Inequality, Inflation, and Central Bank Independence

Jim Dolmas

Gregory W. Huffman

and

Mark A. Wynne

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Jim Dolmas
Department of Economics
SMU
Dallas TX 75275

Gregory W. Huffman
Department of Economics
SMU
Dallas TX 75275
&
Federal Reserve Bank of Dallas
2200 North Pearl Street
Dallas TX 75201

and

Mark A. Wynne
Federal Reserve Bank of Dallas
2200 North Pearl Street
Dallas TX 75201

June 1997

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Abstract

What can account for the different inflation experiences of different countries at any given point in time, and of the same country over time? In this paper we present an analysis of the determination of inflation from a political economy perspective. We begin by documenting a strong positive correlation between income inequality and inflation and then present a theory of the determination of inflation outcomes in democratic societies that illustrates how greater inequality leads to greater inflation as a result of a desire on the part of voters for wealth redistribution. The difficulties of resisting these pressures for redistribution through inflation in democratic societies are a *prima facie* case for central bank independence. The paper concludes by showing that those democracies with more independent central banks tend to have better inflation outcomes for a given degree of inequality.

1. Introduction

What can account for the different inflation experiences of different countries at any given point in time, and of the same country over time? Between 1980 and 1990, the average annual rate of inflation worldwide ranged from a low of -2.7 percent in Kuwait to a high of 432.3 percent in Nicaragua.[1] Since 1960, inflation in the United States has varied between a low of 0.7 percent in 1961 to a high of 13.3 percent in 1979.[2] Both economic theory and experience tell us that the primary determinant of inflation is the rate of growth of the money stock relative to the demand for money. Thus, the inflation rate is determined solely by the policies pursued by a country's central bank or monetary authority. But this raises the question of what it is that determines the policies pursued by central banks. Why does one country's central bank consistently pursue a policy that produces low inflation, while another country's bank pursues a policy that generates relatively severe inflation? Why does the same central bank generate widely different inflation rates at different points in time?

While there is undoubtedly a myriad of factors that underlie the process whereby decisions are made about how high (or low) the inflation rate should be, in this article we will explore the relationship between income inequality and inflation. We will start by showing that there is an empirical link between these two factors: countries with a high degree of income or wealth inequality also tend to have high inflation rates. Although it would be incorrect to infer that there is *per-se* a direct link between these two factors, we will show that the political mechanism, operating through the conduct of monetary policy (as determined by the operation of the central bank), can generate a causal link from income inequality to redistribution policies that ultimately result in inflation.

It is by now well established that there is a significant relationship between the average inflation rates of various countries, and the degree of independence of their central banks. In particular, countries with more independent central banks typically experience lower average rates of inflation, whereas countries with central banks that are more subject to direct political control tend to experience higher rates of inflation. The reason for this is fairly obvious. If the institution charged with the conduct of monetary policy is not subject to political pressure, it can concentrate solely on the pursuit of such goals as price stability. The growing appreciation on the part of politicians of all stripes of the importance of an independent central bank has led to several countries in recent years granting their central banks greater autonomy from the executive and legislative branches of government and mandating the pursuit of price stability as the sole goal of monetary policy. The pioneers in this regard were New Zealand and Canada, followed by France and most recently the UK.

There is a large literature evaluating the impact of independent central banks on economic performance. Banaian, Laney, and Willett (1983), Bade and Parkin (1992), as well as Cukierman, Summers, and Webb (1993) among others study the impact of independence on price stability, while attempting to hold fixed other subjective features. They find a negative relationship between independence and inflation: more independence is typically associated with lower inflation. Alesina and Summers (1993) further confirm the negative relationship between independence and inflation, and show that the superior inflation performance of countries with independent central banks does not come at a cost of worse performance in terms of real economic activity, whether measured by the growth rate of real GDP, variability of real interest rates, or the unemployment rate. However, one question this literature leaves unanswered is,

given the institutional relationship between the central bank and the central government, why is it that we still see remarkable differences in inflation outcomes across countries. Figure 1a of Alesina and Summers (1993) is illustrative in this regard. Inspection of this figure, repeated here as Figure 1 for convenience, shows that there tends to be greater differences in inflation outcomes across countries for a given degree of central bank independence the less independent the central bank is. This naturally begs the question of what gives rise to these differences.

To date there are relatively few general equilibrium models which attempt to explain why different economies would generate such widely different inflation outcomes.[3] Huffman (forthcoming) is a notable exception. He studies an environment in which the inflation rate is determined by a political process in which individual agents vote on the desired inflation rate. He shows that under such an institutional arrangement, both the average rate of inflation, and fluctuations in the inflation rate, are higher than they otherwise might be. This institutional arrangement might be considered to be an extreme case of no central bank independence.

In this article we construct a dynamic general equilibrium model in which agents are heterogeneous in terms of their wealth levels, and consequently prefer different rates of inflation. Following conventional practice in the political economy literature, we assume that in equilibrium the median voter determines the rate at which the money supply increases, and consequently the rate of inflation. We show that greater income (or wealth) inequality in conjunction with a particular political mechanism can lead to higher rates of inflation. Lastly, it is shown that if inequality is sufficiently large, the resulting rate of inflation may be higher than that which maximizes seignorage revenue.

Our model suggests that greater wealth or income inequality may lead to greater pressure

on the monetary and fiscal authorities to print money to finance government expenditure programs. This leads us naturally to the question of whether countries with more independent central banks (greater separation of the monetary from the fiscal authority) are better able to resist pressure of this kind. We re-examine the inflation-inequality relationship, taking account of the degree of separation between the fiscal and monetary authorities using some recently constructed measures of central bank independence prepared by Cukierman, Webb and Neyapti (1992) and show that greater central bank independence seems to alleviate the pressure to create more rapid inflation that comes from greater income inequality in a democratic society.

2. Inflation and Inequality

There are two empirical strategies available to students of the determination of inflation. The first is to examine the pattern of inflation in a single country over a long period of time. The second is to compare the experiences of a number of different countries over a shorter time period. We choose to follow the second course of action here, primarily because of data constraints. Our empirical strategy involved the construction of a data set consisting of observations on the degree of income or wealth inequality within a country and its inflation experience over the past forty years or so. The data on inequality was drawn from Deininger and Squire (1996), who construct a large high quality data set on income inequality for a large number of countries. The data on inflation was drawn from the International Financial Statistics published by the IMF.

Figure 2 is a pair of scatter plots of inflation against income inequality for a collection of democratic and nondemocratic countries.[4] Income inequality is measured as the Gini

coefficient of the income distribution at around the beginning of a decade, while inflation is measured as cumulative Consumer Price Index (CPI) inflation over the course of the subsequent decade. Ocular examination of the Figure yields two important insights. First, the average annual inflation rate in democracies exceeds that in nondemocracies. And second, there is a positive correlation between income inequality and inflation in the democratic countries - no such relationship exists for the sample of nondemocracies.

This casual impression is borne out by more formal statistical tests. In Table 1 we report some simple regressions that illustrate the strength of the inequality-inflation correlation. We look at two different measures of income inequality. The first is the Gini coefficient of the distribution, which is formally defined as $G = 1 - 2\int_0^1 L(y)dy$ where $L(y)$ is the Lorenz curve of the income distribution. The Lorenz curve plots the cumulative percentage of income earned by the bottom y-percent of the population. If everyone earned the same income, the Lorenz curve would be a 45-degree line, and the Gini coefficient would be zero. As the distribution of income becomes more unequal the Gini coefficient increases and is bounded above by 1. The second measure we look at is the difference between the proportion of income accruing to households in the top quintile of the income distribution, minus the proportion accruing to households in the bottom quintile. The first two rows of the table show that regardless of which measure of inequality we use, there is a statistically significant relationship between inequality at the beginning of a decade and inflation over the course of the decade for the countries in our sample. We then investigated whether this relationship depends at all on whether the countries in question are democracies or nondemocracies. The bottom four rows of the table show that while there is a relationship between inequality and inflation in democracies, the same is not true

of nondemocracies. Indeed, inequality has essentially no explanatory power (as measured by the $\bar{R}^2$) for nondemocracies. For democracies, the degree of income inequality is capable of accounting as much as one-fifth of the difference in the inflation experiences of these countries. Furthermore, the fact that the relationship is strongest in democracies reinforces the suspicion that the direction of causality is from inequality to inflation rather than the other way around.

This simple statistical analysis is at least suggestive of a relationship between inequality and inflation, and it is to the formal modeling of this relationship that we now turn.

3. A Model of Inequality, Voting and Inflation

Consider an economy in which time is discrete, and is indexed by t=1,2,3... In each period a new generation is born, and the individual members of each generation live for two periods. Each individual is endowed with some finite amount of a homogeneous consumption good in the first period of his life, and nothing in the second period. This endowment is idiosyncratic among the members of the agent's generation, in that it is determined by a probability distribution which we will denote by $\mu(\cdot)$. We will periodically refer to this endowment as income, and the fact that it varies in size across members of a generation is the source of income inequality.[5]

Each agent has preferences defined over consumption in the two periods of her life. We assume that these preferences are described by the following utility function

$$u(c_1,c_2) = \log(c_1) + \log(c_2) \qquad (1)$$

where c_1 denotes consumption in the first period of life, and c_2 denotes consumption in the

second period. Thus, agents want to consume in both periods of their lives, but only possess the consumption good in the first period. These preferences over consumption are identical for all individuals. Hence any differences on the part of individuals (as voters) in terms of their preferences for different government policies will not be due to differences in their fundamental or primitive preferences.

Agents in this economy are able to consume in the second period of their life (when they have no endowment) because of the existence of an asset than can be traded. This asset is fiat money. Agents "purchase" money when young (by selling part of their initial endowment) and hold it until they are old. They use their holdings of fiat money in the second period of their life to purchase some of the consumption good.

We will also assume that agents receive a transfer payment from the government in the second period of their life, which will be labeled τ.[6] Therefore, the agent's budget constraints take the following forms:

$$c_1 = y - m \tag{2}$$

$$c_2 = mR + \tau. \tag{3}$$

Here m represents the *real* value of currency holdings for an agent who possesses an endowment y, and R represents the real rate of return to holding fiat money. Additionally, the net rate of inflation can then be written as $\pi = (1/R) - 1$.

Agents form a plan for consumption and fiat money holdings by choosing values of c_1, c_2 and m to maximize (1) subject to (2) and (3). Straightforward substitution allows us to

reformulate the agents problem as one of choosing a value for m. The solution to this optimization problem can then be written as

$$m = \frac{y}{2} - \frac{\tau}{2R}. \tag{4}$$

This relationship is more appropriately considered a savings function rather than a money demand function. Under the savings function interpretation, it has the usual properties that savings are positively related to income and real interest rates, and negatively related to government transfers.

What remains is to specify how the government policies are determined. In particular, we assume that each period agents vote on the desired return to currency, or equivalently, the desired inflation rate. The increase in the money stock needed to implement the chosen policy is generated through lump-sum transfers of currency of the same amount to all (currently old) agents. Of course this results in a relationship between the level of the lump-sum transfer τ, the level of the inflation rate, and the amount of aggregate real money holdings. Suppose we let M_t denote the stock of nominal money balances outstanding at the end of period t. If we assume that the money stock grows at a constant rate π each period, then

$$M_t = (1+\pi)M_{t-1}$$

which in turn implies

$$M_t - M_{t-1} = \pi M_{t-1} = (\pi/1+\pi)M_t.$$

We are assuming that the only activity undertaken by the government in this economy is making

transfer payments to the old, and that all of these transfer payments are financed by money creation. Thus the government's budget constraint (in nominal terms) is simply

$$T_t = M_t - M_{t-1}$$

where T_t denotes the dollar value of transfer payments made during period t. Substituting for the growth of the money stock during period t using the expression above, dividing by the price level to put everything in real terms and dropping time subscripts, we obtain

$$\tau = (1-R)m = \frac{\pi}{1+\pi} m.$$

Using the short hand notation that $m(y)$ represents money holdings for an agent with endowment y, it is easy to see that the government's budget constraint can also be written as

$$\tau = (1-R)\int m(y)\mu(dy) = \frac{\pi}{1+\pi}\int m(y)\mu(dy).$$

However, the savings function for each agent, given by equation (4), is a function of the transfer payment (τ). This relationship can be used to show that

$$\tau = (1 - R)\int \left[\frac{y}{2} - \frac{\tau}{2R}\right]\mu(dy)$$

which can be re-written as

$$\tau = \bar{y}\ \frac{(1 - R)R}{(1 + R)} \qquad (5)$$

where $\bar{y} = \int y\mu(dy)$ is the average level of wealth amongst a cohort of agents. We can substitute this expression for the level of transfers back into the agent's utility function (1), together with the budget constraints (2) and (3) to obtain an "indirect" utility function. The indirect utility function expresses the maximum attainable lifetime utility of an agent as a function of the rate of return to money (R), the agent's wealth (y), and the average wealth of the agents in the economy ($\bar{y}$). Specifically,

$$V(R;\ y,\ \bar{y}) = 2\log(y) + \log(R) + 2\log\left[1 + \frac{(\bar{y}/y)(1 - R)}{(1 + R)}\right] - 2\log(2) \qquad (6)$$

Obviously the individual's utility is then dependent upon three factors:

(1) her own endowment or income (y);

(2) the real rate of return to holding fiat money (R) or equivalently, the inflation rate, (π); and

(3) the average level of income of her cohort ($\bar{y}$).

The latter factor is important since it is the average level income which will determine the size of the real transfer payment that the agent receives from the government. In particular, given y, the agent's utility is increasing in the average wealth of her cohort $\bar{y}$, since a higher average income increases the size of the transfer payment.

Note that the objective function given by equation (6) is concave in R when $(\bar{y}/y) \geq 1$. Therefore, in this instance for a fixed level of income (y) an agent has a most preferred value

of R, and hence a most preferred level of inflation. Figure 3 plots equation (6), as a function of various inflation rates, for various values of $\Phi = \bar{y}/y$, holding fixed the level of income (y). Clearly for higher values of Φ, higher inflation is preferred by the agent. That is, the lower the agent's endowment is relative to the mean of her cohort, the more inflation she prefers.

Now consider the problem faced by an agent who could choose the rate of return on money (R). For a randomly chosen agent, his welfare may or may not be increasing in the rate of return to currency. The agent will choose a value for R to maximize equation (6), subject to the constraint that $1 \geq R > 0$. It should be clear that $R > 0$ is not much of a constraint since $V(R,y,y) = -\infty$ for $R = 0$. Restricting $1 \geq R$ simply limits the agents to choosing non-negative inflation rates.

For an agent with wealth or endowment level y, his preferred rate of return to money is given by the following expression

$$R(\Phi) = \frac{(2\Phi - 1) - \sqrt{5\Phi^2 - 4\Phi}}{1 - \Phi} \qquad (7)$$

where $\Phi = \bar{y}/y$ and where $\Phi > 1$. Of course, for $\Phi \leq 1$ it can be shown that $R(\Phi) = 1$. To map the preferred rate of return on money of each individual agent into a policy outcome, we follow the conventional practice of invoking the median voter theorem. Let us assume that there is an agent for whom their income level y_m is such that $\int_0^{y_m} \mu(dy) = 0.5$. Henceforth, we

will let $\Phi = \bar{y}/y_m$. We will assume that the rate of return to money, as given by equation (7), is then determined by this median voter. With the outcome of the voting process determined by the median voter, just less than 50% of the individuals will prefer a higher inflation rate (*i.e.* the poorer agents), while just less than 50% of the individuals will prefer a lower inflation rate (*i.e.* the richer agents).

We can also calculate the value of R, or equivalently of π, which maximizes government revenue. This amounts to finding the value of R which maximizes the value of τ given by equation (5). After some algebra, it can be shown that this rate of return is $R_{\max} = -1 + \sqrt{2}$. For values of $R < R_{\max}$, further increases in the inflation rate or decreases in R result in less seignorage revenue. We sometimes loosely speaking refer to this instance as being on the "wrong side of the Laffer curve."

Now it has been shown that increases in Φ result in higher (lower) values of π (R). It is possible to show that when $\Phi > 1 + \sqrt{2}$, then the resulting $R < R_{\max}$. That is, if there is a sufficiently large degree of inequality in this economy, then this could result in *too much inflation*.[7] This is a novel result since typically when we find that such an outcome is possible, it is because of the "stability" of this high inflation equilibria, and the instability of a corresponding low inflation equilibria. After all, for any equilibrium in which $R < R_{\max}$ there is also another equilibrium in which the inflation rate is lower ($R' > R_{\max}$), and which the government seignorage revenue is identical. Since this latter equilibrium has a higher rate of return to saving, why would an economy instead arrive at an equilibrium in which the rate of

return was so low? The answer hinges on the fact that the median voter in this economy considers the welfare impact not only of changes in the rate of inflation, but also the impact of the (real) size of the government transfer payment. If the benefit to the median voter of a higher transfer payment from the government outweighs the detrimental effect of the higher inflation rate needed to finance the transfer payment, then the median voter may prefer a *very* high inflation rate.

It is also worth noting one other feature of this model. We focus on the case where $\Phi \geq 1$ since this characterizes most empirical distributions of income or wealth. That is, most empirical distributions of income or wealth exhibit substantial right skewness (large numbers of relatively poor people, small numbers of very rich people). In this model, this characteristic of the income distribution results in lump-sum government transfers which cause inflation. On the other hand if $\Phi < 1$ then our model would predict *deflation* which is financed by lump-sum *taxation*.

Given the above analysis, one might wonder why there is not a stronger relationship in the data between inflation and inequality. In the model we have assumed for simplicity that there is only one policy instrument and one policy mechanism which permits agents to acquire resources and influence relative prices through the political process. In practice, of course, there is large number of such instruments and mechanisms. That is, the political process in actual economies has governments design and implement very complex tax codes, institute a plethora of trade barriers and subsidies, spend and transfer trillions of dollars, design and regulate financial markets and so on. All of these activities have distortional and redistributive effects on economies. Not surprisingly, as we look across countries with different degrees of

inequality, we see vastly different political, fiscal, judicial, and legal structures. This is what we would expect if we accept that agents voting preferences were going to influence the policy-making mechanism.

4. Central Bank Independence

The model presented above has implications for the issue of central bank independence. Obviously, if the central bank for this model economy were completely detached from any political pressure, and instead given the sole mission of achieving price stability, there is nothing standing in the way of this objective as it could be accomplished simply by not letting the money stock grow at all. Of course, if the central bank in the economy above were given such a mandate, it would drastically restrict the options available to the fiscal authorities in terms of their ability to make transfer payments, but that is another issue.

Thus, the analysis above suggests that a high degree of wealth or income inequality, *together with certain institutional arrangements*, is an important factor in generating high rates of inflation. That is, it is not merely that inequality alone should contribute to inflation. Presumably a secure governing authority who is quite oblivious to the characteristics of the individual agents would not feel compelled to react to increased inequality with higher money supply growth. Our statistical analysis earlier on showed that the relationship between inflation and inequality that characterizes democracies is entirely absent in nondemocracies. This begs the question of how democracies with independent central banks fare.

To address this question we extended our earlier statistical analysis to take account of the degree of independence of a country's central bank. We used the measures of central bank

independence constructed by Cukierman, Webb, and Neyapti (1992) which build on the earlier measures of central bank independence developed by Bade and Parkin (1992), Alesina (1988) and Grilli, Masciandaro and Tabellini (1991). The latter groups of authors focus on legal independence in determining how independent a central bank is. Cukierman, Webb and Neyapti also construct more subjective or informal measures of independence that examine, for example, how frequently central bank governors are replaced. The primary shortcoming of measures of independence based on laws is that laws are inevitably incomplete because they cannot delineate the bounds of authority between a nation's central bank and central political authorities under all possible states of the world. Furthermore, even in cases where the law is quite explicit, actual practice may deviate from it along significant dimensions. For example, in Argentina the term of office of the governor of the central bank is four years, but traditionally governors offer to resign whenever there is a change in government or the finance minister resigns. As a result, between 1950 and 1989 the average term in office of the governor of the Argentine central bank was about one year.

To see whether the degree of independence of a country's central bank influenced the relationship between inequality and inflation outcomes we simply repeated the simple regression in Table 1, adding as explanatory variables Cukierman, Webb, and Neyapti's measure of legal central bank independence and their measure of the frequency with which central bank governors are replaced. The results of this exercise are reported in Table 2a and Table 2b. The first point to note is that when we look across all countries inequality is still significantly positively correlated with inflation even after we account for the degree of central bank independence. The measure of central bank independence is negatively correlated with inflation (confirming what

many other authors have found) but the relationship is not significant in a statistical sense. Note, however, that the t-statistic is greater than one in all cases, indicating that the measure of central bank independence does contribute to our ability to explain cross-country differences in inflation. By contrast, the measure of frequency of turnover of central bank governors is statistically significant at the 5% level in all of the regressions and has the expected positive sign. When we break the sample into democratic and nondemocratic countries we find somewhat more interesting results. We find that for democracies, both the measure of central bank independence and the measure of turnover of central bank governors noticeably enhance our ability to account for differences in inflation rates across countries. We are able to account for between a quarter and a third of cross-country differences in inflation rates simply by looking at the degree of income inequality in a country and the extent to which the central bank is free from political interference. The measure of legal independence is only statistically significant at the 10% level when included in a regression with the turnover measure as well and we measure inequality using the Gini coefficient. However, in every case the t-statistic is greater than one, confirming that the measure of legal independence adds to our ability to account for cross-country differences in inflation rates in democracies. Note that for the nondemocracies, the inclusion of the measure of legal central bank independence and the turnover rate of central bank governors *worsens* our ability to account for differences in inflation rates.

5. Conclusion

We have shown that economies with high levels of income inequality also tend to have higher average levels of inflation. This correlation is particularly evident in democratic nations.

In this paper we have suggested that the relationship between these two variables is causal, and furthermore, that the direction of causation is from inequality to inflation. We also presented evidence that suggests that this causal mechanism is only operative under certain institutional arrangements in a democracy, specifically in the absence of an independent central bank. Arguably the causal mechanism suggested here is more plausible than the reverse argument since the inflation rate is ultimately determined by policies, and these policies are determined by some institutional structure. In democratic societies, policy outcomes are determined through the interaction of voters' preferences with the institutional structure.

One might criticize the model described above because rich individuals do not typically hold a large amount of their wealth in the form of money. This is really just a simplification made to facilitate the exposition, and is not critical. What is important is that rich agents be harmed in some absolute sense more by inflation than would poorer agents. It is not hard to see why this would be the case. In the U.S. richer agents hold billions of dollars in dollar-denominated assets, especially through pension and mutual funds. Higher inflation certainly hurts these individuals directly. Furthermore, it is widely believed that inflation lowers the real price of capital, and hence its rate of return, through the erosion of the real value of tax depreciation allowances, which are denominated in nominal terms. This effect primarily hurts more wealthy individuals, since they hold title to most of this capital.

Table 1
Inflation and inequality

Intercept	Gini	Top 20% - Bottom 20%	N	$\bar{R}^2$
All				
1.159*** (0.355)	0.025*** (0.0094)	-	101	0.07
0.984** (0.378)	-	0.029*** (0.009)	84	0.10
Democracies				
0.552 (0.488)	0.043*** (0.013)	-	57	0.15
0.181 (0.519)	-	0.052*** (0.014)	49	0.23
Nondemocracies				
1.944*** (0.536)	0.005 (0.012)	-	44	-0.02
1.801 (0.579)	-	0.008 (0.013)	35	-0.02

Notes to Table 1: Source: Authors' calculations. ** denotes significance at the 5% level; *** denotes significance at the 1% level. Standard errors in parentheses. N denotes the number of observations included in the regression. The dependent variable in each case is the log of the average annual inflation rate as there is some evidence of a nonlinear relationship between the average annual inflation rate and the measures of inequality that we employ.

Table 2a
Inflation, inequality and central bank independence

Intercept	Gini	Top 20% - Bottom 20%	Central Bank Independence	Turnover	*N*	$\bar{R}^2$
All Countries						
1.393*** (0.457)	0.029*** (0.010)	-	-1.051 (0.722)	-	79	0.10
1.079*** (0.378)	0.020** (0.010)	-	-	1.203** (0.492)	81	0.14
1.190** (0.526)	-	0.032*** (0.010)	-0.881 (0.820)	-	68	0.13
0.825** (0.399)	-	0.026** (0.010)	-	1.218** (0.537)	68	0.17
1.448*** (0.442)	0.020** (0.010)	-	-1.119 (0.697)	1.263** (0.491)	79	0.16
1.179** (0.508)	-	0.025** (0.010)	-0.923 (0.793)	1.270** (0.540)	68	0.18

Notes to Table 2a: Source: Authors' calculations. * denotes significance at the 10% level; ** denotes significance at the 5% level; *** denotes significance at the 1% level. Standard errors in parentheses. *N* denotes the number of observations included in the regression. The dependent variable in each case is the log of the average annual inflation rate as there is some evidence of a nonlinear relationship between the average annual inflation rate and the measures of inequality that we employ.

Table 2b
Inflation, inequality and central bank independence

Intercept	Gini	Top 20% - Bottom 20%	Central Bank Independence	Turnover	N	$\bar{R}^2$
Democracies						
0.839 (0.562)	0.049*** (0.013)	-	-1.316 (0.799)	-	51	0.23
0.733 (0.516)	0.030* (0.016)	-	-	1.311* (0.678)	51	0.25
0.438 (0.660)	-	0.056*** (0.014)	-1.046 (0.886)	-	45	0.29
1.230** (0.577)	0.030* (0.016)	-	-1.369* (0.775)	1.351** (0.664)	51	0.28
0.239 (0.550)	-	0.044** (0.017)	-	1.087 (0.729)	45	0.30
0.789 (0.683)	-	0.041** (0.015)	-1.165 (0.873)	1.169 (0.725)	45	0.31
Nondemocracies						
2.018** (0.776)	-0.000 (0.017)	-	0.421 (1.704)	-	28	-0.08
1.931** (0.710)	0.005 (0.015)	-	-	-0.051 (0.901)	30	-0.07
1.676 (0.828)	-	-0.001 (0.020)	1.798 (2.711)	-	23	-0.07
1.714** (0.767)	-	0.009 (0.016)	-	0.036 (0.987)	25	-0.08
2.061** (0.846)	-0.001 (0.018)	-	0.461 (1.760)	-0.141 (0.975)	28	-0.12
1.729* (0.930)	-	-0.002 (0.021)	1.881 (2.844)	-0.153 (1.099)	23	-0.13

Notes to Table 2b: Source: Authors' calculations. * denotes significance at the 10% level;** denotes significance at the 5% level; *** denotes significance at the 1% level. Standard errors in parentheses. N denotes the number of observations included in the regression. The dependent variable in each case is the log of the average annual inflation rate as there is some evidence of a nonlinear relationship between the average annual inflation rate and the measures of inequality that we employ.

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NOTES

1. Data from World Development Report 1992, Table 1.

2. Data from Economic Report of the President 1994, Table B-62.

3. The recent study by Beetsma and van der Ploeg (1996) examines the same inequality-inflation nexus that is the focus of this paper, but they do so in the context of a partial equilibrium model.

4. The classification of countries as democracies or nondemocracies is drawn from Appendix 1 of Alesina and Rodrik (1994). A country is classified as a democracy if it has at least two political parties and has regular general elections. This classification is also used by Beetsma and van der Ploeg (1996). Note that we exclude certain outliers from the figures (Chile in the 1970's, and Brazil and Mexico in the 1980's)- our results are robust to the inclusion of these extreme observations.

5. Thus we do not consider income inequality that is "endogenously" determined by different individuals' decisions about how hard to work of how much capital (physical or human) to accumulate.

6. One could alternatively think of this as some public good which appears additively in the utility function of the agents.

7. Although there are infinitely many ways to characterize inequality, for our purposes here what is relevant is the ratio of the mean to median income.

Figure 1
Central Bank Independence and Inflation, 1955-88

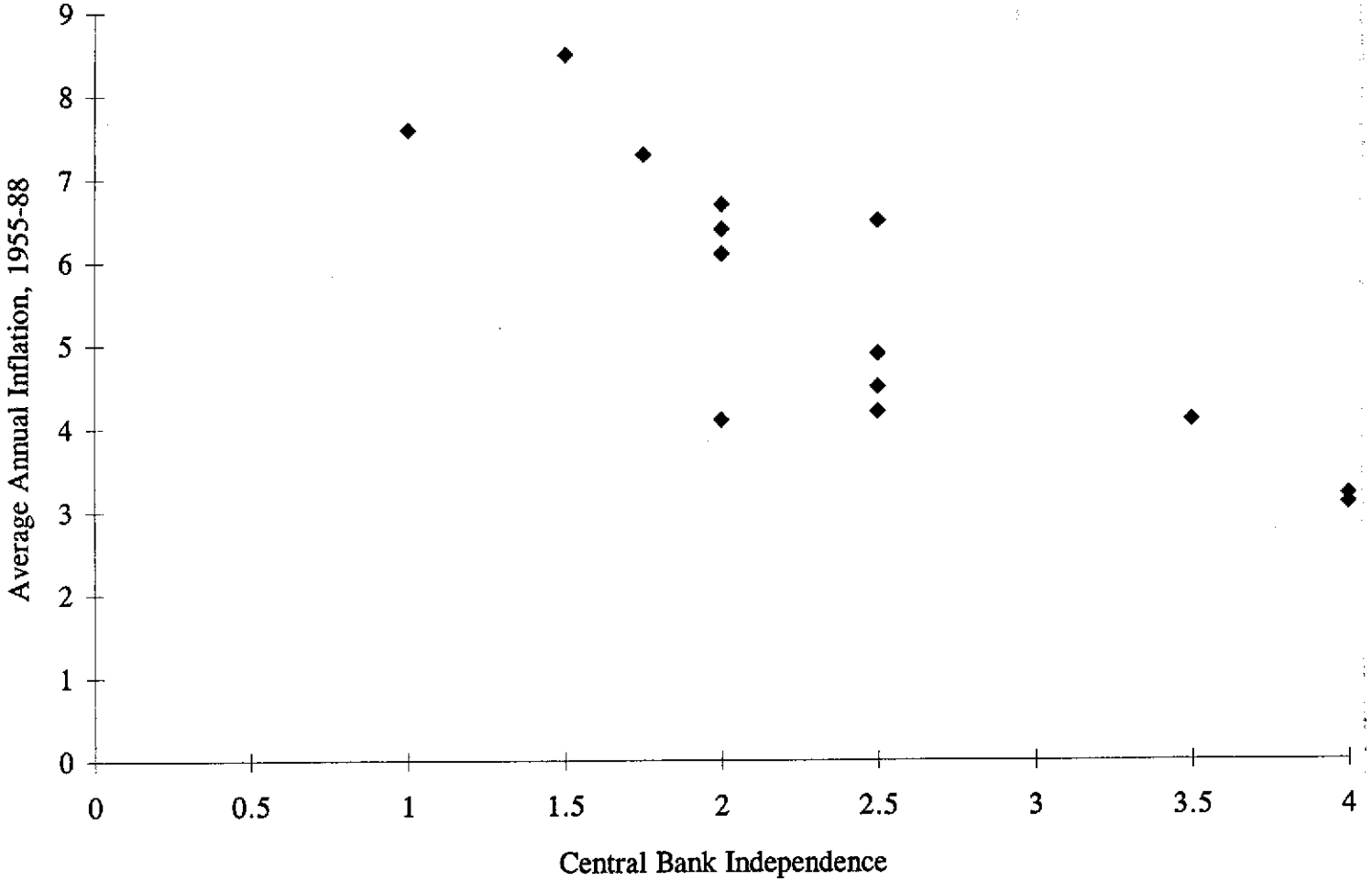
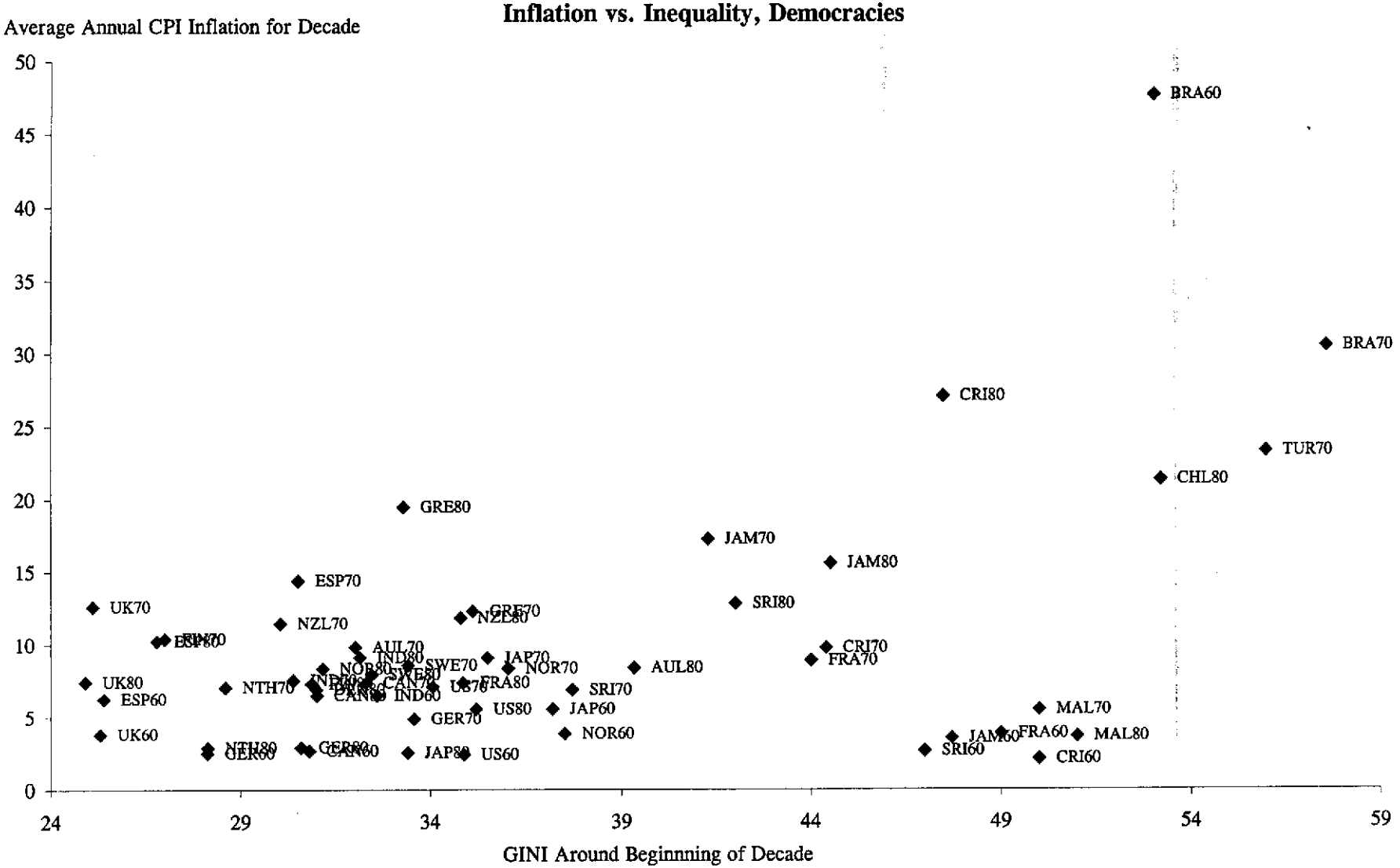
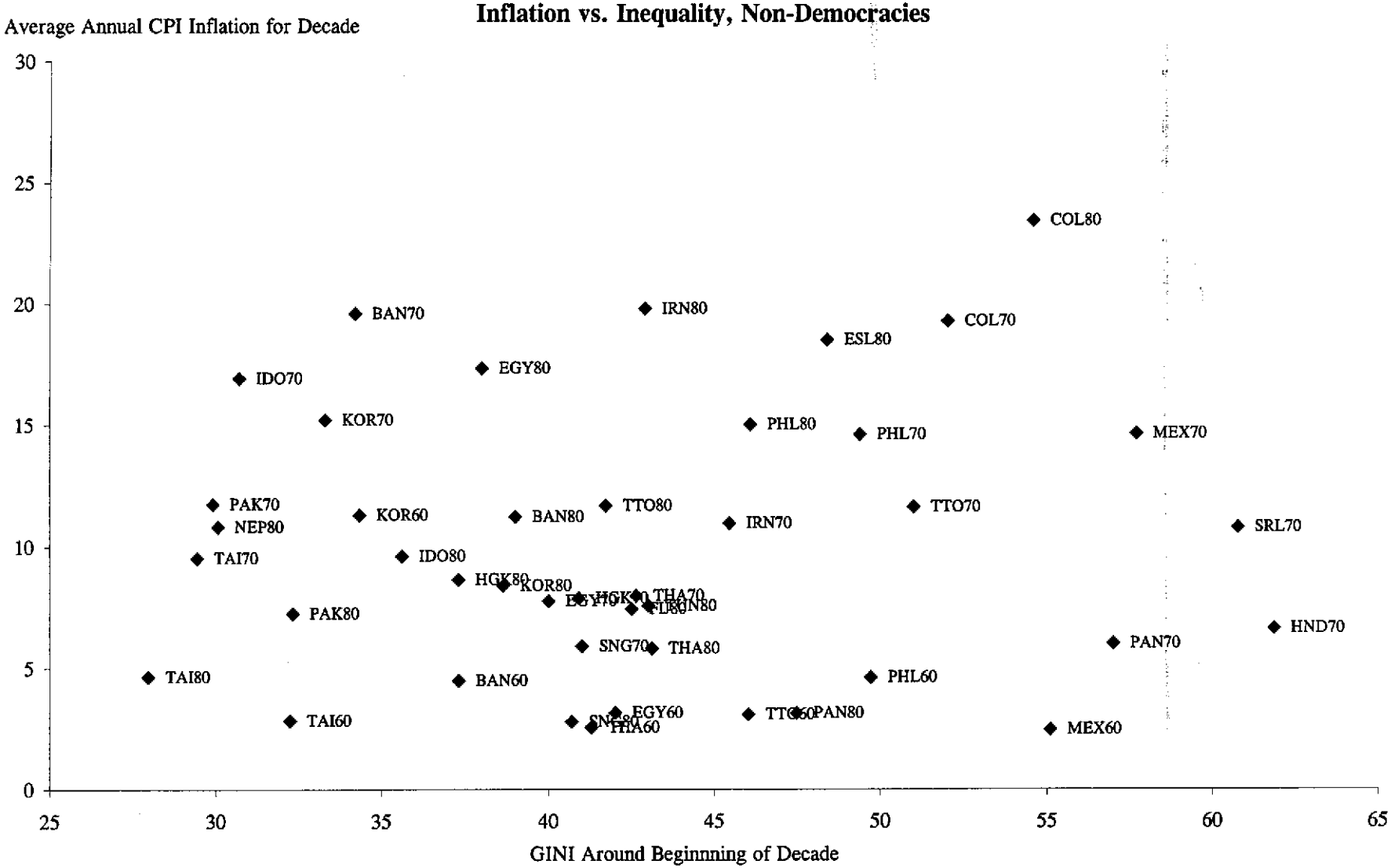


Figure 2a
Inflation vs. Inequality, Democracies



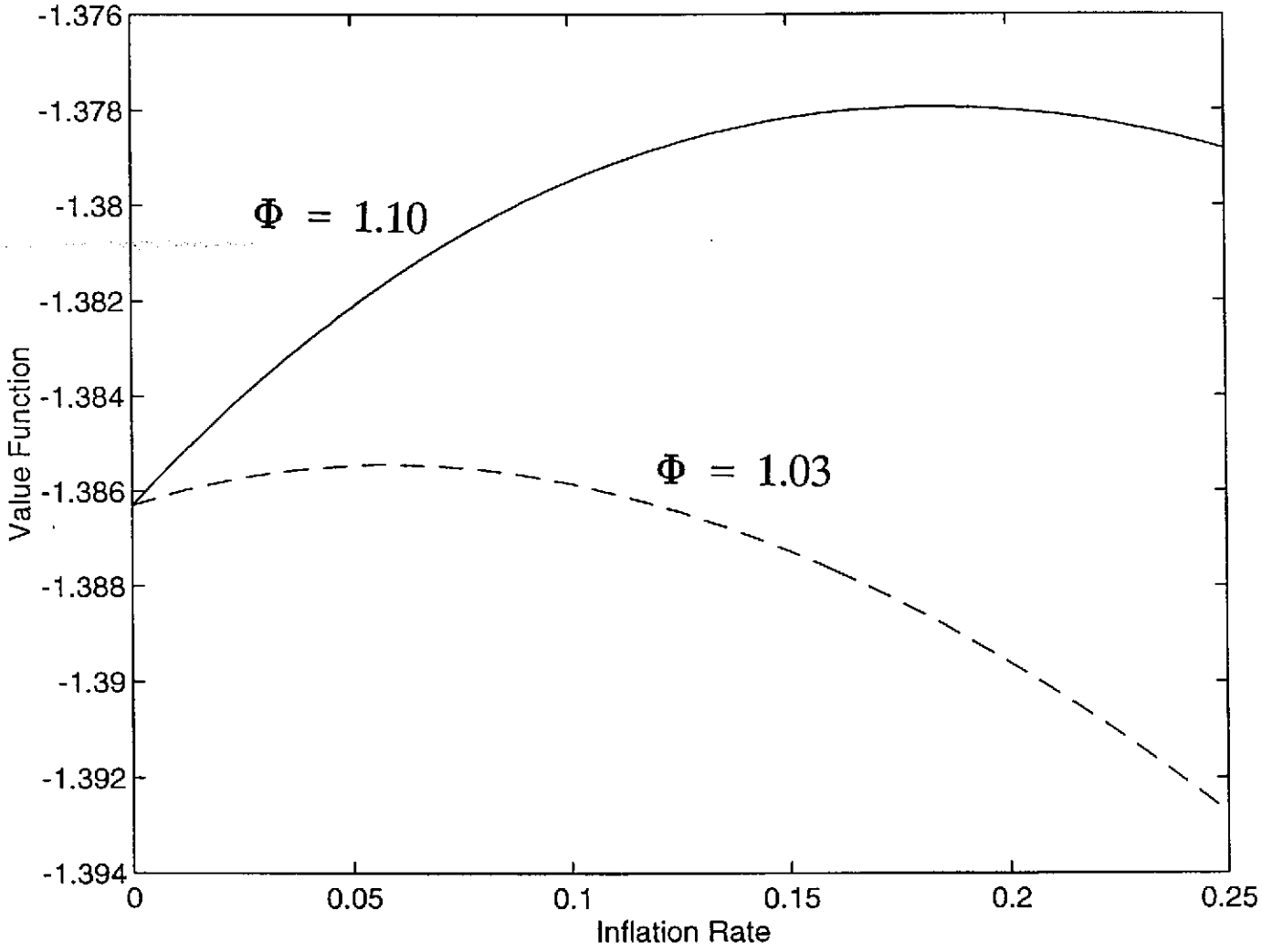
* excludes Brazil in 1980's, Chile in 1970's

Figure 2b
Inflation vs. Inequality, Non-Democracies



* excludes Mexico in 1980's

Figure 3


-1.376
-1.378
-1.38
-1.382
-1.384
-1.386
-1.388
-1.39
-1.392
-1.394
Value Function
Φ = 1.10
Φ = 1.03
0
0.05
0.1
0.15
0.2
0.25
Inflation Rate

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