since 1998. Used the sum of IFS lines 14a and 14c.</li> </ul>
Fiscal Balance IFS line 80 or Ratio of Fiscal Balance to GDP	<ul style="list-style-type: none"> <li>· Annual Report at the central bank website for Aruba, Australia, Azerbaijan, Chile, Cyprus, Fiji, Jamaica, Morocco, Sudan, UAE.</li> <li>· Albanian Ministry of Finance database for Albania.</li> <li>· Annual Report of ESCB for Euro area countries.</li> <li>· The US Bureau of Economic and Business Affairs for Bangladesh, Brazil, Denmark, Egypt, Indonesia, Japan, Malaysia, Sweden.</li> </ul>
<i>Political stability</i>	<ul style="list-style-type: none"> <li>· Political stability from <i>The PRS Group's International Country Risk Guide (ICRG)</i> database.</li> </ul>
<i>CB independence</i>	<ul style="list-style-type: none"> <li>· The central bank independence index from Fry <i>et al.</i> (2000)</li> </ul>
<i>Less transparent</i>	<ul style="list-style-type: none"> <li>· The central bank transparency (<i>Transparent</i>) from Fry <i>et al.</i> (2000) is transformed into <i>Less transparent</i> = <math>\log(96 - \text{Transparent})</math> because <i>Transparent</i> is distributed from 0 to 95.</li> </ul>
<i>Less accountable</i>	<ul style="list-style-type: none"> <li>· The central bank accountability (<i>Accountable</i>) from Fry <i>et al.</i> (2000) is transformed into <i>Less accountable</i> = <math>\log(101 - \text{Accountable})</math> because <i>Accountable</i> is distributed from 0 to 100.</li> </ul>
<i>Corrupt</i>	<ul style="list-style-type: none"> <li>· The 2003 <i>Corruption Perceptions Index (CP)</i> from <i>Transparency International</i> is transformed into <i>Corrupt</i> = <math>\log(11 - CP)</math> because <i>CP</i> is distributed from 0 to 10.</li> </ul>

Note: a) *International Financial Statistics (IFS)* was used for each variable, if not specified.

## REFERENCES

- Al-Mahrubi, F. and T. Willett (1995), "The Anti-Inflationary Influence of Corporatist Structures and Central Bank Independence: The Importance of the Hump-Shaped Hypothesis," *Public Choice* 84, pp.153-162.
- Amtenbrink, F. (2005), "The Three Pillars of Central Bank Governance — Towards a Model Central Bank Law or a Code of Good Governance?" *International Monetary Fund* 4, pp.101-132.
- Bank of Korea (1999), *Explaining the Bank of Korea Act by Theme*, Seoul, Bank of Korea.
- Bearce, D. H. (2003), "Societal Preferences, Partisan Agents, and Monetary Policy Outcomes," *International Organization* 57, pp.373-410.
- Berger, H., J. de Haan, and S.C.W. Eijffinger (2001), "Central Bank Independence: An Update

- of Theory and Evidence,” *Journal of Economic Surveys* 15, pp.3-40.
- Boyes, W. J., W. S. Mounts Jr. and C. Sowell (1988), “The Federal Reserve as a Bureaucracy: An Examination of Expense-Preference Behavior,” *Journal of Money, Credit, and Banking* 20, pp.181-90.
- Broz, J. L. and J. A. Frieden (2001), “The Political Economy of International Monetary Relations,” *Annual Review of Political Sciences* 4, pp.217-343.
- Campillo, M. and J. A. Miron (1996), “Why Does Inflation Differ Across Countries?,” *NBER Working Paper* 5540.
- Caporale, T. and K. Grier (1998), “A Political Model of Monetary Policy with Application to the Real Fed Funds Rate,” *Journal of Law and Economics* 41, pp.409-28.
- Chant, J. F. and K. Acheson (1972), “The Choice of Monetary Instruments and the Theory of Bureaucracy,” *Public Choice* 12, pp.13-33.
- Cho, J. and K. Kim (2001), “Jobs in the Bureaucratic After-Life: A Corruption-Facilitating Mechanism Associated with Law Enforcement,” *Southern Economic Journal* 68, pp.330-48.
- Crowe, C. and E. A. Meade (2007), “The Evolution of Central Bank Governance around the World,” *Journal of Economic Perspectives* 21, pp.69-90.
- Crowe, C. and E. A. Meade (2008), “Central Bank Independence and Transparency: Evolution and Effectiveness,” *European Journal of Political Economy* 24, pp.763-777.
- Cukierman, A. (2008), “Central Bank Independence and Monetary Policymaking Institutions: Past, Present, and Future,” *European Journal of Political Economy* 24, pp.722-736.
- Cukierman, A., S. Edwards and G. Tabellini (1992), “Seigniorage and Political Instability,” *American Economic Review* 82, pp.537-555.
- Cukierman, A., G. Miller and B. Neyapti (2002), “Central Bank Reform, Liberalization and Inflation in Transitional Economies — An International Perspective,” *Journal of Monetary Economics* 49, pp.237-264.
- de Haan, J., S. C. W. Eijffinger and K. Rybinski (2007), “Central Bank Transparency and Central Bank Communication: Editorial Introduction,” *European Journal of Political Economy* 23, pp.1-8.
- de Haan, J., D. Masciandaro and M. Quintyn (2008), “Does Central Bank Independence Still Matter?,” *European Journal of Political Economy* 24, pp.717-721.
- Fry, M., A. Julius, L. Mahadeva, S. Roger and G. Sterne (2000), “Key Issues in the Choice of Monetary Policy Framework,” in: L. Mahadeva and G. Sterne, eds., *Monetary Policy Frameworks in a Global Context*, London, Bank of England.
- Gerrats, P. (2006), “Transparency of Monetary Policy: Theory and Practice,” *CESifo Economic Studies* 52, pp.111-52.
- Granato, J., M. Lo and M. C. S. Wong (2007), “A Note on Romer’s Openness-Inflation Relation: The Responsiveness of AS and AD to Economic Openness and Monetary Policy,” *Applied Economics* 39, pp.191-197.
- Ortiz, G (2009), *Issues in the Governance of Central Banks*, A Report from the Central Bank Governance Group, Bank for International Settlements Press & Communications, Basel, Switzerland.
- Havrilesky, T. and J. Granato (1993), “Determinants of Inflationary Performance: Corporatist Structures vs. Central Bank Autonomy,” *Public Choice* 76, pp.249-261.
- Husain, A., A. Mody and K. Rogoff (2005), “Exchange Rate Regimes and Economic

- Performance in Developing versus Advanced Economies," *Journal of Monetary Economics* 52, pp.35-64.
- Kane, E. J. (1982), "External Pressure and the Operation of the Fed," in: R. E. Lombra, W. E. Witte, eds., *Political Economy of International and Domestic Monetary Policy*, Ames, Iowa State University.
- Kaufmann, D. and A. Kraay (2008), "Governance Indicators: Where Are We, Where Should We Be Going?" *The World Bank Research Observer* 23, pp.1-30.
- Kaufmann, D., A. Kraay and M. Mastruzzi (2009), "Governance Matters VIII: Aggregate and Individual Governance Indicators for 1996-2008," *World Bank Policy Research Working Paper* 4978, Washington D.C.
- Kim, I. and I. Kim (2005), "Endogenous Changes in the Exchange Rate Regime: A Bureaucratic Incentive Model," *Public Choice* 125, pp.339-61.
- Kim, I. and I. Kim (2007), "Central Bank's Retained Profits and Discount Windows: A Bureaucratic Organization's Discretion-Seeking Hypothesis," *Department of Economics Working Paper*, Seoul, SungKyunKwan University.
- Kim, I. and I. Kim (2008), "Interest Group Pressure Explanations for the Yen-Dollar Exchange Rate Movements: Focusing on the 1980s," *Journal of the Japanese and International Economies* 22, pp.364-382.
- Klitgaard, R. (1988), *Controlling Corruption*, Berkeley, University of California Press.
- Klomp, J. and J. de Haan (2010), "Inflation and Central Bank Independence: A Meta-Regression Analysis," *Journal of Economic Surveys* 24, pp.593-621.
- Lybek, T. and J. Morris (2004), "Central Bank Governance: A Survey of Boards and Management," *IMF Working Paper* 04/226, Washington, International Monetary Fund.
- Niskanen, W. (1975), "Bureaucrats and Politicians," *Journal of Law and Economics* 18, pp.617-643.
- Poole, W. (1990), "The Discount Window," in: T. Mayer, ed., *The Political Economy of American Monetary Policy*, Cambridge, Cambridge University Press.
- Rogoff, K. (1985), "The Optimal Degree of Commitment an Intermediate Monetary Target," *Quarterly Journal of Economics* 100, pp.1169-1189.
- Romer, D. (1993), "Openness and Inflation: Theory and Evidence," *Quarterly Journal of Economics* 108, pp.869-904.
- Schwartz, A. (1992), "The Misuse of the Fed's Discount Window," *Review - Federal Reserve Bank of St. Louis* 74, pp.58-69.
- Shugart, W. and R. Tollison (1983), "Preliminary Evidence on the Use of Inputs by the Federal Reserve System," *American Economic Review* 73, pp.291-304.
- Temple, J. (2002), "Openness, Inflation, and the Phillips Curve: A Puzzle," *Journal of Money, Credit and Banking* 34, pp.450-468.
- Toma, M. (1982), "Inflationary Bias of the Federal Reserve System: A Bureaucratic Perspective," *Journal of Monetary Economics* 10, pp.163-90.
- Tuladhar, A. (2005), "Governance Structures and Decision-Making Roles in Inflation Targeting Central Banks," *IMF Working Paper* 05/183, Washington, International Monetary Fund.
- van Rixtel, A. (2002), *Informality and Monetary Policy in Japan: The Political Economy of the Bank Performance*, Cambridge, Cambridge University Press.