

# SEIGNIORAGE AND CENTRAL BANK INDEPENDENCE IN DEVELOPING COUNTRIES: FURTHER EMPIRICAL EVIDENCE\*

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## Abstract

The purpose of this paper is to determine the association between Central bank independence and seigniorage in developing countries. Theoretically, more central bank independence would mean less reliance of government on seigniorage since the decision to raise any revenue from seigniorage is left to the Central bank. Although some caution is needed owing to the definition, measurement and data limitations, the empirical cross country evidence from the present paper using a sample of 40 developing countries for the period 1974-1990 indicate a surprising positive and statistically significant association between seigniorage and the Central bank independence index based on office term of the Central bank governors in these countries. The results suggest that we should either interpret a longer term in office as an indication of low level of independence in developing countries or to conclude that the Central banks may keep and even spend part of the seigniorage in these countries. Bearing in mind the institutional and cultural relations, the author thinks that the first interpretation is more justifiable in these countries.

## Introduction

Historically, many countries, especially developing countries have relied on revenue from money creation, known as "seigniorage". The main reason for this reliance is related to substantial difficulties these countries had to finance government spending

and deficits through channels other than borrowing from Central banks by issuing more currency. As a result, this policy caused an increase in inflation and lowered the purchasing power of money in these countries.

There is a relatively large literature on the welfare

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costs and other detrimental effects of seigniorage. Moreover, since seigniorage is very small in developed countries, policy makers have no reason to consider it as a source of revenue for government in these countries. Therefore, it is not surprising that most studies on seigniorage are related to developing countries.<sup>1</sup>

Theoretically, one expects a strong link between the restriction on the Central bank credit to the government and seigniorage. In other words, more Central bank independence would mean less reliance of government on seigniorage.

The main purpose of the present paper is to determine the association between the Central bank independence and seigniorage using cross-country data for a sample of 40 developing countries for the period 1971-1990, for which the necessary data were available.

The paper proceeds as follows: In the next section definitions of seigniorage are discussed. The section after that deals with the problem of measuring seigniorage in the literature. Then the importance of Central bank independence and its expected role in controlling seigniorage is analysed. The empirical cross-section analysis of the relationship between Central bank independence and seigniorage is carried out in the section after that. The last section provides the conclusion.

### The Definition of Seigniorage

There is no comprehensive definition of seigniorage in the literature. Nevertheless, the most popular and general definition of seigniorage is "the revenue collected by sovereign government from its monopoly control over the creation of money".

McKinnon (1979) by drawing on the Oxford English Dictionary defined seigniorage as "...a duty levied on the coining of money for the purpose of converting the expenses of minting, and as a source of revenue to the Crown ..."

Hallwood and McDonald (1986) defined seigniorage as "the right to the difference between the spending power of money and its cost of production". Black (1989) also defined seigniorage

as "the excess of the face value over the costs of production of the currency".

Porter and Judson (1996) described seigniorage as "the government's gain from converting valuable metal into more valuable coins".

Click (1998) defined seigniorage as "the revenue a government gets from its monopoly control over the creation of money".

Kravchuk (1998) defined seigniorage as "the command over societal resources, or the purchasing power obtained by issuing new money".

McPherson (2000) drawing on the MIT Dictionary of Modern Economics by Pearce (1989), defines seigniorage as "the net revenue derived by any money-issuing authority."<sup>2</sup>

It should be noted that different definitions of seigniorage are based on a similar approach and it is remarkable that various investigations undertaken in this area show considerable agreement but as we will see in the next section when it comes to measuring the seigniorage, they sometimes show very different outcomes.

### Measurement of Seigniorage

Seigniorage has interested many economists for a long time.<sup>3</sup> Despite a relatively common agreement on definition, various measures of seigniorage have been developed in previous empirical studies. The most popular measurement of seigniorage is "the ratio of change in reserve money<sup>4</sup> to price level or simply the real change in reserve money". In order to be more specific we can differentiate the real money balances with respect to time; we'll have:

$$\left( \frac{\dot{M}}{P} \right) = \frac{\dot{M}P - \dot{P}M}{P^2} = \frac{\dot{M}}{P} - \frac{\dot{P}}{P} \frac{M}{P} \quad \text{or}$$

$$\frac{\dot{M}}{P} = \left( \frac{\dot{M}}{P} \right) + \frac{\dot{P}}{P} \frac{M}{P}$$

$$\text{where, seigniorage} = \frac{\dot{M}}{P} = \frac{dM}{P}$$

Therefore, we can write:



Seigniorage = change of real money balances + inflation tax

It is seen that seigniorage consists of two parts. The first part is the change in real money balances required for economic growth. This part does not depend on the inflation rate and is necessary for transaction of higher output caused by economic growth and will exist even under a zero rate of inflation. The second part is the government revenue due to inflation, which is called the "Inflation Tax."<sup>5</sup>

Although the above equation forms the basic mathematical measuring of seigniorage from theoretical point of view, previous empirical studies have used different measures of seigniorage:

Fischer (1982) measures seigniorage as "the ratio of change in money stock to nominal GNP".

Cukierman, Edwards & Tabellini (1992), measured seigniorage as "the ratio of the increase in base money to total government revenues (inclusive of seigniorage)"<sup>6</sup>.

De Haan, Zelhorse & Roukens (1993) measured seigniorage as "the change in reserve money as a percentage of GNP".

Sachs & Larrain (1993) measured seigniorage as "the change in monetary base as a percentage of government revenues (exclusive of seigniorage)".

The World Bank (1997) defined seigniorage in nominal terms as "the annual change in holding of reserve money."<sup>7</sup>

Click (1998) measured seigniorage as the change in monetary base normalized using either GDP or government spending.

Kravchuk (1998) measured seigniorage in the following way:

$$\text{Seigniorage} = (\text{change in Real Balances}) \times [M_2 \text{ growth rate} / (M_2 \text{ growth rate} - \text{CPI growth rate})]$$

Bhattacharya and Haslag (1999) defined seigniorage as "the ratio of the change in high-powered money divided by the nominal level of government purchases". They also found that the reliance of governments on seigniorage varied from 1% to 31%.

It should be noted that the countries' ranking of

seigniorage varies according to different measurements of seigniorage. For example, average levels of seigniorage in a pool of 90 countries for the period 1971-1990 ranges from less than 1/2 percent of GDP (New Zealand with 0.381% had the lowest ratio) to more than 14% (Israel with 14.842% had the highest ratio), while seigniorage as a percent of government spending for the same sample ranges from less than 1% of government spending (Netherlands had the lowest ratio) to more than 100% (Yugoslavia had the highest ratio).<sup>8</sup> Also Cukierman et al (1992) found that seigniorage revenue measured as the ratio of the change in monetary base to government revenue for 79 countries for the period 1971-1982 varied from 0.4% to 28%. They have also shown that on average seigniorage played a more important role in developing than developed countries.

It can be argued that based on the foregoing discussion some ambiguities still surround the problem of measuring the seigniorage in developing countries. This implies that some caution is needed in using different measurements of seigniorage for international country comparison.

### Seigniorage and the Role of Central Bank

In general, as mentioned earlier, governments in developing countries use the seigniorage revenue to finance their budget deficits.<sup>9</sup> As far as the financing of government budget deficits is concerned, the following equation can be written: Government budget deficit financing = money creation (seigniorage) + internal debt financing + external debt financing.

Following Dornbusch, Sturzenegger and Wolf (1990), it can be argued that in economics, like most developing countries, where seigniorage has been the most important instrument to finance government budget deficit, it becomes a principal determinant of the money growth and inflation.<sup>10</sup> Therefore, the amount of seigniorage should be controlled by monetary authority and it is on this matter than an independent Central bank can play a significant role. In addition, the discussion in the



previous section made it clear that the amount of seigniorage revenue is directly related to increases in reserve money. From theoretical point of view, sustained increases in reserve money have a significant detrimental effect on output, economic growth, employment, inflation, investment, saving, interest rates, wages, the exchange rate, the balance of payments and external debt.<sup>11</sup> The crucial question is that who should control the amount of reserve money, and consequently the amount of the seigniorage in the economy?

As a priori, one expects a strong link between the Central bank credit to government and the amount of seigniorage. Therefore, a responsible and more independent Central bank can play an important role in controlling the excessive and unnecessary increases in reserve money.<sup>12</sup> This indicates that seigniorage would probably be lower where the Central bank is more independent. Recently Central bank independence has been considered as a major issue in debates about institutional reforms designed to improve economic performance. Many researchers have argued that when independence is coupled with a price stability objective, economic performance appears to improve.<sup>13</sup>

Previous limited studies suggest that, though Central bank independence is not a sufficient condition to avoid sustained increases of the monetary base, at best it can be considered a necessary condition.<sup>14</sup> In the present paper the author intends to supplement the previous studies through cross-country evidence from a sample of developing countries.

### **Empirical Evidence**

Our empirical analysis of the association between seigniorage and Central bank independence is carried out using the available data for a sample of 40 developing countries<sup>15</sup> for the period 1971-1990. Various measures of Central bank independence have previously developed. An index of legal Central bank independence and the actual average term of office of Central bank governors (i.e. non-legal index) are mainly obtained from

Cukierman, Webb and Neyapti (1992).<sup>16</sup> This index is based on the presumption that a higher turnover of Central bank governors indicates a lower level of independence.<sup>17</sup> Data for two measures of seigniorage, namely the ratio of seigniorage to GDP and the ratio of the seigniorage to government spending, are used as dependent variables in our models obtained from Click (1998).<sup>18</sup>

Classifying central banks according to their degree of independence is, of course, not straightforward. Most authors provide no clear definition of central bank independence. According to Friedman<sup>19</sup>, central bank autonomy refers to a relation between the central bank and the government that is comparable to the relation between the judiciary and the government. Some researchers believe that central bank independence relates to three areas in which the influence of government must be either excluded or drastically curtailed: independence in personnel matters, financial independence, and independence with respect to policy.<sup>20</sup>

Grilli, Masciandaro, and Tabellini (1991) constructed an index measuring the independence of the central bank that reflects both political and economic independence.<sup>21</sup> Political independence is defined essentially as the ability of the central bank to select its policy objectives without influence from the government. This measure is based on factors such as whether or not its governor and the board are appointed by the government, the length of their appointments, whether government representatives sit on the board of the bank, whether government approval for monetary policy decisions is required and whether the "price stability" objective is explicitly part of the central bank rule.

Economic independence is defined as the ability to use instruments of monetary policy without restrictions. The most common constraint imposed on the applying monetary policy is the extent to which the central bank is required to finance government deficit.<sup>22</sup>

It should be noted that although different indexes of measuring the degree of legal central bank



independence are based on a similar approach, it is remarkable that the various investigations undertaken in this area show considerable agreement when it comes to assessing the degree of independence of different central banks, but they sometimes show very different outcomes.<sup>23</sup>

Cukierman<sup>24</sup> develops a non-legal measure for central bank independence on the basis of answers to a questionnaire under "qualified individuals in various central banks." He gives both an unweighted and weighted variant of this indicator. The questionnaire examined five issues: 1) legal aspects of independence; 2) actual practice when it differs from the ruling of the law; 3) monetary policy instruments and the agencies controlling them; 4) intermediate targets and indicators; and 5) final objectives of monetary policy and their relative importance.<sup>25</sup>

Cukierman, Webb and Neyapati<sup>26</sup> have also developed a measure for central bank independence based on the actual average term of office of central bank governors in a number of countries from 1950 to 1989. This indicator is based on the presumption that a higher turnover of central bank governors indicates a lower level of independence.<sup>27</sup>

Cukierman and Webb<sup>28</sup> have gone one step further. They argue that the frequency of transfers of central bank governors reflects both the frequency of political change (shift in regime, for example, or in the head of government) and the percentage of political changes that are followed by changes in the governorship of the central bank. They therefore develop an indicator of the political vulnerability of the central bank, which is defined as the percentage of political transitions that are

followed within six months by the replacement of the central bank governor.

It can be argued that based on the foregoing analysis some ambiguities still surround the existing indexes of central bank independence. They are often incomplete and are not really indicators of actual independence. This does not, however, mean that they are uninformative<sup>29</sup>, but it does imply, as mentioned earlier, that their use should be supplemented by judgement of the problem under consideration and with caution.<sup>30</sup>

Table (1) presents the statistical analysis of the variables used in our models. As it is seen from data in Table 1, the ratio of seigniorage to government spending varies from 2.5% to 62% and the ratio of seigniorage to GDP varies from 0.65% to 14.8% for our sample of 40 developing countries during 1971-1990.

Tables (2-5) present the cross-sectional weighted least squares estimated by simple and multiple regression results using different versions of our two dependent variables.<sup>31</sup> Two different indexes of Central bank independence<sup>32</sup> and the ratio of government spending to GDP are considered as independent variables. The Central bank independence index variable does not present the expected theoretical sign. In general, our estimation results indicate that the non-legal index of the Central bank independence (i.e., Office term of Central bank governor) produce more statistically significant results for developing countries. For example, in Table 5, as it is observed, the non-legal independence index itself accounts for 86% of variations in seigniorage.

**Table 1.** Statistical analysis of variables used in our models

Variables	No. of Observations	Min.	Max.	Average	Standard Deviation
Non-Legal Index	40	0.06	0.93	0.295	0.169
Legal Index	40	0.10	0.55	0.334	0.106
Ratio of government spending to GDP	38	0.11	0.67	0.257	0.111
Ratio of seigniorage to government spending	39	2.53	62.00	14.16	10.65
Ratio of seigniorage to GDP	40	0.653	14.84	3.53	2.99

Sources: Calculated by the author. The basic data came from Click (1998); Cukierman, Webb & Neyapti (1992); and Jafari-Samimi & Ahmadi (2000).



**Table 2.** Seigniorage and Central Bank Independence in Developing Countries: Cross-section weighted least squares (WLS) estimated regression results (Dependent variable: average change in monetary base normalized by GDP 1971-1990).

Independent variables	(1)	(2)	(3)	(4)
Constant	4.703** (1.69)	9.99* (7.98)	-2.05 (-0.73)	-6.33* (-4.13)
Non-legal Independence		-3.34 (-1.14)		12.03* (6.3)
Legal Independence	10.77 (1.52)		10.75 (1.59)	
Ratio of government spending to GDP			17.40* (7.07)	28.37* (11.7)
No. of observations	40	40	38	38
Adjusted R-Squared	0.757	0.751	0.896	0.948
F-test	122.7	118.6	160.6	337.2

Notes: (\*) and (\*\*) denote, respectively, significance at the .05, and .01 levels. The numbers in parantheses are heteroscedasticity-consistent t-statistics using the dependent variable as weighting series. Data for seigniorage and the ratio of government spending to GDP are obtained from Click (1998) and indexes of legal and non-legal (the office term of the Central bank governor) Central bank independence are obtained from Cukierman, Webb & Neyapti (1992) and Jafari-Samimi & Ahmadi (2000).

**Table 3.** Seigniorage and Central Bank Independence in Developing Countries: cross-section weighted least squares (WLS) estimated regression results (Dependent variable: log of average change in monetary base normalized by GDP 1971-1990)

Independent variables	(1)	(2)	(3)	(4)
Constant	1.17* (3.37)	1.61* (8.11)	0.18 (0.47)	-0.18 (-0.68)
Non-legal Independence		0.39 (0.82)		1.88* (5.35)
Legal Independence	1.57** (1.75)		2.25* (2.34)	
Ratio of government spending to GDP			2.10* (4.08)	3.76* (7.82)
No. of observations	40	40	38	38
Adjusted R-Squared	0.811	0.799	0.879	0.923
F-test	167.8	155.9	135.7	223.4

Notes: (\*) and (\*\*) denote, respectively, significance at .05 and .01 levels. The numbers in parantheses are heteroscedasticity-consistent t-statistics using the dependent variable as weighting series. For source details see notes in Table 2.



**Table 4.** Seigniorage and Central Bank Independence in Developing Countries: cross-section weighted least squares (WLS) estimated regression results (Dependent variable: average change in monetary base normalized by government spending 1971-1990).

Independent variables	(1)	(2)	(3)	(4)
Constant	1.93 (0.11)	0.56 (0.22)	9.45 (0.59)	-2.84 (-0.61)
Non-legal Independence		63.5* (14.8)		65.4* (13.5)
Legal Independence	82.95** (1.83)		108.6* (2.61)	
Ratio of government spending to GDP			-75.48* (-3.04)	10.44 (0.87)
No. of observations	38	38	38	38
Adjusted R-Squared	0.682	0.954	0.896	0.950
F-test	80.5	714.5	160.6	355.3

Notes: (\*) and (\*\*) denote, respectively, significance at .05 and .01 levels. The numbers in parantheses are heteroscedasticity-consistent t-statistics using the dependent variable as weighting series. For source details see notes in Table 2.

**Table 5.** Seigniorage and Central Bank Independence in Developing Countries: cross-section weighted least squares (WLS) estimated regression results (Dependent variable: log of average change in monetary base normalized by government spending 1971-1990).

Independent variables	(1)	(2)	(3)	(4)
Constant	2.01* (5.2)	2.10* (13.2)	2.13* (5.34)	1.98* (7.54)
Non-legal Independence		1.89* (4.84)		1.95* (4.78)
Legal Independence	2.09** (2.01)		2.40* (2.24)	
Ratio of government spending to GDP			-0.91 (-1.11)	0.40 (0.58)
No. of observations	38	38	38	38
Adjusted R-Squared	0.791	0.859	0.793	0.857
F-test	141.2	226.9	71.7	111.5

Notes: (\*) and (\*\*) denotes respectively, significance at .05 and .01 levels. The numbers in parantheses are hetroscedasticity-consistent t-statistics using the dependent variable as weighting series. For source details see notes in Table 2.

According to the empirical results presented in Tables (2-5), it could be argued that the estimation equation model (4) in Table 2 with all significant

coefficients at .05 level may be chosen as the statistically preferred model. The explanatory variables in this model account for almost 95% of



variations in seigniorage across countries. The F-test is also significant at classical confidence level. The results indicate a surprising positive and significant association between seigniorage and Central bank independence index. In addition, our results concerning the effect of government spending on seigniorage shows that contrary to Click's (1998) findings, the level of government spending is a statistically significant determinant of seigniorage in Developing Countries.

### Concluding Remarks

The main purpose of the present paper was to determine the link between seigniorage and the Central bank independence in developing countries. Theoretically, one expects a negative relation between the two variables, but the empirical cross-country evidence of the present paper using a sample of 40 developing countries for the period 1971-1990 showed a surprising positive and statistically significant association between seigniorage and the Central bank independence based on office term of the Central bank governors in these countries.

Our findings suggest that we should either interpret a longer term in office as an indication of low level of Central bank independence in developing countries or to conclude that the Central banks may keep and even spend part of the seigniorage in these countries. Although some caution is needed owing to definition, measurement and data limitations, bearing in our mind the institutional and cultural relations, the researcher thinks the first interpretation would be more justifiable in these countries.

### Notes

<sup>1</sup> For a review of literature on seigniorage and some of the empirical studies in developing countries see: Baily (1956); Friedman (1971); Keynes (1923); Sargent (1987); Anand & Wijnbergen (1989); Mundell (1965); Cukierman, Edwards & Tabellini (1992); Sachs & Larrain (1993); Ball (1993); Jafari-Samimi & Shamkhal (1997); Kravchuk

(1998); Click (1998); Haslag (1998); Bhattacharya & Haslag (1999); McPherson (2000); Jafari-Samimi (1997-98).

<sup>2</sup> According to him, the costs of seigniorage (or Seigniorage! In his word) which have widely been ignored in literature should be taken into account. He noted that "an important cost of seigniorage is the resource cost of printing, issuing, storing and maintaining the stock of fiat money". Therefore the concept of "net revenue" or "profit" has been used by some authors. See McPherson (2000) and Pearce (1989) for the details.

<sup>3</sup> For the evolution of the literature on seigniorage see Click (1998).

<sup>4</sup> It should be noted that the concepts of money base, high-powered money, outside money, and reserve money are all the same and consists of currency in circulation and reserves of banks (including cash in vaults) held by monetary authority.

<sup>5</sup> Assuming  $\frac{\dot{M}(t)}{P(t)} = ky$ , then from simple

quantity theory of money we can also write:

$$\text{Seigniorage} = \frac{\dot{M}}{P} = \left[ \frac{\dot{M}}{M} \right] + \left[ \frac{\dot{P}}{P} \right] \left[ \frac{M}{P} \right] =$$

$$ky + \pi ky \quad \text{or,} \quad \frac{\dot{M}}{P} = ky \left[ \frac{\dot{y}}{y} + \pi \right] =$$

$$ky(g + \pi)$$

Where  $g = \frac{\dot{y}}{y}$  is the output growth rate and  $\pi = \frac{\dot{P}}{P}$

is the inflation rate and  $k$  is the reciprocal of money velocity assumed constant. In addition, inflation tax acts exactly like a tax where its base is  $\frac{M}{P}$  and its rate is inflation rate. It should be noted that when the first part of seigniorage, namely, the change of



real money balance is zero, which means that  $\frac{M}{P}$  is constant, then seigniorage and inflation tax will be the same.

<sup>6</sup> It should be noted that the measurement of seigniorage in this form has originally been introduced by the International Monetary Fund.

<sup>7</sup> See De Haan, Zelhorst & Roukens (1993); and World Bank (1997).

<sup>8</sup> See Click (1998), p. 155. It should also be noted that the above different measurements for seigniorage may show similar trend and present high correlation for an individual country during a given period of time.

<sup>9</sup> Bhattachary & Haslag (1999) have considered a situation in which the seigniorage revenue would be for the purposes of making transfers to the old generation in the economy. However, their model is not relevant to developing countries where the main purpose of seigniorage is to finance the current budget deficits.

<sup>10</sup> It should be noted that countries of the former Soviet Union have all experienced persistent fiscal deficits and inflation since gaining independence in the early 1990s. Having few options to finance their fiscal deficits, these transitional economies had to largely rely on seigniorage. See Kravchuk (1998) for more details. Also, for a theoretical and empirical relationship between budget deficits, seigniorage and inflation see Jafari-Samimi (1998).

<sup>11</sup> Some economists maintain that due to the above second round consequences of sustained increases in reserve money, the concept of seigniorage should be analysed in a general equilibrium framework using structural simultaneous equation model. See McPherson (2000) for example.

<sup>12</sup> As mentioned earlier, in Bhattachary & Haslag (1999) model, it is required for the Central bank to back the optimum amount of seigniorage necessary for the welfare of the old. In other words, the government in their model outlines the revenue-generation responsibilities of the Central bank based on welfare considerations and it is assumed that the Central bank perform its task without question.

<sup>13</sup> Due to favourable impacts of the Central bank independence on macroeconomic performances of both developing and developed countries, some researchers suggested that Central bank independence come to the top of the list of institutional reforms designed to safeguard the stability of money and macroeconomics. See for example Issing (1993), Hutchison & Walsh (1998).

<sup>14</sup> See Wesche & Weidman (1995) for the details.

<sup>15</sup> The cross-sectional data of the following developing countries were used in the present paper: Greece, Brazil, Ghana, Costa Rica, Zambia, Turkey, Uruguay, Mexico, Bolivia, Portugal, Iran, Peru, Egypt, Poland, Malta, Nicaragua, Argentina, Chile, Israel, Philippines, Indonesia, Nepal, Botswana, Korea, Nigeria, Malaysia, India, Morocco, Ethiopia, Singapore, Tanzania, Pakistan, Columbia, Uganda, Romania, Qatar, South Africa, Zimbabwe, Kenya, and Thailand. So, the number of observations is 40. However, the seigniorage data for Qatar and Poland were not available, therefore in our model estimation sometimes the numbers reduced to 38.

<sup>16</sup> It should be noted that for the case of Iran, these indexes were calculated by the author. See Jafari-Samimi & Ahmadi (2000) for the details. It should also be mentioned that some researchers have suggested that the measures of legal independence may be a better proxy for independence in industrial countries than in developing countries. See Eijffinger & De Haan (1996), p. 28 for the details.

<sup>17</sup> The Central bank independence indexes vary from 0 to 1. The higher the score is for the various indexes, the more independent will be the Central bank. It could be argued that a long-term in office, especially in developing countries, may also indicate a low level of independence, because a relatively subservient governor will tend to stay longer in office than will a governor who stands up to the executive branch.

<sup>18</sup> Seigniorage is defined as the change in monetary base normalized using either GDP or government spending.



<sup>19</sup> See Friedman (1962).

<sup>20</sup> Personnel independence refers to the influence the government has in appointment procedures. Financial independence refers to the ability given to the government to finance its expenditure either directly or indirectly through central bank credits-policy independence refers to the maneuvering room given to the central bank in the formulation and execution of monetary policy. See for example Hasse (1990) for more details.

<sup>21</sup> See Grilli, Masciandaro, and Tabellini (1991). The index used by them is the sum of their indicators for political and economic independence and ranges from 3 to 13.

<sup>22</sup> There are other legal -- as opposed to non-legal or actual -- measures of central bank independence, as developed by Alesina (1988, 1989), Eijffinger and Schaling (1993), and Cukierman (1992) respectively. The measures of Alesina and Eijffinger - scaling range from 1 to 4 and 1 to 5 respectively. The index of Cukierman varies from 0 to 1. The higher the score is for the various indexes, the more independent will be the central bank.

<sup>23</sup> According to the measure used by Grilli, Masciandaro and Tabellini, for example, the Greek central bank has little autonomy whereas according to Cukierman's (1992) index, it is relatively independent. Therefore, any conclusion in this regard should be treated with caution.

<sup>24</sup> See Cukierman (1992) Ibid.

<sup>25</sup> It should be noted that an obvious methodological drawback of the questionnaire is that central bankers may benefit from providing a too positive impression of their independence. It is therefore doubtful that the personnel of central banks are the most appropriate recipients for a questionnaire on central bank independence. The difference between the legal-independence measure and the indicator based on the questionnaire gives some impression of the degree to which central bankers overestimate their independence. For example, the score for Cukierman's unweighted legal-independence for Italy is 0.22, whereas the score of questionnaire is 0.76

<sup>26</sup> See Cukierman, Webb and Neyapati (1992).

<sup>27</sup> One can argue that a long-term in office may also indicate a low level of independence, because a relatively subservient governor will tend to stay longer in office than will a governor who stands up to the executive branch. Therefore, the main difficulty in examining the question of central bank independence is measuring it in different countries.

<sup>28</sup> See Cukierman and Webb (1995).

<sup>29</sup> Resistance to making the central bank independent may reflect the intention of reserving access to an illegal money creation and the risk of corruption to policy makers which in turn violates the government credibility.

<sup>30</sup> Some researchers have suggested that the measures of legal independence may be a better proxy for independence in industrial countries than in developing countries. See for example Eijffinger and De Haan (1996), p. 28.

<sup>31</sup> The correlation coefficient between the two versions of our dependent variables namely, the ratio of seigniorage to GDP and the ratio of seigniorage to government spending, 0.702, indicates despite some minor changes, these countries tend to hold their positions with respect to the role of seigniorage in their macroeconomic.

<sup>32</sup> The correlation coefficient between the two Central bank independence indexes, 0.083, indicates that countries ranking according to various indexes of the Central bank independence produce completely different results. This indicates that the ambiguities still surround the existing indexes of the Central bank independence. They are often incomplete and are not really indicators of actual independence. Therefore, their use should be supplemented by judgement of the problem under consideration and also with caution.

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## حق الضرب و استقلال بانک مرکزی در کشورهای در حال توسعه: شواهد جدید تجربی

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### چکیده

هدف مقاله حاضر تعیین ارتباط بین استقلال بانک مرکزی و حق الضرب (درآمد ناشی از انتشار پول توسط دولت) در کشورهای در حال توسعه می باشد. از دیدگاه نظری، استقلال بیشتر بانک مرکزی به معنی اتکای کمتر دولت به حق الضرب است زیرا هرگونه تصمیم‌گیری در زمینه افزایش درآمد ناشی از حق الضرب توسط بانک مرکزی صورت می‌گیرد. با وجودی که لازم است به دلایل مختلف ناشی از محدودیت‌های مربوط به تعریف، اندازه‌گیری و اطلاعات آماری تا اندازه‌ای به نتایج حاصل از مقاله حاضر با احتیاط برخورد نمود اما یافته‌های این مقاله که براساس اطلاعات مربوط به نمونه‌ای از ۴۰ کشور در حال توسعه در سالهای ۱۹۹۰-۱۹۷۴ استوار است نشان می‌دهد برخلاف انتظار یک رابطه مثبت و معنی‌دار بین حق الضرب و شاخص اندازه‌گیری استقلال بانک مرکزی - که به صورت طول دوره مسئولیت اجرایی رؤسای بانکهای مرکزی در این کشورها اندازه‌گیری شده است - وجود دارد. نتایج بدست آمده حاکی از آن است که یا بایستی طولانی شدن دوره مسئولیت اجرایی رؤسای بانکهای مرکزی را به عنوان استقلال کمتر بانک مرکزی در این کشورها تفسیر نمود و یا اینکه نتیجه‌گیری نمود که بانکهای مرکزی ممکن است بخشی از وجوه ناشی از حق الضرب را نزد خود نگهداری نموده و آن را خرج می‌نمایند. با توجه به روابط فرهنگی و نهادی موجود در این کشورها نویسنده معتقد است که نتیجه‌گیری و تفسیر اول از توجیه‌پذیری بیشتری برخوردار می‌باشد.