Bureaucratic Discretion and Endogenous Selection of Monetary Institutions: With the Case of Discount Windows

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<ABSTRACT>

Selection of monetary institutions is often endogenous in that the selection is made by monetary authorities mainly to serve their own interests. We apply this proposition to open market operation and discount windows. Both monetary institutions have dominantly been treated indifferently either in traditional macroeconomic theory or in existing central banking laws. Nonetheless, we observe that the differing degrees of the reliance on discount windows in 4 countries have been relatively stable for three decades, and further, that the recent worldwide distribution of the reliance of 71 countries is fairly dispersed. This paper is a first-time attempt to empirically explain these cross-country differences by means of multi-dimensional proxies for the bureaucratic discretionary power. It confirms that the monetary authority’s discretionary power per se, rather than the conventional factors such as economic development or the central bank’s independence, plays a far more important role in explaining its relative reliance on discount windows.

JEL Classification: K42, D78, E58.
Key Words: bureaucratic discretion, institutional choice, discount windows, central bank, endogeneity, transparency

*. (Acknowledgement)

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I. Introduction: Indifference among Monetary Institutions?

Law and economics scholars recognize that legislation can frequently be the outcome of a political market dominated by narrowly focused interest groups. Thus, one can submit that institutional selections are "endogenous" in that they are manipulated mainly by institution-enforcers, usually bureaucrats. They act as agents to the legislature, but, sometimes, with significant institution-selecting discretion, capture some of the wealth, or raise transaction costs for the principal and other competitors. This paper applies this endogeneity perspective stemming from bureaucratic discretion to the selection of the representative monetary institutions: discount windows versus open market operation.

We all are familiar with, and have taught to students, the popular statement: "The Fed has three tools in the monetary toolbox: open market operations, reserve requirements, and the discount rate." (Mankiw, 2001, 619). The three institutions are assumed to be "indifferent" and/or "simply substitutable." Except for the case of the reserve requirement, an indifferent treatment of open market operation and discount windows underlies most macroeconomics texts, too.1) In fact, the case is overwhelming for this indifference assumption in most macroeconomic theories and major monetary policy debates.

This indifference proposition is reflected in the central bank laws of many countries. According to our random survey of 30 countries, as shown in <Appendix I>, all three monetary instruments are listed in the central bank acts of 20 countries. In 29 countries, open market operation and discount windows

1) Again, the representative example of the differentiating views on the reserve requirement is: "The Fed uses changes in reserve requirement only rarely because frequent changes would disrupt the business of banking." (Mankiw, 2001, 620) Mainly for this reason, that instrument was repealed in England (1981), New Zealand (1985), and Canada (1994), to name a few. Nonetheless, one can still easily find the indifference treatment in many famous macro texts such as Barro (1987, 435), Dornbusch et al. (2001, 379), or Samuelson and Nordhaus (2001, 199).
are used. Nevertheless, we were not able to find a statutory provision explicitly indicating difference or preference concerning these listed instruments.

In spite of this indifference treatment in both economics textbooks and statutory provisions, observing a significance difference in their actual uses rendered us suspicious of it. We express doubt about it particularly since we encountered a claim by a prominent macro-economist himself (Poole, 1990, 266): "A subsidy discount rate serves no monetary policy purpose, and so it is worth exploring the advantages to the Fed of providing subsidies to banks through the discount window." Since then, as will be summarized in Section III, we have been able to find a group of economic literature criticizing varying inefficient features and opportunistic incentives embedded in discount windows. We have also figured out that the discount window is likely to confer more benefits upon monetary authorities than does open market operation. In a related context, we believe, it is the bureaucrats’ discretionary power that mainly allows the central bank to lean back toward the discount window despite its inferiority.

The purpose of this paper lies in a first-time empirical verification regarding bureaucratic discretion and the selection of a monetary institution, the discount windows. We hope this paper to cast critical implications to a host of countries for enhancing meaningful "transparency" in central banking institutions, which has recently come to the fore of academic and policy attention.

For this purpose, in Section II, we first examine the systematic differences in the reliance on discount windows in 4 countries over 3 decades, and

2) Our belief of this endogeneity in institutional selection was reinforced by Chant and Acheson’s contemplation (1972, 14) that "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." Our paper thus belongs to the broadly defined political economic models of monetary policy. For details, refer to Caporale and Grier (1998, 410–413) and Kim and Kim (2005).

3) See, Buiter (1990), Issing (1990), and The Manchester Schoo. (2003, v. 71, no. 5). In particular, Gerrats (2002), in an excellent survey paper on central bank transparency, defined the transparency as the absence of asymmetric information between monetary policy makers and other economic agents. We are confident that an excessive discretionary power is a major cause of asymmetric information.
subsequently cross-section discrepancy still prevailing these days in 71 countries. Section III, based on the existing literature and our additional statutory observations, investigates the incentive structures underlying the discount window in terms of supply and demand, in order to infer existence of a strong preference over it on the part of the monetary authorities. We also infer that their discretionary power can be exercised better with discount windows. It is accordingly hypothesized that ceteris paribus bureaucrats would rely more on discount windows as they possess greater discretionary power to implement their preferred institution: discretionary power $\Rightarrow$ discount windows.

To be sure, anecdotal evidence abounds concerning the above hypothesis, but its substantiation has by no means been easy. Section IV starts with potential (and orthodox) determinants of the reliance on discount windows across countries. We then carefully develop our four distinctive proxies of bureaucratic discretion: intra-governmental constraint on their discretion, existence of policy partner to directly utilize discretionary power, financial leverage to discretion in discount windows, and an overall level of discretion in the public sector. We intend these proxies to be multi-dimensional, if not entirely exhaustive. Upon obtaining estimation results fairly indicative of our hypothesis in Section V, we conclude our discussion and suggest future research in Section VI.

II. Systematic Differences in the Reliance on Discount Windows?
1. Time-Series Evidence from Four Countries

For illustrative convenience, we define the "relative reliance on discount windows as a monetary instrument ($\delta$)" to be the ratio of the current balance of discounted loans ($d$) to the monetary base ($m_b$), i.e., $\delta = \frac{d}{m_b}$. The monetary base consists of several sources of inflows: loans through discount windows, securities purchases by the central bank, purchases of foreign exchanges, etc. Therefore, one can presume that the higher $\delta$, the less reliance on other alternative monetary instruments, including the open market operation.
<Figure 1> Comparison of δ : US, Germany, Japan, and Korea

![Diagram showing comparison of δ for US, Germany, Japan, and Korea]


*Figure 1* compares δ of the US, Germany, Japan, and Korea for the past 3 decades. A simple visual inspection suggests some noticeable facts. There existed substantial differences in δ across the 4 countries during most of the sample period, although they have narrowed since the mid-1990s (Germany, for example, has not relied on discount windows since the inception of Eurocurrency). Furthermore, each country’s δ appears to have had a rather stable relative position, except in Korea.

2. Cross-Section Evidence from Seventy One Countries

*Figure 2* displays the distribution of δ of 71 countries. First of all, the worldwide distribution of δ is very dispersed. Chile (0.07) and Mongolia (0.05)

4) Refer to *Table A1* in *Appendix II* for data collection and sources, and *Table A2* for actual values of δ.
are close to its mean of 0.06, while Lithuania has its median value of 0.003. A much higher mean than the median is due to the 25 countries with δ = 0. The 5 countries with highest δs in our sample turn out to be Sudan (0.55), Egypt (0.39), Mexico (0.35), Korea (0.34), and Slovakia (0.32). <Figure 3> also features simple comparisons by economic development and across continents, again reinforcing our impression that its worldwide distribution is fairly dispersed.

Based on the above inspections, we temporarily conclude that there exists systematic cross-country difference in the reliance on discount windows. To be sure, open market operations are anonymous. The market allocates reserve injections or withdrawals among participants according to the bidding mechanism, which in turn makes this monetary institution more transparent, and probably more efficient, than discount windows.

How can one then explain those countries with highest δs? For instance, the Bank of Korea elucidates (BOK, 2002, 98) that in Korea it was partly because of the chronic excess demand for loanable funds, partly because of the unfledged development of various financial markets, and, most importantly, because of their effective role as selective subsidies to industries and firms to boost the economic growth. History actually indicates that the discounted loans were once used as a selective funding device even in currently advanced countries such as the US, Germany, and Japan.

Nonetheless, we suspect that the above explanations are neither sufficient nor comprehensive, especially considering the non-trivial levels of δ in many countries up to recently. As will be explained in Section III, discount windows appear to allow monetary authorities to extract relatively more benefits for themselves. Moreover, monetary authorities are likely to exercise their discretion more easily than in open market operation, rendering us to propose that a high value of δ might have endogenously resulted from their own preferences at the margin. It follows accordingly that they would be able to rely more on discount windows under a greater discretionary power to implement their preferred institution. This discretionary power ⇒ discount windows hypothesis is empirically tested in Sections IV and V, which would complete our endogeneity hypothesis.
<Figure 2> Worldwide Distribution of $\delta$: Seventy One Countries in 2001

Note: Number of countries and its percentage, respectively, in parenthesis.

<Figure 3> $\delta$ by Economic Development and across Continents
III. Peculiarities and Incentives Underlying the Discount Windows

Despite the overwhelmingly prevailing view on the indifference between two different monetary instruments, it has been redeeming to come across a group of literature revealing some of the true attributes of the discount window. A representative example is Poole (1990, 256) with a more provocative statement than the one shown in the Introduction: "The real purpose of the discount window today is to serve the political and bureaucratic needs of the Federal Reserve." For illustrative convenience, this section addresses such arguments, attempting to unveil the veracity of discount windows from the supply and demand side, respectively.

1. Demand–Side Features and Incentives

Firstly, the subsidy nature of the discount rate must be preferred by financial institutes. Although the discounted interest rate at central banks sometimes exceeds the market rate, such as in the lombard loan, generally its lower rates can cause moral hazard on the part of financial institutes just like other government subsidies.

<Figure 3> shows the difference between the call (or federal fund) rates and the rediscount rates of the 4 countries depicted in <Figure 1>: the U.S., Germany, Japan, and Korea. A simple visual inspection suggests that in the first three countries the spread was positive (up to 2%) mostly over the sample period, except for Japan and Germany after the late 1990s. In contrast, the interest rate subsidies were much greater in Korea. Although the spread has decreased recently, before the 1997 financial crisis the average was above 6% with a maximum of 10.03% per annum in 1991 (not to mention the peak in 1997). Needless to say, the higher spread would induce a greater excess demand by the financial sector for the discount windows.
Secondly, if there is substantial disparity as discussed above, the nonprice rationing, like administrative restrictions have had the biggest role in limiting the amount of borrowing (Meulendyke, 1992, 36). Peristiani (1998, 612) keenly pointed out that the ability to visit discount windows is a privilege and not a right. Hakkio and Sellon (2000, 9) highlighted inefficiency associated with these administrative costs. One can then easily predict demanders' unproductive activity full of variety implied by Barzel (1989), for example.

Thirdly, inefficiency under higher discount rates has also been noted. Even if a very high discount rate as a penalty system is applied to financial intermediaries, free assess to discount windows, if without further effective constraints, would cause adverse selection due to risk-increasing activity, resulting in bad debts (Kaufman, 1991). It is in this context that Schwartz (1992) argues that the central bank can play the role of the last-resort lender through open market operation for the financial market as a whole.
2. Supply–Side Features and Incentives

One can thus infer that the request of the institution of discount windows would persist from the demand side. Nonetheless, we believe that there exists another reason on the part of the suppliers: they opt for the discount window, since it appears to be a vehicle through which to exercise their considerable latitude to reap benefits.

Firstly, it is generally accepted that central banks have much leeway in operating discount windows. Hakkio and Sellon (2000, 7) assert that the Fed, for instance, relies more on regulation than on price mechanism to control the borrowings. When Poole (1990, 256) identifies the real purpose of the discount window above, he explicitly specifies the wide discretion of bureaucrats as the origin of appropriating their benefits. He also argues that the subsidy discount window enables the Fed to establish "other" regulatory constraints or powers that might not otherwise exist (Poole, 1990, 266). Schwartz (1992, 67) emphasizes the "political decision" and its detrimental effects in allocating discounted loans, especially as the lender of last resort. We presume that the scopes of the political consideration include not only outside pressures but inside amenities. Goodfriend and King (1988, 216) similarly highlight selective bias toward the Fed’s own preference in allocating discounted loans, contending that many financial institutes could in fact have borrowed in the federal fund market.

Secondly, recall that open market operations are anonymous, which makes its operation literally "open." However, discount windows are "clandestine" in the sense that only the central bank, but not the public, usually knows the institutes that request discount accommodation. This secrecy begs the question of whether provision of loans on a case-by-case basis assures equal treatment for all (Friedman, 1960, 38). Moreover, according to Chant and Acheson (1972, 15–16), central banks appear to have a predictable but contrary desire not to leave a clear record of their actions. Intriguingly, we believe that the discount window is fairly consistent with this preference to have the power to clandestinely select a favorable account of their actions at the margin. In other words, it is
apparently easier to exercise bureaucratic discretion with discount windows for seeking their own benefits.

Finally, encouraged by the aforementioned literature, we have taken one step forward. We have reexamined the central bank laws of the 30 countries in <Appendix I>, hoping to keep track of evidence regarding, among varying sorts, any direct benefit from the discount windows.\(^5\) Four countries at the statutory acts level explicitly stipulate staff loans to central bank employees.\(^5\) Furthermore, loans are granted for houses and automobiles in Jamaica, for ex-officials of the central bank in South Africa, and for school expenses of employees and their children in Malaysia. In fact, even non-employees can receive the central bank loans with the permission of the related committee.\(^7\)

According to our examination of balance sheets, the balance of staff loans was positive in at least 6 countries as of 2001, as shown in the last column of <Appendix I>. Very interesting is that there is no provision in any statutory act regarding the staff loan, as indicated in the second to the last column. We cautiously submit that central bank loans are available to employees without explicit stipulations.\(^8\) Clearly, instituting the discounted loans seem to directly benefit bureaucrats to a degree. Now we turn to an empirical confirmation of the discretionary power \(\Rightarrow\) discount windows (i.e., high \(\delta\), hypothesis.

\(^5\) The term “direct benefit” here indicates (pecuniary) amenities stemming directly from selecting discount windows as the monetary institution itself, in contrast to any other benefits provided from outside, for example, from borrowers.


\(^7\) On the contrary, Peru (§79) and Venezuela (§36) have clauses explicitly prohibiting loans to a certain group of employees.

\(^8\) When we arrived at this submission, we reinvestigated the balance sheets of all 71 countries surveyed in <Figure 2>. Unfortunately, due to insufficient information, we could not tell if there exists a staff loan for several countries. Even for a handful of countries with positive balances of staff loans, we could not know the exact amount because it is included with other items in aggregated accounts such as “Other Assets” or “Other Loans.” Notwithstanding this difficulty, we were able to verify positive balances of staff loans for 14 and 17 countries in 2000 and 2001, respectively.
IV. Determinants of the Reliance on Discount Windows
1. Empirical Equation and TRADITIONAL Variables

In this section we attempt to empirically explain the inter-country differences in $\delta$ as depicted in <Figure 2>. In particular, as a major contribution, we explore proxies of bureaucratic discretion in selection and implementation of a monetary institution, i.e., discount windows, as well as traditional variables inferred directly or at second hand from the existing literature.

Our empirical equation <1> also differs from the previous estimation. First, most empirical work regarding discounted loans explained the magnitude of the loans.9) Equation <1> attempts to explain the reliance on discounted loans relative to other monetary instruments, which clearly manifest our belief against the indifference treatment between the two. Second, to the authors’ knowledge, earlier studies used time-series data of a particular country, mostly of the US. Ours uses cross-section data for two years.

$$\delta_{i,t} = \beta_0 + \beta_1 \text{TRADITIONAL}_{4,t} + \beta_2 \text{INSTITUTIONAL}_{4,t} + \beta_3 \text{REGION}_i + \beta_4 t + \epsilon_{i,t}$$

where $i$ = each country, and $t$= year 2000 and 2001, <1>.

The TRADITIONAL vector includes three representative variables which have been inferred from the existing literature. First of all, $SPR$ is the difference of call rate over discount rate, reflecting the degree of subsidy nature. As explained in Section III, its coefficient is expected to be (+).10)

The argument, mentioned in Section II., that discounted loans can be used as selective subsidies to boost the economy at an earlier state of growth, if it holds, would make per-capita income $PCY$ have a (+) coefficient. We use the log-transformed per-capita GDP measured in constant US$ of 1995.

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9) Refer to Dow (2001, 200) for a summary list of determinants of bank borrowing from the Fed surveyed through various empirical studies.

The third is the central bank’s independence index, \( IND \). It is generally accepted, for instance in Maxfield (1994, 563), that a less independent central bank would \( ceteris \ paribus \) provide more discounted loans to industries and firms as quasi-fiscal activities, which would result in a \((\cdot)\) coefficient estimate of \( IND \).\(^{11}\)

2. **INSTITUTIONAL** Variables Highlighting Bureaucratic Discretion

We adopt five institutional variables of central banks which we suspect \( \text{a priori} \) could make impacts on \( \delta: INT, ACC, BND, RES, COR \). Considering their importance in our estimation, more detailed explanations for each are in order.

1) **Monetary Intervention (\( \text{INT} \))**

We define \( \text{INT} \) as the degree of the central bank’s intervention for the stability of financial markets. Since the degree of monetary intervention would vary depending on several factors such as the statutory purpose or organizations of each central bank, we intended to have a measurement of an institutional composite reflecting each central bank’s overall intervention as it actually is. It was highly fortunate for us to find an appropriate proxy of \( \text{INT} \) from a comprehensive survey of 94 central banks that cover a wide variety of aspects ranging from institutional characteristics to policy focus.\(^{12}\)

Signing \( \text{INT} \) in advance is indeterminate though, since the monetary authority can in principle choose any monetary instrument given the same level of intervention. Upon estimation, however, we will be able to make some \( \text{ex-post} \) account of real characteristics of this intervening activity, preferably in

\(^{11}\) We use as \( IND \) the “overall measure of independence over a range of characteristics covering legal objectives, goals, instruments, finance of the government deficit and term of office of the Governor,” constructed by Fry et al. (2000, 68).

\(^{12}\) It was the index for “how far various financial stability issues affect both the choice of framework and the setting of policy instruments of each central bank” in Fry et al. (2000, 80).
association with discussions in Section III.

Below we turn to our exploratory task of designing the discretionary power proxies to be included in vector \textit{INSTITUTIONAL} of equation \textless 1\textgreater. We have tried, in four different dimensions, to capture institutionalized bureaucratic latitude expected to be important in affecting $\delta$. We hope that the four dimensions have been adequately set, although not perfectly either distinctive or exhaustive.

\textbf{2) Accountability (ACC)}

Higher accountability ($ACC$) statutorily imposed upon central banks would tend to constrain the scope and level of bureaucratic discretion. We intend to make $ACC$ specifically represent various "intra-governmental restrictions to deter central bank’s arbitrariness."

To the extent that the monetary authority’s preference for the discount window, despite its inefficiency, is strong, as discussed in Section III, we expect the sign of the $ACC$ coefficient to be ($-$), other things being equal. We again appreciate the fact that Fry et al. (2000, \textless Table A.6\textgreater) also measured how far the central bank has legal or informal responsibility to explain and defend its policies to governments. We use this as $ACC$.

\textbf{3) Central Bank’s Authority to Issue Bonds (BND)}

We give a value of one to $BND$ for a country where its central bank is able to issue bonds, zero otherwise.\textsuperscript{13} In spite of their preference over discount windows, monetary authorities cannot increase discounted loans

\textsuperscript{13} In principle, central bank’s own bonds are dispensable for undertaking monetary policy: It can use bonds issued by other institutes. One reason for their use suggested by Beckerman (1997, 169) though is that the central bank can carry out contractionary open market operations less unprofitably by selling its own obligations rather than its higher yielding Treasury holdings. (See Section IV.2.4) of the current paper for central bank’s profit-maximizing motive.) Beckerman, however, argues strongly that, because of the danger of an excessive money creation from interest payments or taking on additional interest-bearing debt, central banks of developing countries should avoid issuing interest-bearing bills and indeed domestic interest-bearing liabilities of any kind.
unlimitedly due to other policy goals, representatively a preannounced goal of price stability. We characterize BND as an "effective policy partner to discount windows," since they can withdraw money by issuing bonds.\textsuperscript{14} 

The central bank’s bonds thus play, among others, a role of ameliorating a burden in exercising bureaucratic discretionary power on behalf of their own interests at the margin.

A reexamination of the central bank laws disclosed that 35 countries have statutory provisions which allow bond issuing as shown in <Table A2>. To put this differently, the other half of the central banks are undertaking central banking without their own bonds. More interesting, countries with BND=1 tended to have high values of $\delta$, which was consistent with our expectation. For example in 7 out of the top 10 $\delta$ countries of 2001, their central banks are allowed to issue bonds.

4) Central Bank’s Reserve Fund ($RES$)

We now take on a relatively unexplored fact-finding, yet with respect to the real composition of bureaucratic discretion in central banks. Most central banks at least partially retain their profits inside. According to our own survey, quite a few countries institutionalized non-trivial amounts of retained profits (or "reserve fund" hereafter), if under varying names such as general reserve, reserve fund, or rest fund. We define $RES$ to be the proportion to GDP of the central bank’s retained profits as the reserve fund. As shown in <Table A2>, many countries had non-trivial amounts of retained profit, i.e., high values of $RES$ (e.g., Oman, 4.2%; Bahrain, 3.8%; Iceland, 3.4%; Sweden, 3.3% in 2001). In fact, the reserve fund is not just sitting in the vault, but continuously managed in and out. Through the scrutiny illustrated below, we have come to believe that $RES$ can represent another important dimension of the discretionary power: a "financial leverage to discretion."

\textsuperscript{14} In Korea, for instance, the bond’s title is the Monetary Stabilization Bond, the balance of which has been enormous and is about twice the monetary base recently.
Inspired by Shughart and Tollison, Kim and Kim (2004) undertook a random survey of 20 countries. The authors first detected that the selected countries, at the statutory act levels governing their own central banks, provide the official titles of retained profits, their purposes, or allocation formula from annual net profits. Some countries such as Croatia, Indonesia, and Korea define more than a single-type reserve fund.

Only 7 out of the 20 countries explicitly identify the goals of their reserve fund. They are associated with "covering some types of losses." The losses are not completely detailed in the relevant clauses themselves, but seem to be understood as including a fairly broad set of losses from varying operations of central banking. As to the other 13 countries without explicit goals, they could not identify any; the reserve fund seems to be rather a mystery in its use.

More importantly, Kim and Kim argued that even in the occurrence of losses the government, rather than its central bank, should in principle be responsible for them. Accordingly, their own simple T-account analysis revealed that there is no change in the size of the monetary base no matter who makes up the losses, the central bank or the government. This result insinuates that it makes essentially no difference for the credibility of the central bank.

15) Shughart and Tollison (1983) showed how central bank bureaucrats' incentives set in to benefit themselves in allocating the Fed's earnings each year. Central bank's 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. The authors plead that the constraint of returning most of 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 suffice these bureaucratic incentives, the authors articulated, the Fed would try to maximize its profits by the expansionary open market operations, resulting in inflationary bias. For similar perspectives, see Toma (1982) and Boyes, Mounts, and Sowell (1988).

16) Due to language barriers, it was inherently difficult to investigate legal documents regarding the reserve fund's purpose below the acts level in many countries. However, Kim and Kim discovered a surprising and somewhat provocative argument in a major publication by the Bank of Korea (BOK). Although the BOK Act formally identified, as the reserve fund's goal, preparing for "recoupment of loss," BOK assigns another
Finding that the size of the reserve fund stands enormous in many countries, and that there certainly exists statutory ambiguity in its actual use, Kim and Kim speculated that the reserve fund can be utilized somewhere to pursue their own private interests *ceteris paribus.*\(^{17}\) We now hypothesize, mainly based on the discussion in Section III, that the discount window might be a major outlet through which central bank bureaucrats can have considerable leeway in how to manage the reserve fund, thereby making RES effective financial leverage to their discretion to rely more on discount windows. If this holds, we predict its coefficient to be (+) in equation \(<1>\).

5) Overall Corruption Level (*COR*)

Our fourth proxy of discretion might be rather unfledged in that we now seem to enter a territory of norm and culture. Focusing on a casual observation that people in a corrupted society tend to have uncertainty in every aspect of their businesses involving any government regulation, we came to a speculation that corruption would make bureaucratic discretion more permissible as part of social culture.

In a sense, this speculation of ours in cultural nature might be consistent with Klitgaard’s (1988, 41) keen-edged account of the *nefarious incentive* effect throughout the society, from the economist’s point of view. Therefore, we hypothesize that "society’s widespread corruption (*COR*) would pervade an epidemic of bureaucratic discretion" among most government agencies and officials.\(^{18}\) We use the Corruption Perceptions

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17) Kim and Kim then inferred and empirically confirmed that the intention to accumulate a bigger reserve fund from higher profits would render monetary policy expansionary, resulting in inflationary bias.

18) Cho and Kim (2001) provide empirical evidence to indirectly infer this hypothesis at least for the case of the Bank of Korea officials.
Index from Transparency International for this proxy. If this hypothesis holds, discussions in Section III predict: The more corrupt a country (i.e., the higher \( \text{COR} \)) is, the higher \( \delta \) will be. In this regard, this fourth proxy might not be so unfledged as it appeared at the first glance, after all.

3. \textit{REGION} Variables and the Data

Equation \(<1>\) includes vector \textit{REGION} with continental dummies to control for their differences in \(<\text{Figure 3}>\) and also time dummy \((t)\). \(<\text{Table A1}>\) in \(<\text{Appendix II}>\) describes the data collection process, sources, and some major sampling rules.\(^{19}\)

Finally, before our empirical analysis we undertook some preliminary reviews of the data, one of which was correlation coefficients in \(<\text{Table 1}>\). None was particularly noticeable except for the high value, \(-0.86\), between \textit{PCY} and \textit{COR}.\(^{20}\) We will take this into account for our estimation later. Encouragingly enough, low values among the four proxies of discretion are believed to warrant to some extent our initial intention of having their multi-dimensional measurement feature.

\textbf{<Table 1> Correlation Coefficients among the Explanatory Variables}

\begin{center}
\begin{tabular}{cccccccc}
\hline
 & \textit{SPR} & \textit{PCY} & \textit{IND} & \textit{INT} & \textit{ACC} & \textit{BND} & \textit{RES} & \textit{COR} \\
\hline
\textit{SPR} & 1.00 & & & & & & & \\
\textit{PCY} & -0.22 & 1.00 & & & & & & \\
\textit{IND} & -0.07 & 0.23 & 1.00 & & & & & \\
\textit{INT} & 0.04 & -0.27 & -0.18 & 1.00 & & & & \\
\textit{ACC} & -0.01 & 0.06 & -0.28 & -0.05 & 1.00 & & & \\
\textit{BND} & 0.13 & -0.36 & 0.10 & 0.27 & -0.13 & 1.00 & & \\
\textit{RES} & -0.08 & 0.01 & -0.23 & 0.05 & 0.18 & 0.12 & 1.00 & \\
\textit{COR} & 0.09 & -0.86 & -0.19 & 0.38 & -0.13 & 0.27 & 0.04 & 1.00 \\
\hline
\end{tabular}
\end{center}

\(^{19}\) Please refer to \(<\text{Referee’s Appendix}>\) for further information on our data collecting procedure for this research project which started in 2003.

\(^{20}\) This result is quite consistent with the existing theory on corruption and economic growth that they should be closely and negatively associated. Empirical research has also confirmed that either corruption systematically lowers economic growth (e.g., Mauro, 1995), or vice versa (e.g., Treisman, 2000).
V. Estimation Results
1. Traditional Explanation of Discount Windows

<Table 2> reports the estimation result of the equation <1> in various specifications. \textit{EQ 1} includes only \textit{TRADITIONAL} variables and the time dummy. Only \textit{PCY} has a significant estimate, thereby supporting the public interest justification for discount windows, namely, an effective device as selective subsidies to boost the economy at the earlier stage of development. As will be seen, this result is robust through \textit{EQ 2} to 5. Insignificant estimates of \textit{SPR} and \textit{IND} needs some elaboration. To be sure, it would not be so hard to find the papers that showed a disruption of historical linkages between the level of discount window borrowing and the spreads.\footnote{21} However, we suspect that, for our cross-section analysis, it was at least partly attributable to immaturity of the financial market in less developed countries; the price mechanism then would not function well.

A similar logic can be applied to \textit{IND}. We used, for \textit{IND}, a range of independence characteristics mainly covering legal aspects. For less developed countries, however, such legal independence might not be a good proxy for actual independence because of substantial deviation between actual practice and the law. Cukierman et al. (1992, 2002), for instance, were not able to find the well-established inverse relationship between independence and inflation in transitional economies, so they emphasized the merit of distinguishing countries by economic development in estimation.

In \textit{EQ 2} thus we interacted the \textit{TRADITIONAL} variables with \textit{D$_{adv}$}, which is the advanced country dummy by the IMF standard, and added the regional dummies. The adjusted $R^2$ increased from 1% to 13%. The significant coefficient estimate of \textit{D$_{adv}$} * \textit{IND} confirmed our proposition above indicating that the central bank’s independence is associated with lower $\delta$ in advanced

countries. $D_{adv} \times SPR$ has also the expected sign with an improved significance level around 12%. Hence, price mechanism seems to be working to an extent in advanced countries. Finally, $PCY$ itself is still significant, which is not surprising because the major determinant of $D_{adv}$ must have been per-capita income.

2. Bureaucratic Discretion and Discount Windows

Now in $EQ\ 3$ we include the intensity of actual intervention, $INT$, to $EQ\ 2$. The adjusted $R^2$ increased again to 21%, and the previous variables virtually remained unchanged. The (+) coefficient of $INT$ at the 1% significance level shows that a highly intervening central bank appears to rely more on discount window. Note that this is an ex post finding, since the authority can in principle choose any monetary instrument for a given intensity of intervention. Nonetheless, we will wait for further empirical analysis ($EQ\ 5$ and $6$ in particular) before we make a final characterization regarding $INT$ and $\delta$.

In $EQ\ 4$ we added to $EQ\ 2$ the discretion proxies in $INSTITUTIONAL$ except $COR$ which caused multi-collinearity with $PCY$ as expected from $<Table\ 1>$. All of $ACC$, $BND$, and $RES$ had expected signs at the significance level of 10%, 1%, and 5%, respectively. The adjusted $R^2$ tripled to 39% with slightly improved results for the original variables of $EQ\ 2$.\footnote{Furthermore, absence of any endogeneity problem related these discretion variables was confirmed by the Hausman test.} Hence, we tentatively submit that our endogeneity hypothesis does hold: Bureaucratic discretionary power itself explains much of central bank’s relative reliance on discount windows.
<Table 2> The Determinants of Discount Window Reliance: Traditional and Institutional Factors

<table>
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<tr>
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<th>TRADITIONAL</th>
<th></th>
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<th>REGIONAL</th>
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<td>$PCY$</td>
<td>$L_{ach} \cdot GDP$</td>
<td>$IND$</td>
<td>$L_{ach} \cdot IND$</td>
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<td>(-1.71)</td>
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<td>-0.017**</td>
<td>-0.027</td>
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<td>-0.005**</td>
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<td></td>
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<td>(1.57)</td>
<td>(-2.08)</td>
<td>(-0.62)</td>
<td>(0.91)</td>
<td>(-2.63)</td>
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<td>-0.005**</td>
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<td>(0.76)</td>
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<td>(-1.86)</td>
<td>(-0.16)</td>
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<td>(-3.49)</td>
<td>(-0.71)</td>
<td>(0.65)</td>
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<td>-0.001**</td>
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<td></td>
<td>(-0.72)</td>
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<td>(-3.62)</td>
<td>(-0.71)</td>
<td>(0.81)</td>
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<tr>
<td>EQ 5'</td>
<td>0.137</td>
<td>1.034**</td>
<td>-1.560**</td>
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<td>-0.003</td>
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<td>(1.32)</td>
<td>(2.50)</td>
<td>(-2.74)</td>
<td>(1.61)</td>
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<td>(1.23)</td>
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<tr>
<td>EQ 6'</td>
<td>0.065</td>
<td>0.913**</td>
<td>1.560**</td>
<td>2.066</td>
<td>0.005</td>
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<tr>
<td></td>
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<td>(2.52)</td>
<td>(2.74)</td>
<td>(1.61)</td>
<td>(0.44)</td>
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</table>

Note: t and z-values in parentheses for EQ 1–6 and EQ 5 and 6', respectively. *, **, and *** represent the 10%, 5%, and 1% significance level, respectively. White's (1980) Heteroscedasticity-Consistent Pooled Least Square was used for EQ 1–6, whereas the Probit was estimated for EQ 5 and 6'. * represents the McMadden $R^2$. 

- 21 -
We added INT back into EQ 5 and 6, but replaced PCY now with the fourth discretion proxy, COR, in EQ 6. Whereas EQ 5 shows robust results with EQ 4, EQ 6, with all four proxies of discretionary power designed in Section IV, improves in the adjusted $R^2$ up to 47%, again firmly validating the explanatory power of the discretion proxies in total. Incremental improvements in fitting of equation \(<1>\) through stepwise adding each discretion proxy has also convinced us of the multi-dimensional nature of these four proxies. Therefore, the empirical results so far confirm the discretionary power $\rightarrow$ discount windows (i.e., high $\delta$) hypothesis motivated and built upon Sections I to III. Furthermore, our results shed a critical complement to the arguments against discount windows in Section III, representatively, a la Poole (1990), Hamdani and Peristiani (1991), and Meulendyke (1992).

Meanwhile, we encounter an interesting observation from EQ 3, 5, and 6 that the significance level of the coefficient estimate of INT generally declines as we include the discretion proxies. Specifically, note from EQ 5 that adding INT into EQ 4 hardly increases the adjusted $R^2$ with a lower significance level of its coefficient estimate compared with that in EQ 3. Note also from EQ 6 that the coefficient estimate of INT becomes finally insignificant, in spite of a tangible increase in the adjusted $R^2$, as we add one more discretion proxy (COR) into EQ 5.

All these suggest that the measurement of actual intervention could have at least partially reflected bureaucratic discretion after all. That being the case, central bank’s activism in some countries might not have originated so much from public interest rationales or macroeconomic philosophies as their monetary authorities claim or as we readily assume.

Finally, in EQ 5’ $\triangleright$ 6’ in <Table 2> we report Probit estimation results using the same specifications of EQ 5 $\triangleright$ 6, since there were 25 countries in the sample with $\delta=0$. The results are overall similar, but two facts are noticeable. First, a much more significant estimate of $D_{adv} \ast SPR$ suggests that the spread in advanced countries, rather than how much, plays a more important role in whether to rely on discount windows. Second, among the four discretion proxies, BND (as a policy partner to directly utilize discretionary power) and
RES (as a financial leverage to exercising discretion in discount windows) turn out to be particularly important in this dichotomic choice model. Interestingly enough, these two proxies are also built-in institutions relatively more "within" central banks than the other two, ACC and COR, usually triggered from outside.

VI. Conclusions and Future Research

Selection of monetary institutions is often "endogenous" in that it is manipulated by monetary authorities, mainly to serve their own interests at the margin. We have applied this proposition to explain inter-country differences in the relative reliance on discount windows vis-à-vis open market operation.

Nevertheless, an existence of the bureaucratic (unlawful) benefits associated with discount windows is hard to substantiate, despite sometimes substantial anecdotal evidence. Indeed, an empirical proof of such endogeneity embedded is a tough task inherently because "disentangling economic (i.e., public interest) and political influences" (Crone and Tschirhart, 1998, 106) is usually difficult.

We have endeavored to overcome this barrier somehow. Based on the existing theoretical arguments, statutory examinations, and preliminary reviews of data, we first established: Discount windows are more likely to allow monetary authorities not only to extract private benefits to themselves, but to exercise their bureaucratic discretion more freely than in open market operation. As a result, we came to a testable hypothesis that greater discretion would cause a higher level of reliance on discount windows ceteris paribus. Our next main task was scrutinizing and designing four multi-dimensional proxies of discretion.

To the authors’ knowledge, this paper is a first-time attempt to empirically explain cross-country differences in relative reliance on discount windows through bureaucratic discretionary power, of course, with other standard economic variables. It has confirmed that the monetary authority’s discretionary power per se, rather than the conventional factors such as economic development and the central bank’s independence or than the casual justification regarding central bank’s market intervention, plays a far more important role in explaining its relative reliance on discount windows.
After all, "Monetary policy is determined by the interactions of the preferences and personalities of key government officials with formal and informal institutional structures and the pressures of interest groups and market behavior." (Willet and Keen, 1990, 13). In fact, one of the most fundamental agenda in designing monetary institutions or organizations would be how to balance such powers of discretion with effective accountability measures and incentive-compatible conditions, to which we believe the field of law and economics can make a significant contribution.

Accordingly, it is imperative for researchers to make serious endeavors to answer such essential questions, just as Kane (1990, 291) set forth: "Empirical research has yet to assess quantitatively how much the operation of myopic and redistributional politics fostered by looseness in monetary policy reporting and decision-making damages macroeconomic and financial performance." Specifically for the current paper’s context, there is an urgent need to analyze any injurious effect on various monetary performances (e.g., price stability) of heavily using discount windows.
<References>


- 25 -
### Appendix I: Statutory Provisions Regarding Monetary Instruments and Staff Loans: Thirty Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Relevant Statutes</th>
<th>Monetary Instrument</th>
<th>Provision for Staff Loans</th>
<th>Staff Loans&gt;0 (2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Reserve Bank Act 1959</td>
<td>$8</td>
<td>$8</td>
<td>X</td>
</tr>
<tr>
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<td>National Bank Act</td>
<td>$47</td>
<td>$47</td>
<td>X</td>
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<tr>
<td>Bulgaria</td>
<td>Law on The Bulgarian National Bank</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Canada</td>
<td>Bank of Canada Act</td>
<td>$18</td>
<td>$18</td>
<td>X</td>
</tr>
<tr>
<td>Chile</td>
<td>Constitutional Organic Act of The Central Bank of Chile</td>
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<td>$34</td>
<td>X</td>
</tr>
<tr>
<td>Croatia</td>
<td>Law on The Croatian National Bank</td>
<td>$10</td>
<td>$10</td>
<td>X</td>
</tr>
<tr>
<td>Czech Rep</td>
<td>Czech National Council Act No.6/1993 Coll.</td>
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<td>$20</td>
<td>X</td>
</tr>
<tr>
<td>Estonia</td>
<td>Law on The Central Bank of The Republic of Estonia</td>
<td>$14</td>
<td>$14</td>
<td>X</td>
</tr>
<tr>
<td>Finland</td>
<td>Act on The Bank of Finland</td>
<td>$5</td>
<td>$5</td>
<td>X</td>
</tr>
<tr>
<td>Germany</td>
<td>Bundesbank Act</td>
<td>$19</td>
<td>$19</td>
<td>X</td>
</tr>
<tr>
<td>Hungary</td>
<td>Act VIII of 2001 on The Magyar Nemzeti Bank</td>
<td>$7</td>
<td>$7</td>
<td>X</td>
</tr>
<tr>
<td>Iceland</td>
<td>Act of The Central Bank of Iceland</td>
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<td>$7</td>
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<tr>
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<td>$48</td>
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<td>Portugal</td>
<td>Organic Law</td>
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<td>X</td>
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<tr>
<td>South Africa</td>
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<td>National Bank Law</td>
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<td>$40</td>
<td>X</td>
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<td>Venezuela</td>
<td>Law on The Central Bank of Venezuela</td>
<td>$48</td>
<td>$48</td>
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</table>

Note: O and X indicate that the size of the staff loans is positive and zero, respectively. “na” denotes that we were not able to verify the existence of staff loans due to insufficient information.
<Appendix II> Details on the Data

<Table A1> The Data Sources and Calculation Methods

| Central Bank Loans | • *Annual Report* at 71 central bank websites and direct confirmations with central bank officials for some countries.  
• Included loans to financial institutions and firms in the *Asset* account of the *Balance Sheet*; Government loans are excluded.  
• For countries where the fiscal year is not defined as January to December (Australia, Bangladesh, Egypt, Japan, Kuwait, Pakistan, Singapore, UK), the figure in the *Balance Sheet*; for example, at the end of February 2001 is counted as the year 2000 one to our data set. |
|-------------------|---------------------------------------------------------------------------------------------------------------------|
| Monetary Base     | • Measured in domestic currency.  
• ESCB countries have not reported MB since 1998. Used the sum of IFS<sup>a</sup> line 14a & 14c. |
| GDP               | • Measured in domestic currency.  
• *World Bank Database* for Albania.  
• Annual Report at the central bank websites for Aruba, Azerbaijan, Bahamas, UAE, Macedonia, Fiji, Mongolia, Sudan.  
• Changed to Euro using domestic currency/Euro conversion rate for ESCB countries. |
| CPI (1995=100)    | • *Annual Report* at the central bank websites for Aruba, Azerbaijan, Sudan, UAE. |
| Per Capita Income | • Measured in constant US$ of 1995.  
• Calculated as $\text{GDPC}_{t}=(100/\text{CPI}_{t})\times e_{t}$, where $\text{GDPC}_{t}=$GDP/Population (from IFS), and $e_{t}=$the domestic currency/US$ exchange rate. However, $e_{t}=(\text{US$/(the domestic currency/Euro conversion rate in 1995)*/(the domestic currency/Euro conversion rate for ESCB countries.} |
| Exchange Rate     | • IFS |
| Call Rate & Discount Rate | • IFS  
• Government and central bank websites, otherwise. |
| ND                | • *Independence Scores* of <Table A.5> in Fry et al. (2000). |
| INT               | • *Financial Stability Issues Scores* of <Table A.8> in Fry et al. (2000). |
| ACC               | • *Accountability of the Central Bank to Government in terms of a Specific Target of* <Table A.6> in Fry et al. (2000). |
| BND               | • Each Central Bank’s *Act*. |
| RES               | • *Balance Sheet* of each central bank’s *Annual Report*.  
• 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.  
• 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 year’s reserve fund in our data set.  
• 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 in the *Balance Sheet*, for example, at the end of February 2001 is recorded as the year 2000 reserve fund to our data set. |
| COR               | • *The Corruption Perceptions Index 2002*, from Transparency International |

<sup>a</sup> IFS: *International Financial Statistics*. 

- ii -
<table>
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Note: The number in parentheses is the ranking. "na" indicates that we were not able to verify the existence of staff loans due to insufficient information.
Data Collecting Procedure

It took much longer than we had expected to complete the data for $\delta$ and $RES$ variables. To get those data for the most recent 5 years initially, in 2003 we first sent email questionnaires to 119 central banks out of the 133 countries listed on the website of the Bank for International Settlements (BIS, www.bis.org). 34 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’s 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 loans and the reserve fund. Furthermore, it turned out that, before and after the two relatively recent years (years 2000 and 2001), the number of observations dropped significantly, so we decided to go with those two years.

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 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 seven countries where ambiguity seemed larger concerning the reserve fund definition.

Hence, we finally constructed a data set consisting of $\delta$ for 71 countries, out of which we could collect $RES$ values only for 60 countries. Moreover, with other important variables (e.g., IND, INT, ACC, and COR) added into the current paper later, the number of observation in estimating models in <Table 2> has dropped. For instance, the most complete specification in <Table 2> has 98 observations, namely, 49 countries.