

## **Inflation and the Poor**

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**Abstract:** Using polling data for 31869 households in 38 countries and allowing for country effects, we show that the poor are more likely than the rich to mention inflation as a top national concern. This result survives several robustness checks. We also find direct measures of improvements in well-being of the poor – the change in their share in national income, the percent decline in poverty, and the percent change in the real minimum wage – to be negatively correlated with inflation in pooled cross-country samples.

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The claim that “inflation is the cruelest tax of all” is often interpreted as meaning that inflation hurts the poor relatively more than the rich. It could also mean that the inflation tax is particularly unfair because, the taxing mechanism being little understood, the inflation tax can be imposed by stealth.

The essential *a priori* argument is that the rich are better able to protect themselves against, or benefit from, the effects of inflation than are the poor. In particular, the rich and more sophisticated are likely to have better access to financial instruments that hedge in some way against inflation, while the (small) portfolios of the poor are likely to have a larger share of cash. The poor may also depend more than the rich on state-determined income that is not fully indexed to inflation. Among the elderly poor, pensions are often not fully indexed and so inflation will directly reduce their real incomes. For the remainder of the poor, state subsidies or direct transfers may also not be fully indexed.

However, these arguments are not decisive. Aside from the points that the poor are likely to hold relatively more cash in their portfolios, and to be less sophisticated, the relative effects of inflation on the rich versus the poor must be specific to the institutions and histories of each economy. Certainly, study of the long list of the potential effects of inflation on the economy outlined in Fischer and Modigliani (1978) does not lead to a clear presumption that it is the poor who are hurt relatively more by inflation, especially because so many of the effects of inflation come through complicated details of the tax system, including capital taxation. The question must be an empirical one, and the answer may well differ among economies.

In this paper, we examine inflation's effects on the poor in two ways. First, we draw on the results of a global survey of 31869 individuals in 38 countries, which asked whether individuals think inflation is an important national problem. This provides an indirect way at getting at the issue of whether inflation is more of a problem for the poor than for the rich. Second, we assess the effects of inflation on direct measures of inequality and poverty in various cross-country and cross-time samples.

Our evidence supports the views that inflation is regarded as more of a problem by the poor than it is by the non-poor, and that inflation appears to reduce the relative income of the poor. It thus adds to a growing body of literature that on balance — but not unanimously — tends to support the view that inflation is a cruel tax. We start by reviewing the literature, and then turn to the new evidence.

## **I. Literature Survey**

Most of the literature deals with the U.S., using annual data on poverty rates and inflation. Powers (1995) finds that inflation worsens a consumption-based poverty measure over 1959-92, but has no significant impact on the income-based poverty rate. Cutler and Katz (1991), in contrast, find that an increase in inflation reduces the poverty rate over 1959-89. Blank and Blinder (1986) found that inflation increased poverty rates, but also slightly increased the income shares of the bottom two quintiles (only the second quintile was significant). On balance, Blank and Blinder argue that “there is little or no evidence that inflation is the cruelest tax.”

Moving to other countries, Cardoso (1992) argues that the inflation tax does not affect those already below the poverty line in Latin America because of their negligible cash holdings. However, she finds that higher inflation is associated with lower real

wages in a panel of seven Latin American countries. An additional fragment of evidence comes from Rezende (1998, p. 568), who points out that the Gini coefficient in Brazil increased steadily with rising inflation in the 1980s and then declined with the successful inflation stabilization of 1994-1996. Datt and Ravallion (1996) found in a cross-time, cross-state study of India that observations with higher inflation rates also had higher poverty rates.

Romer and Romer (1998) argue that the effects of inflation on the incomes of the poor are likely to differ between cyclical and longer-term perspectives. In the short run, an increase in (unanticipated) inflation will be associated with a decline in unemployment, that may well relatively benefit the poor. Over the longer term, however, higher inflation cannot permanently reduce unemployment, and the effects of inflation on the poor could then be reversed. Even in a cyclical perspective, Romer and Romer find the effects of unemployment on the income distribution to be stronger in earlier decades than in the nineties. Using an international panel, they find that lower inflation tends to increase the income of the poor over the longer term — a result they attribute in part to the negative association between inflation and economic growth. Agenor (1998) also finds poverty rates to be positively related to inflation in cross-country data.

In our work using polling data, we will explore the impact on attitudes to inflation of factors other than relative income. The poor are less educated, and there may be an independent effect of inflation's impact on the uneducated. Our priors on the impact of education on attitudes to inflation are, like those on income, ambiguous. One consideration is that human capital may be a good hedge against inflation, so those with more human capital feel more protected (also stocks and bonds may be good hedges

against inflation and they are also held disproportionately by the more educated). The uneducated probably have a lower weight of human capital relative to cash in their portfolios, and so dislike inflation more. But the more educated may know more about the damage that inflation can do to the economy as a whole and so may be more likely to mention inflation as a top concern than the less educated.

Previous literature using polling data includes Fischer and Huizinga (1982), who analyzed the relative probabilities of mentioning inflation and unemployment as a (or the most) serious problem facing the nation, in the US over the period 1939-78. They found that inflation was consistently more frequently cited as a serious problem than unemployment except during recessions. Apropos the question in this paper, they found a positive association between income and the probability of mentioning inflation as a serious problem (“inflation aversion”), although the relationship was sometimes non-monotonic. Moreover, in regression analysis income was positively but insignificantly related to inflation aversion. Rose (1997) found no association between the standard of living and inflation aversion relative to unemployment aversion in a sample of polling data from ex-Communist countries.

Fischer and Huizinga (1982) also found little relationship between the level of education and inflation aversion. However, their education variable discriminated only between high school education and above.

We will control for the national averages of inflation aversion when testing the poor’s relative inflation aversion. On the cross-section relationship between inflation aversion and actual inflation, Fischer (1996) found a surprisingly weak correlation using the same survey data that we use in this paper. Likewise Rose (1997) found little

association among transition countries between actual inflation and inflation aversion — inflation aversion rose relative to unemployment as inflation was falling. The Czech Republic with its low inflation had higher inflation aversion than Ukraine and Belarus with their quadruple-digit inflation (although causality is important — the Czechs' inflation aversion could be the reason they have low inflation). However, Fischer and Huizinga (1982) did find that the cross-time variation in the US of mentioning inflation or unemployment as the most serious problem was associated with actual inflation and unemployment.

Shiller (1996) poses a question closely related to ours, “*Why Do People Dislike Inflation?*” He conducted a questionnaire survey of 677 people in the US, Germany, and Brazil. His answer was that people perceived inflation as reducing their standard of living. In the US sample, when asked what was their biggest concern about inflation, 77 percent of the sample chose the response “inflation hurts my real buying power.” Only 7 percent chose the traditional view of economists — “inflation causes a lot of inconveniences: I find it harder to comparison shop, I feel I have to avoid holding too much cash etc.” When pressed further, the majority in the samples in the US, Germany, and Brazil supported the view that their wages would not rise as fast as the price level during the process of inflation. If Shiller’s results indeed reflect most people’s view of inflation, than we might expect the poor and uneducated to dislike inflation more because they are probably less protected by asset income from changes in their real wages. We will find some support for the idea that inflation reduces the real wages of the poor in our empirical results.

## II. Results on inflation concerns and income

### *II.A The data*

Roper Starch Worldwide, a marketing, public opinion, and advertising research firm, coordinated the survey that we use to measure inflation concerns. International Research Associates (INRA) did the actual field work with its affiliates and partner companies. The survey was undertaken by Roper Starch during February to May 1995. Table 1 lists the 38 countries — 19 industrialized, and 19 developing and transition — covered in the survey.

Respondents to the survey from all countries were classified according to their standard of living (self-assessed) and level of education. The survey question on which we focus is:

“Here is a list of things people have told us they are concerned about today. Would you read over the list and then tell me which 2 or 3 you personally are most concerned about today.”

The economic concerns included in the list were “recession and unemployment, inflation and high prices, money enough to live right and pay bills, educational quality”. There were 14 other non-economic concerns, and respondents could also say “other, none of these, don’t know”. We define a dummy variable that takes the value 1 if people mention “inflation and high prices” among the top 2 or 3 concerns (the top 2 or 3 are not ranked among themselves), and 0 otherwise.

The wording of the inflation response is unfortunate in that it also includes “high prices.”<sup>1</sup> It is unclear how the respondent will interpret “high prices”— will it be high prices compared to the past or high prices compared to the respondent’s wage? If the latter, then the respondent may simply be complaining about low real wages. Fortunately, there is

another

Table 1: Percentage of responses that mentioned given problem as among the top 2 or 3 problems, by country

|                 | Inflation<br>& High<br>Prices | Crime | AIDS | Unemplnt | Drug<br>Abuse | Money<br>enough<br>to live | Govn't<br>Cor-<br>ruption | Edu-<br>cation<br>quality | Imm-<br>gration | Racial/<br>Ethnic<br>Relations | Environ-<br>mental<br>Pollution | Reli-<br>gious<br>Extre-<br>mism | For-<br>eign<br>Re-<br>lations | For-<br>eign<br>Aid | Terror-<br>ism | Other/<br>Don't<br>Know |
|-----------------|-------------------------------|-------|------|----------|---------------|----------------------------|---------------------------|---------------------------|-----------------|--------------------------------|---------------------------------|----------------------------------|--------------------------------|---------------------|----------------|-------------------------|
| Australia       | 4                             | 17    | 6    | 13       | 6             | 8                          | 8                         | 9                         | 6               | 4                              | 12                              | 2                                | 1                              | 3                   | 1              | 1                       |
| Austria         | 7                             | 16    | 10   | 9        | 8             | 6                          | 6                         | 2                         | 6               | 4                              | 11                              | 3                                | 1                              | 2                   | 7              | 2                       |
| Belgium         | 10                            | 13    | 9    | 18       | 10            | 5                          | 12                        | 2                         | 6               | 2                              | 5                               | 2                                | 1                              | 1                   | 2              | 1                       |
| Brazil          | 7                             | 17    | 14   | 10       | 9             | 8                          | 14                        | 10                        | 0               | 1                              | 4                               | 1                                | 1                              | 2                   | 2              | 0                       |
| Canada          | 10                            | 18    | 8    | 17       | 6             | 10                         | 6                         | 7                         | 4               | 3                              | 7                               | 1                                | 1                              | 1                   | 1              | 1                       |
| Chile           | 5                             | 10    | 17   | 8        | 19            | 9                          | 7                         | 13                        | 0               | 0                              | 7                               | 1                                | 1                              | 1                   | 2              | 0                       |
| China           | 25                            | 13    | 1    | 10       | 1             | 11                         | 15                        | 12                        | 1               | 0                              | 8                               | 0                                | 1                              | 1                   | 1              | 1                       |
| Colombia        | 9                             | 15    | 14   | 11       | 10            | 4                          | 10                        | 9                         | 1               | 0                              | 9                               | 1                                | 1                              | 0                   | 7              | 0                       |
| Czech Republic  | 14                            | 26    | 7    | 4        | 7             | 8                          | 11                        | 3                         | 1               | 2                              | 12                              | 2                                | 0                              | 0                   | 2              | 0                       |
| Denmark         | 3                             | 12    | 7    | 10       | 3             | 9                          | 3                         | 8                         | 8               | 6                              | 15                              | 2                                | 5                              | 5                   | 3              | 1                       |
| Finland         | 4                             | 21    | 3    | 24       | 5             | 16                         | 9                         | 1                         | 2               | 1                              | 8                               | 3                                | 0                              | 0                   | 1              | 3                       |
| France          | 4                             | 12    | 19   | 21       | 6             | 6                          | 6                         | 4                         | 4               | 3                              | 4                               | 5                                | 1                              | 2                   | 2              | 0                       |
| Germany         | 8                             | 21    | 6    | 16       | 7             | 6                          | 6                         | 3                         | 4               | 4                              | 12                              | 2                                | 0                              | 1                   | 3              | 0                       |
| Greece          | 9                             | 13    | 14   | 20       | 15            | 2                          | 6                         | 6                         | 0               | 0                              | 8                               | 1                                | 1                              | 1                   | 3              | 0                       |
| Hong Kong       | 11                            | 12    | 7    | 14       | 6             | 8                          | 3                         | 5                         | 3               | 1                              | 7                               | 2                                | 3                              | 4                   | 3              | 9                       |
| Hungary         | 19                            | 17    | 2    | 10       | 2             | 17                         | 9                         | 7                         | 2               | 1                              | 8                               | 1                                | 2                              | 1                   | 1              | 0                       |
| India           | 13                            | 14    | 7    | 14       | 7             | 7                          | 9                         | 9                         | 2               | 3                              | 6                               | 3                                | 1                              | 1                   | 5              | 0                       |
| Indonesia       | 12                            | 24    | 9    | 24       | 11            | 2                          | 5                         | 6                         | 0               | 1                              | 4                               | 1                                | 1                              | 1                   | 0              | 0                       |
| Ireland         | 4                             | 18    | 10   | 15       | 17            | 10                         | 6                         | 3                         | 3               | 1                              | 5                               | 1                                | 0                              | 3                   | 3              | 0                       |
| Italy           | 6                             | 10    | 12   | 22       | 2             | 7                          | 13                        | 3                         | 3               | 4                              | 11                              | 3                                | 1                              | 1                   | 1              | 0                       |
| Japan           | 6                             | 9     | 6    | 20       | 2             | 4                          | 21                        | 6                         | 0               | 1                              | 17                              | 1                                | 4                              | 1                   | 0              | 3                       |
| Mexico          | 17                            | 13    | 7    | 18       | 7             | 7                          | 15                        | 5                         | 1               | 1                              | 4                               | 1                                | 1                              | 1                   | 2              | 0                       |
| Netherlands     | 3                             | 23    | 6    | 12       | 7             | 7                          | 5                         | 5                         | 4               | 7                              | 7                               | 8                                | 0                              | 1                   | 3              | 2                       |
| Norway          | 2                             | 19    | 2    | 12       | 11            | 10                         | 4                         | 9                         | 4               | 4                              | 11                              | 3                                | 2                              | 3                   | 1              | 1                       |
| Philippines     | 12                            | 24    | 4    | 12       | 10            | 4                          | 10                        | 6                         | 0               | 0                              | 9                               | 1                                | 1                              | 0                   | 6              | 0                       |
| Poland          | 11                            | 22    | 6    | 12       | 7             | 11                         | 11                        | 2                         | 0               | 1                              | 10                              | 4                                | 1                              | 1                   | 3              | 0                       |
| Russia          | 22                            | 28    | 1    | 13       | 1             | 15                         | 8                         | 2                         | 1               | 3                              | 5                               | 0                                | 0                              | 0                   | 1              | 1                       |
| Singapore       | 23                            | 12    | 4    | 9        | 4             | 12                         | 2                         | 14                        | 1               | 3                              | 10                              | 1                                | 2                              | 1                   | 0              | 2                       |
| Spain           | 7                             | 6     | 12   | 18       | 13            | 9                          | 10                        | 4                         | 1               | 2                              | 6                               | 1                                | 0                              | 3                   | 9              | 0                       |
| Sweden          | 5                             | 20    | 5    | 15       | 11            | 3                          | 4                         | 3                         | 6               | 6                              | 13                              | 3                                | 1                              | 1                   | 2              | 1                       |
| Switzerland     | 6                             | 15    | 11   | 15       | 10            | 5                          | 5                         | 3                         | 4               | 6                              | 10                              | 5                                | 2                              | 1                   | 3              | 0                       |
| Taiwan          | 11                            | 13    | 4    | 8        | 11            | 4                          | 18                        | 12                        | 1               | 1                              | 13                              | 0                                | 1                              | 0                   | 1              | 2                       |
| Thailand        | 5                             | 23    | 20   | 12       | 10            | 1                          | 8                         | 7                         | 1               | 0                              | 10                              | 1                                | 0                              | 0                   | 1              | 0                       |
| Turkey          | 19                            | 8     | 5    | 12       | 4             | 5                          | 11                        | 7                         | 1               | 3                              | 8                               | 6                                | 1                              | 1                   | 10             | 0                       |
| Ukraine         | 22                            | 26    | 2    | 9        | 3             | 19                         | 10                        | 2                         | 0               | 2                              | 4                               | 0                                | 0                              | 0                   | 0              | 0                       |
| United Kingdom  | 5                             | 19    | 4    | 14       | 9             | 11                         | 6                         | 10                        | 3               | 2                              | 7                               | 2                                | 1                              | 2                   | 3              | 0                       |
| USA             | 7                             | 24    | 12   | 6        | 11            | 10                         | 6                         | 7                         | 3               | 4                              | 4                               | 2                                | 1                              | 1                   | 1              | 0                       |
| Venezuela       | 16                            | 16    | 10   | 11       | 11            | 5                          | 13                        | 12                        | 1               | 0                              | 2                               | 0                                | 1                              | 1                   | 2              | 0                       |
| Sam ple average | 10                            | 17    | 8    | 14       | 8             | 8                          | 9                         | 6                         | 2               | 2                              | 8                               | 2                                | 1                              | 1                   | 3              | 1                       |

“top concern” that directly addresses the standard of living, which is “money enough to live right and pay bills.” The correlation among all respondents between these two “top concerns” was only .0043, with a p-value of .437. Hence, we can be moderately reassured that the “inflation and high prices” question is really about inflation and not about real wages. Fischer and Huizinga (1982) found no difference in poll responses in the US to questions that mentioned just “inflation” and those that mentioned “inflation and high prices”.

The income question on the survey asked the respondents to classify themselves in one of seven categories: “rich, very comfortable, comfortable, average, just getting by, poor, and very poor.” Thus participants are self-classifying on this question, and we should therefore interpret the answers as relating to the relative income of the participant in his or her own country. We define dummy variables for each category that take the value 1 if the respondents self-classify in that category and zero otherwise. Similarly the education question asked the respondents to put themselves in one of the following three categories: “primary or less, secondary/technical, higher”. We again code three dummy variables for each category. We will also include country dummies in our regressions, and will later review them as indicators of the underlying sensitivity to inflation in each country.

Table 1 shows summary statistics on the poll responses in each country. The percentages for each problem  $x$  are the number of total responses that mentioned  $x$  as among the top 2 or 3 national problems, where each respondent has 2 to 3 responses. The average across nations is for 10 percent of the responses to be “inflation”. Only crime and recession/unemployment account for more responses on average.

## II.B Income and education results

We do a probit equation, with the dependent variable equal to one if inflation is mentioned as among the top two or three national concerns. The independent variables are the income category dummies and the education category dummies. The results are shown in Table 2. The category “rich” is omitted from the specification, so the coefficients on the income variables measure the difference between the coefficient on that income category and “rich.” Likewise, the category “higher education” is omitted, so the coefficients on the education variables measure the difference between that category and “higher education.”

| <b>Table 2: Estimated probit equation for mentioning “inflation and high prices” as a top national concern</b> |                    |                |             |         |
|--|--------------------|----------------|-------------|---------|
| Observations: 31869  |                    |                |             |         |
|  | Parameter Estimate | Standard Error | t-statistic | P-value |
| Constant   | -1.09              | 0.14           | -7.95       | [.000]  |
| <i>Standard of living of individual ("Rich" is omitted category):</i>  |                    |                |             |         |
| Very Comfortable   | 0.03               | 0.14           | 0.25        | [.801]  |
| Comfortable  | 0.15               | 0.13           | 1.17        | [.240]  |
| Average  | 0.25               | 0.13           | 1.91        | [.057]  |
| Just Getting By  | 0.28               | 0.13           | 2.11        | [.035]  |
| Poor   | 0.31               | 0.14           | 2.30        | [.022]  |
| Very Poor  | 0.36               | 0.15           | 2.39        | [.017]  |
| <i>Educational attainment ("Higher education" is omitted category)</i>   |                    |                |             |         |
| Primary School   | 0.13               | 0.02           | 5.22        | [.000]  |
| Secondary School   | 0.06               | 0.02           | 2.79        | [.005]  |

*Note: country intercept dummies are included but not shown.*

Table 2 shows the results. (Individual country effects are not shown at this point; they will be discussed below.) The likelihood of mentioning inflation as a top concern is decreasing in the standard of living of the respondent. The coefficient increases

monotonically as respondents range from “very comfortable” to “very poor.” The coefficients on “just getting by,” “poor” and “very poor” are all statistically significant, meaning that the difference between those categories and “rich” is statistically significant. The significance is not overwhelming given the large sample, but it does pass the common statistical threshold. The very poor have a 10.5 percent higher probability of mentioning inflation as a top concern than do the rich. The poor are thus relatively more concerned than the rich about inflation.

The pattern for the education variable is similar: the less educated dislike inflation more than the more educated. The difference between those who have a primary education or less and those with higher education is highly significant statistically, though not absolutely large. The coefficient implies that those with only a primary education have a 3.8 percent higher probability of mentioning inflation as a top concern than do those with higher education.<sup>2</sup> Those with a secondary education are also significantly more likely to mention inflation as a top concern than those with higher education. Recalling the possibly offsetting effects of human capital as a hedge against inflation and the greater knowledge of inflation’s damage with higher education, as factors affecting the response, our results suggest that the first effect dominates the second.

### *II.C Robustness checks*

Our first robustness check is to split the sample between developing and developed countries. Table 3a shows that the results are still very strong in the industrial country sample, but Table 3b shows much weaker results in the developing country sample. The magnitudes of the coefficients are uniformly lower in the developing country

sample than in the industrial country sample. In the industrial country sample, the very poor have a 14 percent higher probability of mentioning inflation as a top concern than the rich. In the developing country sample, the very poor have a 9 percent higher probability than the rich.

| Table 3a: <b>Results for industrial economies</b> (16352 observations) |                       |                   |             |         |
|--|-----------------------|-------------------|-------------|---------|
| (country effects included but not shown)                               |                       |                   |             |         |
|  | Parameter<br>Estimate | Standard<br>Error | t-statistic | P-value |
| Constant   | -1.25                 | 0.23              | -5.56       | [.000]  |
| <i>Standard of living ("Rich" is omitted category):</i>                |                       |                   |             |         |
| Very Comfortable   | 0.16                  | 0.23              | 0.69        | [.391]  |
| Comfortable  | 0.26                  | 0.22              | 1.15        | [.184]  |
| Average  | 0.33                  | 0.22              | 1.51        | [.022]  |
| Just Getting By  | 0.31                  | 0.22              | 1.40        | [.039]  |
| Poor   | 0.49                  | 0.23              | 2.13        | [.004]  |
| Very Poor  | 0.59                  | 0.26              | 2.29        | [.004]  |
| <i>Educational level ("Higher education" is omitted category)</i>      |                       |                   |             |         |
| Primary School   | 0.29                  | 0.04              | 7.97        | [.000]  |
| Secondary School   | 0.18                  | 0.03              | 5.74        | [.000]  |

| <b>Table 3b: Developing Countries</b> (15517 observations)<br>(country effects included but not shown) |                       |                   |             |         |
|--|-----------------------|-------------------|-------------|---------|
|  | Parameter<br>Estimate | Standard<br>Error | t-statistic | P-value |
| Constant   | -1.20                 | 0.17              | -7.01       | [.000]  |
| <i>Standard of living ("Rich" is omitted category):</i>  |                       |                   |             |         |
| Very Comfortable   | -0.04                 | 0.17              | -0.23       | [.822]  |
| Comfortable  | 0.10                  | 0.16              | 0.61        | [.539]  |
| Average  | 0.21                  | 0.16              | 1.28        | [.202]  |
| Just Getting By  | 0.27                  | 0.16              | 1.65        | [.099]  |
| Poor   | 0.25                  | 0.17              | 1.50        | [.134]  |
| Very Poor  | 0.27                  | 0.18              | 1.44        | [.150]  |
| <i>Educational level ("Higher education" is omitted category)</i>                                      |                       |                   |             |         |
| Primary School   | 0.00                  | 0.03              | 0.01        | [.993]  |
| Secondary School   | -0.03                 | 0.03              | -1.20       | [.230]  |

The weakness of the developing country results may have to do with collinearity in discriminating among the finely defined income categories. When we aggregate the bottom two categories as “lower class”, the middle three categories as “middle class”, and the top two categories as “upper class”, we get statistically significant differences in the developing country sample between “lower class” and “upper class”, and between “middle class” and “upper class” (Table 4). These differences are also significant in the

industrial sample. The coefficient on “lower class” continues to be higher in the industrial sample than in the developing country sample.

| <b>Table 4: Results with aggregated income classes</b>            |           |          |             |         |
|---|-----------|----------|-------------|---------|
|   | Parameter | Standard |             |         |
|   | Estimate  | Error    | t-statistic | P-value |
| <b>Industrial countries</b>                                       |           |          |             |         |
| Constant  | -1.11     | 0.08     | -14.65      | [.000]  |
| <i>Income Class ("Upper Class" is omitted category)</i>           |           |          |             |         |
| Middle Class  | 0.15      | 0.06     | 2.52        | [.012]  |
| Lower Class   | 0.36      | 0.09     | 4.07        | [.000]  |
| <i>Educational level ("Higher education" is omitted category)</i> |           |          |             |         |
| Primary Education   | 0.30      | 0.04     | 8.36        | [.000]  |
| Secondary Education   | 0.19      | 0.03     | 5.99        | [.000]  |
|   | Parameter | Standard |             |         |
|   | Estimate  | Error    | t-statistic | P-value |
| <b>Developing countries</b>                                       |           |          |             |         |
| Constant  | -1.24     | 0.08     | -16.28      | [.000]  |
| <i>Income Class ("Upper Class" is omitted category)</i>           |           |          |             |         |
| Middle Class  | 0.26      | 0.07     | 3.69        | [.000]  |
| Lower Class   | 0.23      | 0.06     | 3.91        | [.000]  |
| <i>Educational level ("Higher education" is omitted category)</i> |           |          |             |         |
| Primary Education   | 0.03      | 0.03     | 0.83        | [.406]  |
| Secondary Education   | -0.02     | 0.03     | -0.62       | [.537]  |

The education variables are not robust across the two samples. They are still highly significant in the industrial country sample, but are always insignificant in the developing country sample.

Our second robustness check is to also include age and occupational groups. The seven age groups are 14-20 (the omitted category), 21-29, 30-39, 40-49, 50-59, 60-69, and 70 and over. The occupational categories are student (the omitted category),

professional/executive, white collar, blue collar, unemployed, homemaker, and retired.

Table 5 shows the results.

| <b>Table 5: Robustness to Age and Occupation</b>                       |                           |                       |                    |                |
|--|---------------------------|-----------------------|--------------------|----------------|
| Observations: 31443  |                           |                       |                    |                |
| Country dummies are included but not shown                             |                           |                       |                    |                |
|  | <i>Parameter Estimate</i> | <i>Standard Error</i> | <i>t-statistic</i> | <i>P-value</i> |
| Constant   | -1.34                     | 0.14                  | -9.43              | [.000]         |
| <i>Standard of living ("Rich" is omitted category):</i>                |                           |                       |                    |                |
| Very Comfortable   | 0.04                      | 0.14                  | 0.31               | [.755]         |
| Comfortable  | 0.15                      | 0.13                  | 1.12               | [.264]         |
| Average  | 0.23                      | 0.13                  | 1.77               | [.076]         |
| Just Getting By  | 0.25                      | 0.13                  | 1.90               | [.057]         |
| Poor   | 0.28                      | 0.14                  | 2.04               | [.041]         |
| Very Poor  | 0.32                      | 0.15                  | 2.13               | [.033]         |
| <i>Educational attainment ("Higher education" is omitted category)</i> |                           |                       |                    |                |
| Primary School   | 0.10                      | 0.03                  | 3.69               | [.000]         |
| Secondary School   | 0.06                      | 0.02                  | 3.01               | [.003]         |
| <i>Age Groups (14-20 age group is omitted category)</i>                |                           |                       |                    |                |
| People in their 20s  | 0.17                      | 0.03                  | 4.84               | [.000]         |
| People in their 30s  | 0.21                      | 0.04                  | 5.66               | [.000]         |
| People in their 40s  | 0.17                      | 0.04                  | 4.34               | [.000]         |
| People in their 50s  | 0.20                      | 0.04                  | 4.87               | [.000]         |
| People in their 60s  | 0.28                      | 0.05                  | 6.03               | [.000]         |
| People in their 70s+   | 0.26                      | 0.06                  | 4.60               | [.000]         |
| <i>Occupational Groups ("Student" is omitted category)</i>             |                           |                       |                    |                |
| Professional/Executive   | 0.06                      | 0.04                  | 1.50               | [.133]         |
| White Collar   | 0.06                      | 0.04                  | 1.48               | [.140]         |
| Blue Collar  | 0.09                      | 0.04                  | 2.37               | [.018]         |
| Unemployed   | 0.05                      | 0.05                  | 1.04               | [.300]         |
| Homemaker  | 0.06                      | 0.04                  | 1.55               | [.121]         |
| Retired  | 0.06                      | 0.05                  | 1.15               | [.250]         |

The results on poverty and education are robust to the inclusion of age group dummies and occupational group dummies. The poor and very poor are still significantly more likely than the richer to mention inflation as a top concern. Primary-educated and

secondary-educated respondents are still more likely to cite inflation as a concern than those with higher education.

All of the age groups are more likely to be concerned about inflation than teenagers. The age group most concerned with inflation is people in their sixties, followed closely by people in their seventies and above (the difference between the sixties and seventies is not statistically significant). This group is at the stage in the life cycle of consuming by running down their assets, and so may dislike the uncertainty introduced by inflation.

The occupational group most concerned with inflation is blue-collar workers. This reinforces the finding that those who are more averse to inflation are relatively disadvantaged on several different dimensions — the poor, the uneducated, and the unskilled (blue collar) workers.

We also tried a gender dummy. Males were slightly more likely to mention inflation as a problem than females, but the difference was not statistically significant.

#### *II.D Other concerns*

We also examined what other economic concerns the poor had, to see how their concern with inflation compares to other problems. Table 6 shows which concerns are disproportionately and significantly more likely to be mentioned by the poor. The result on unemployment and recession is very surprising – the poor are more likely to mention it as a problem than the rich, but the difference is not significant.

Other concerns follow a more predictable pattern. The poor are much more likely than the rich to mention “money enough to live right” as a concern, not surprisingly. The

less educated are predictably much less likely to mention quality of education as a concern than the more educated.

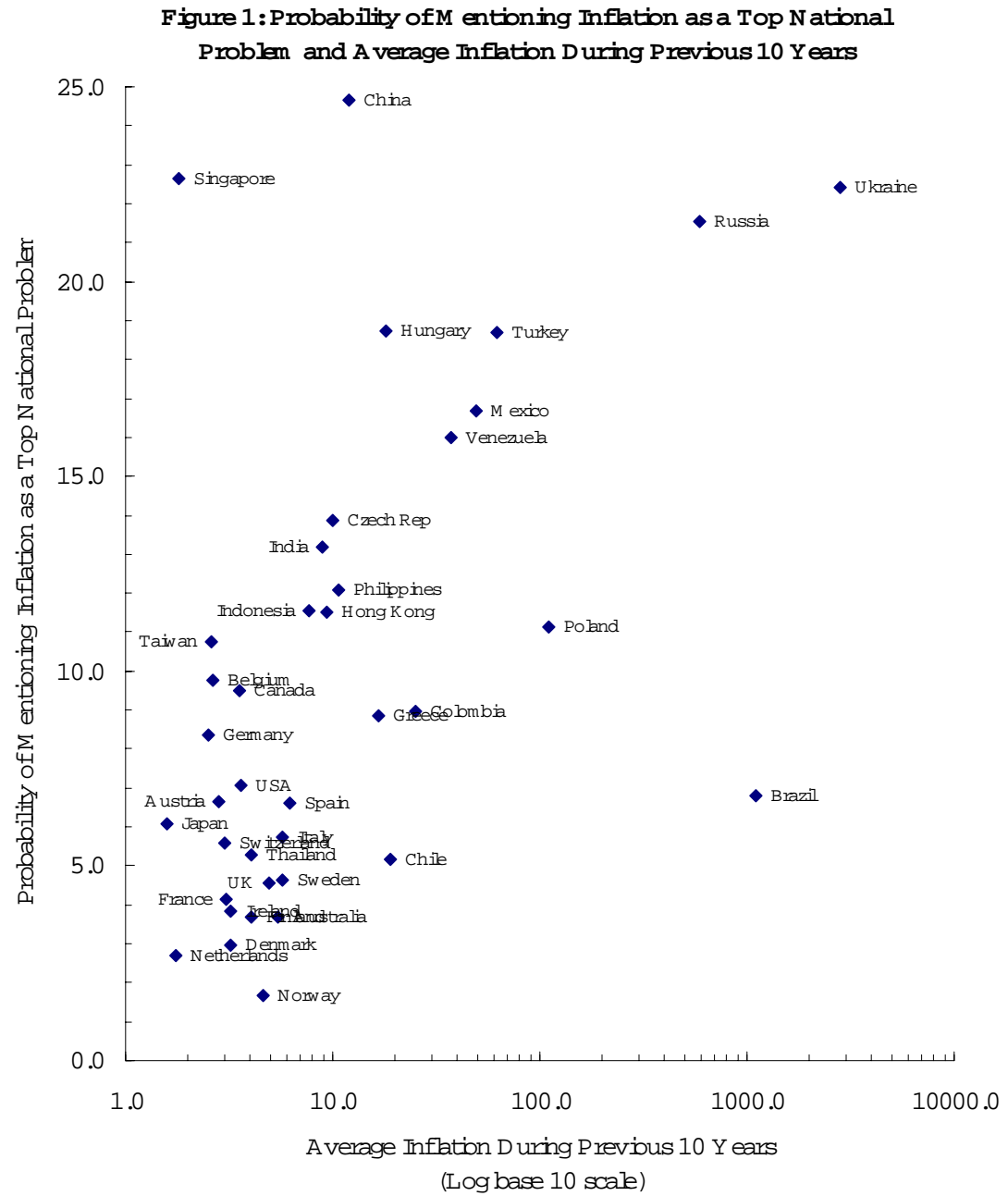
On a question where our priors were not so clear, we found that the poor were less likely than the rich to mention crime as a concern. The difference was not very significant, however. Confusing the picture on crime further, the primary-educated were more likely to mention crime than the college-educated.<sup>3</sup>

| <b>Table 6: What other concerns do the poor have?</b>                  |   |                            |                                       |                     |       |
|--|---|----------------------------|---------------------------------------|---------------------|-------|
|  | <i>t</i> -statistic on income or educational level in probit regression for mentioning concern shown: |                            |                                       |                     |       |
|  | Inflation and high prices   | Recession and unemployment | Money enough to live right, pay bills | Educational quality | Crime |
| <i>Standard of living of individual ("Rich" is omitted category):</i>  |   |                            |                                       |                     |       |
| Very Comfortable   | 0.25  | -0.52                      | 0.05                                  | 0.86                | -0.29 |
| Comfortable  | 1.17  | 0.26                       | 1.43                                  | 0.50                | -0.55 |
| Average  | 1.91  | 1.03                       | 2.88                                  | -0.41               | -0.35 |
| Just Getting By  | 2.11  | 1.34                       | 4.89                                  | -0.47               | -1.43 |
| Poor   | 2.30  | 1.51                       | 5.27                                  | -0.94               | -2.07 |
| Very Poor  | 2.39  | 1.04                       | 5.81                                  | 0.54                | -1.14 |
| <i>Educational attainment ("Higher education" is omitted category)</i> |   |                            |                                       |                     |       |
| Primary School   | 5.22  | -0.43                      | 6.01                                  | -17.66              | 4.42  |
| Secondary School   | 2.79  | -0.05                      | 4.04                                  | -11.85              | 0.97  |

We also tried the gender dummy in the regressions for the other economic concerns. The only significant results were that females were more likely than males to mention “money enough to live right” and “education quality” as concerns.

### *II.E Country effects*

Although not directly relevant to our main question, the pattern of country effects is interesting (as was previously noted in Fischer (1996)). Figure 1 graphs the countries’ propensity to mention inflation as a top national problem (from Table 1) against the



actual inflation rate in the decade preceding the survey (1985-94). (We would get a very similar picture using the country dummies from the regression in Table 2 for inflation preferences.) Although there is a significant positive relationship between the log of average inflation 1985-94 and the country propensities to mention inflation as a top problem, there are some striking outliers. The country in which respondents were, *ceteris paribus*, most concerned about inflation is not Ukraine, Russia, or Brazil — in all of which the inflation rate shortly before the poll had been around 1000 percent or higher — but is China with its modest inflation rate of 12 percent. An even more striking outlier is Singapore, where the likelihood of mentioning inflation as a top problem is similar to those of Russia and Ukraine, even though inflation was only 2 percent, which tied with Japan and the Netherlands for lowest inflation in the entire sample! Since Singapore's population is largely of Chinese descent, we speculate that there is a Chinese dummy variable. This Chinese variable may have something to do with the memory of the hyperinflation in China after World War II. (The Taiwan and Hong Kong dummies are also at least weakly consistent with the Chinese dummy hypothesis.) It is interesting that another country that had a post WWII (and post WWI) hyperinflation — Hungary — also displays a high tendency to mention inflation as a top problem relative to a modest recent inflation. Perhaps surprisingly, the observation for Germany is not far out of line with the average.

Outliers in the other direction are Brazil and Chile. Brazilians are a little less likely to mention inflation as a top problem than Americans, despite having had around 1000 percent inflation in Brazil over the previous decade. It could be argued that since the survey was conducted in early 1995, Brazilians may have already incorporated

favorable expectations about the success of the stabilization plan (the *Plan Real*) introduced in mid-1994. Brazilians may also have been relatively well-protected from inflation by indexation — but the election results in Brazil following the success of the *Plan Real* led us to expect high Brazilian inflation aversion. Chile is a similar outlier, with low concern about inflation despite a history of high inflation — this could suggest that the Chilean inflation stabilization had great credibility by 1995, and could also reflect the extensive capital market inflation indexation in Chile.

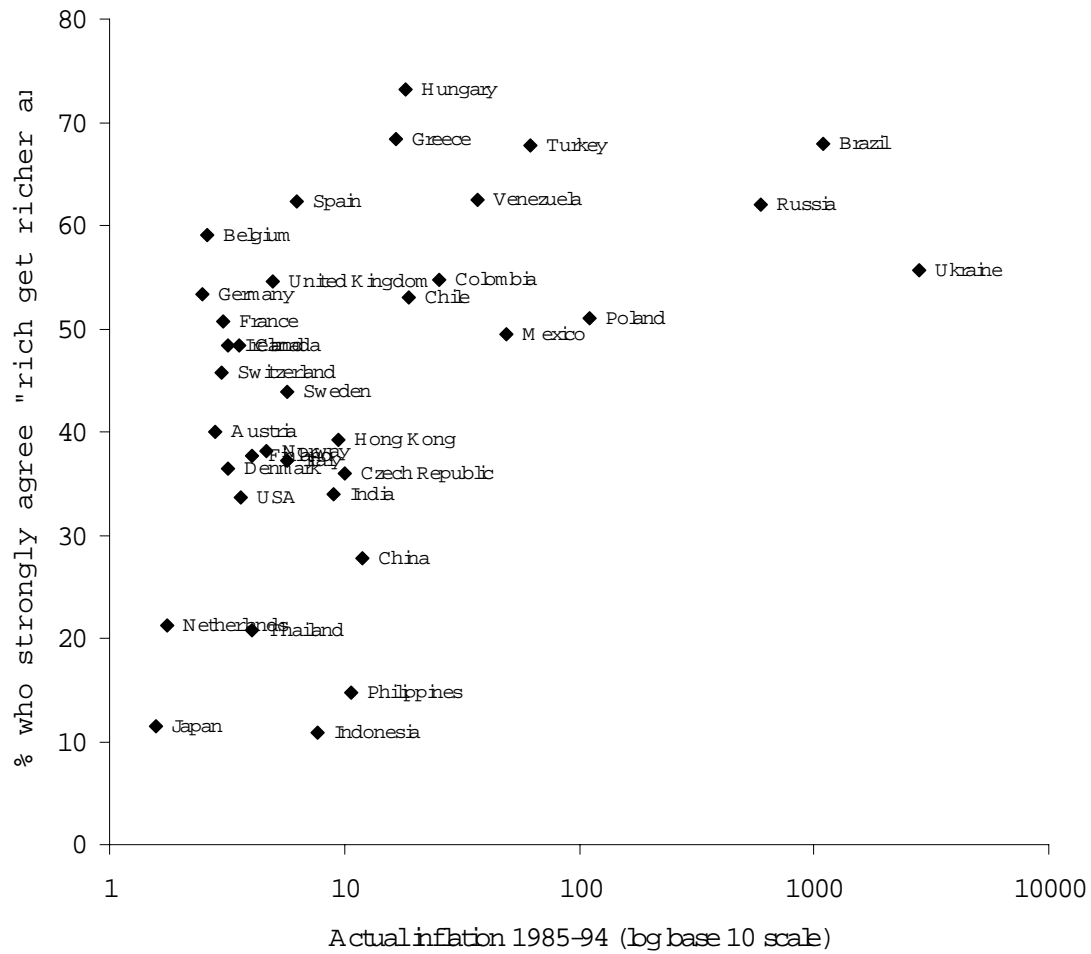
More germane to our main question, we also relate actual country inflation to another poverty-related question asked on the Roper-Starch survey. This question asked

Do you strongly agree, mostly agree, mostly disagree, or strongly disagree with the following statement: “In our society, the rich get richer and the poor get poorer”?

In figure 2, we graph the percentage of respondents in each country who answer this question “strongly agree” against the actual rate of inflation 1985-94. We see a positive association (which is highly statistically significant). Thus, not only do the poor within each society complain more about inflation, but the whole society has a perception of a growing gap between rich and poor in high inflation societies.<sup>4</sup>

The evidence from the poll data provides very strong support for the view that the poor express relatively more dislike of inflation than the rich, and that the less educated are more inflation averse than the more educated. This provides some support for the view that inflation hurts the poor relatively more than the rich. Another interpretation would be that, whatever the facts about the damage inflation does and to whom, the poor believe it to be more damaging than do the rich. This would suggest that populist

Figure 2: A association between perception that "rich get richer and poor get poorer" and actual inflation



politicians are likely to pursue more anti-inflationary policies than those seeking to appeal to the middle- and upper classes, which is not in accord with our *ex ante* beliefs. Perhaps populists depend on a core group of poor supporters who receive benefits financed by inflation, even though the poor as a whole may dislike inflation.

### **III. Results using direct measures of inequality, poverty, and real wages**

In this section we turn to more direct evidence on the effects of inflation on the distribution of income. We use a number of different measures of the relative well being of the poor: the share of the bottom quintile in income, the poverty rate, and the real minimum wage. All of these three indicators are correlated with inflation.

#### *III.A Results on the bottom quintile in income*

We look at changes from one decade average to the next in the share of the bottom quintile of income, using the data of Deininger and Squire (1996) for the 70s, 80s, and 90s. We regress the change in the share of the bottom quintile on decade average CPI inflation and real GDP per capita growth (both from the World Bank database). We use the inflation tax rate transformation  $[\pi/(1+\pi)]$  of the percent inflation rate  $\pi$ . This transformation reduces the extent to which extreme values of inflation will dominate the results; it is also the tax rate on money balances in discrete time, or the annual rate of loss in the value of money caused by inflation over the period being considered. However, the results shown here are robust to simply using the decade average percent inflation, or the log change in the CPI. Growth turns out not to be a statistically significant determinant of changes in the distribution of income, as other authors have found (e.g. Ravallion and Chen 1997), so we show only the results with the inflation tax:

| Dependent Variable: DINCQ1 (change in the share of the bottom quintile of the income distribution) |             |                    |             |          |
|--|-------------|--------------------|-------------|----------|
| Method: Least Squares  |             |                    |             |          |
| Included observations: 110   |             |                    |             |          |
| White Heteroskedasticity-Consistent Standard Errors & Covariance                                   |             |                    |             |          |
| Variable   | Coefficient | Std. Error         | t-Statistic | Prob.    |
| C  | 0.004195    | 0.001545           | 2.714256    | 0.0077   |
| INFLATIONTAX   | -0.017412   | 0.005195           | -3.351531   | 0.0011   |
| R-squared  | 0.028909    | Mean dependent var |             | 0.002084 |
| Adjusted R-squared   | 0.019918    | S.D. dependent var |             | 0.013564 |

The R-squared is very modest, so we are not explaining much of the variation in changes in bottom quintile shares. However, the coefficient on the inflation tax rate is highly significant. We also try controlling for growth but it is not significant and does not change the significance of the inflation tax. A movement from zero inflation to hyperinflation would decrease the share of the bottom quintile by 1.7 percentage points (from the coefficient on the inflation tax). This is economically significant since the sample average share of the poor in income is just 6.2 percent.

Given the transformation of the inflation rate, the effect of changes in inflation is nonlinear: a change in the inflation rate from zero to, say, 40 percent, would reduce the share of the bottom quintile by 0.5 percent, which again is large relative to the typically small share of the bottom quintile in the income distribution. With a positive constant, implying that *ceteris paribus* the share of the bottom income quintile in this sample would have increased over time, we have the share of the bottom quintile increasing if the inflation tax is less than .24 (corresponding to an inflation rate of 31 percent) and decreasing otherwise.

There may be an argument for using the *change* in the inflation tax rate on the right hand side of this equation instead of the level. We do not have clear priors on this: the level of the inflation tax is what is important if some nominal incomes of the poor are fixed. On the other hand, only “surprise” inflation may effectively tax the poor, so we would then want the change in inflation (as opposed to surprises in the price level, in which our original specification is appropriate). When we rerun the equation above with the change in the inflation tax, it is not statistically significant. Alternatively, we can run the equation in levels: the share of the bottom quintile regressed on the inflation rate (and the growth rate). The inflation tax rate is then a significant determinant of the share of the bottom quintile; an increase of the inflation tax from zero to hyperinflation would then lower the share of the bottom quintile by 1.7 percentage points.

After getting this result in an earlier version of this paper, we became aware of related results by Romer and Romer (1998). They show that the log of average income of the poorest fifth of the population is negatively related to log inflation across countries, and the Gini coefficient is positively related to log inflation.

### *III.B Inflation and the poverty rate*

We use data on poverty rates that span more than one point in time for 42 developing and transition countries over 1981-93, from household data collected by Ravallion and Chen (1997). For each country, they construct a country-specific poverty line linked to mean income: it is 50 percent of the initial mean income for the household survey for that country, starting with the initial year of the years included in the sample for that country. Ravallion and Chen present 64 episodes of changes in poverty rates using this country-specific poverty line. The median length of an episode is three years.

We regress the percentage change per year in the proportion below the poverty line (50 percent of initial mean income) on real GDP, per capita growth, and the inflation tax rate, over the period spanned by the change in poverty rate.

| Dependent Variable: POVERTYCH (change in percent of households below the country-specific constructed poverty-line) |             |                    |             |          |
|---|-------------|--------------------|-------------|----------|
| Method: Least Squares   |             |                    |             |          |
| Included observations: 64   |             |                    |             |          |
| White Heteroskedasticity-Consistent Standard Errors & Covariance  |             |                    |             |          |
| Variable  | Coefficient | Std. Error         | t-Statistic | Prob.    |
| C   | 7.171827    | 9.541762           | 0.751625    | 0.4552   |
| GROWTH  | -5.328780   | 1.439615           | -3.701533   | 0.0005   |
| INFTAX  | 62.54719    | 30.81613           | 2.029690    | 0.0468   |
| R-squared   | 0.496244    | Mean dependent var |             | 35.79547 |
| Adjusted R-squared  | 0.479727    | S.D. dependent var |             | 69.48502 |

The inflation tax rate has a significant positive effect on the increase in poverty. The growth rate has a negative effect on the change in poverty, as Ravallion and Chen also found. The result on the inflation tax rate is not robust to using the percent inflation rate or the log inflation rate (they have the same sign, and log inflation is significant at the 10 percent level), but the inflation tax rate does have appeal as the most appropriate functional form.<sup>5</sup>

Once again, we are uncertain about whether the level of the inflation tax rate or its change is more appropriate, for the same reasons mentioned before. In any case, the change in the inflation tax rate is insignificant in the poverty change regression, although it becomes significant of the same sign as in levels when an extreme outlier (Poland 1989-93) is omitted.<sup>6</sup>

### *III.C Inflation and the real minimum wage*

The real minimum wage is not as clear an indicator of the well-being of the poor as the two previous measures. A decrease in the real minimum wage could benefit the poor by facilitating their entry into formal sector employment, and too high a minimum wage could make the poor worse off by increasing formal sector unemployment.

Nonetheless, assuming the minimum wage regulations are observed, the real minimum wage *is* a welfare indicator for the group of workers that are at the bottom of the formal sector wage distribution.

How might inflation affect the real minimum wage? The government usually sets the nominal minimum wage. If there is downward nominal rigidity, the government will find it easier to lower the real minimum wage during times of high inflation. There is also the arithmetic relationship pointed out by Bacha and Lopes (1983), among others, that given an initial real minimum wage, the average real minimum wage is lower the higher is inflation for a given indexation lag (e.g. one month) from prices to wages.

We use minimum wage data collected by Rama and Artecona (1999), using a pooled sample of annual data for all years in which it is available for all countries. We use the same CPI series as before. We regress the log change in the real minimum wage on the inflation tax and on real growth per capita. High growth per capita implies rising labor productivity and so would be expected to translate into higher average real wages; if the real minimum wage is sensitive to the average real wage, we would expect it to increase also. The results are as follows:

Dependent Variable: Log percent change in real wage

Method: Least Squares

Included observations: 331

White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable           | Coefficient | Std. Error         | t-Statistic | Prob.     |
|--------------------|-------------|--------------------|-------------|-----------|
| C                  | 0.041116    | 0.016368           | 2.511911    | 0.0125    |
| Inflation Tax Rate | -0.004066   | 0.001900           | -2.140478   | 0.0331    |
| GROWTH             | 0.004589    | 0.001547           | 2.966504    | 0.0032    |
| R-squared          | 0.127369    | Mean dependent var |             | -0.000940 |
| Adjusted R-squared | 0.122048    | S.D. dependent var |             | 0.198479  |

A high inflation tax rate is significantly associated with a negative percent change in the real wage. The real minimum wage change is positively associated with growth, as expected, with 1 percentage point more growth increasing real minimum wages by 0.4 percent. The explanatory power of the regression is again modest. The implied effect of inflation on the minimum real wage is fairly strong: an increase in the inflation tax rate from zero to, say, 20 percent would reduce the real wage by 8 percentage points. This strong result depends in part on a large outlier – Nicaragua in 1987 when inflation was near 1000 percent but the nominal minimum wage only increased by 22 percent. When this outlier is omitted, the relationship between the real minimum wage change and the inflation tax is still significant, although the magnitude of the coefficient is cut in half.

We also ran the change in real minimum wage equation on the change in the inflation tax and the growth rate. The change in the inflation tax is highly significant. Thus, both the level of the inflation rate (as would be predicted by Bacha and Lopes

1983)) and its change (as would be predicted by models in which only surprise inflation matters) are significantly associated with the real minimum wage.

#### **IV. Conclusions.**

This paper presents evidence that supports the view that inflation makes the poor worse off. The primary evidence comes from the answers to an international poll of 31,869 respondents in 38 countries. These show that the disadvantaged on a number of dimensions — the poor, the uneducated, the unskilled (blue collar) worker— are relatively more likely to mention inflation as a top concern than the advantaged on these dimensions. Each dimension is significant when controlling for the others, suggesting that the different components of being disadvantaged have independent effects on attitudes to inflation.

We also examine the impact of changes in inflation on direct measures of poverty and relate them to inflation. We found that high inflation tended to lower the share of the bottom quintile and the real minimum wage, while tending to increase poverty. Similar results on the direct effects of inflation on the per capita incomes of the poor have been found recently by Romer and Romer (1998) and Agenor (1998). This paper presents evidence from surveying the poor themselves that they suffer more from inflation than the rich.

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Endnotes

<sup>1</sup> It is not uncommon in such polls for “inflation and high prices” to be classed together as one issue.

<sup>2</sup> The coefficient estimates are not the same as the marginal probabilities, which vary with the RHS variables. The marginal probabilities reported here are at the sample means.

<sup>3</sup> Muddling the crime story further, there was only a weak statistical association between the country dummies in the crime regression and the prevalence of actual crimes.

<sup>4</sup> This result seems to depend on the transition and developing countries, as can be seen from inspection of figure 2.

<sup>5</sup> This seems to imply that some of the extreme inflation observations don't fit the regression line very well. This conjecture is confirmed: Brazil and Peru are notable outliers to the regression using log inflation as the RHS variable. If Brazil and Peru are omitted, then there is a significant effect of log inflation on the change in poverty.

<sup>6</sup> This outlier seems anomalous because it shows a large increase in poverty, while two other observations on Poland covering sub-periods of this period do not show dramatic change in poverty.