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Empirical evidence.**

Mazhar, Ummad and Jafri, Juvaria

Beaconhouse National University, Lahore, Pakistan, SZABIST,
Karachi, Pakistan

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**Does an informal sector reduce the economic dividends of political stability?
Empirical evidence.**

Corresponding Author:

Ummad Mazhar

Department of Economics
Seeta Majeed School of Liberal Arts and Social
Sciences,
Beaconhouse National University, Lahore,
Pakistan.

and

Université libre de Bruxelles (ULB)
Solvay Brussels School of Economics and
Management
Centre Emile Bernheim, Belgium
ummad.mazhar@bnu.edu.pk

Juvaria Jafri

Shaheed Zulfikar Ali Bhutto Institute of
Science and Technology, Karachi, Pakistan

juvaria.jafri@alumni.utoronto.ca

Abstract. Political stability is generally hailed as an asset that yields positive economic dividends. In particular, the macroeconomic environment is likely to benefit from political stability. On the other hand, the existence of a sizeable shadow (or informal) economy represents institutional weaknesses and may undermine the macroeconomic environment. The latter effect is more likely if the shadow economy reduces the government's tax revenues and disturbs the balance of demand and supply for formal businesses. This paper tests these contradictory tendencies. Circumventing the issues related to reverse causality and endogeneity of the informal sector, we define a qualitative variable for the size of the informal sector. The qualitative variable assumes a value of 1 for all the countries having an informal sector exceeding 25 percent of GDP on average over our sample period. Using a large data set of 162 countries over the 1999 to 2007 period we find that an informal sector can undermine the positive effect of political stability. The results are robust against alternative specifications and satisfy the usual assumptions of valid empirical analysis.

JEL Classification: O17, E52, H26, H27

Keywords: Political stability; Informal sector or shadow economy; Inflation; Openness; tax revenue.

Introduction

Despite numerous studies on the topic, the issue of inflation, particularly in developing countries, continues to hold the attention of economists as well as non-economists. Inflation, particularly in developing countries, has a strong political economy aspect which may be studied in the context of various determinants. This study takes the view that one key variable which has not yet been sufficiently analyzed is the shadow economy.

The shadow economy refers to those economic activities that would generally be taxable if they were to be reported to the authorities responsible for taxation and regulation. In the context of developing countries, this variable is especially important because it tends to be a feature of economies that are prone to high and often volatile inflation. This study contends that the above relationship is rooted in a political context.

The shadow economy influences monetary policy outcomes because it is associated with a larger demand for currency, and fiscal policy outcomes because it impacts the size of the tax net. Shadow economies are also relevant to both monetary and fiscal policy considerations because of the tendency of governments to use the inflation tax. The underlying basis for this tendency will be studied here, given the proposition that the shadow economy is related to the political basis for inflationary policies.

To examine whether this is so, we empirically test the relationship between inflation, the shadow economy, and political stability. This is done through a series of regressions using a large panel data set, of 162 countries, containing qualitative as well as quantitative variables.

This study posits that an analysis that includes a third variable, the shadow economy, can add an important dimension to the relationship between political stability and inflation. From this the following hypotheses may be derived; that political stability reduces inflation; and, that it does so to a lesser extent in the presence of a large shadow sector. The use of a carefully selected set of additional regressors confirms that the estimates are robust to controlling for other macroeconomic and institutional indicators associated with inflation.

These findings are consistent with recent, as well as older literature on the political economy of inflation. This is so because two very prevalent discussions related to inflation pertain to time inconsistency and seigniorage respectively. Political stability

is of course related to issue of credibility arising from the rational expectation that policies will be time inconsistent. Alesina and Stella (2011) provide an overview of the literature. Similarly, seigniorage and political stability are related because less stable governments are more likely to pursue inflationary policies, especially those arising from fiscal profligacy and corruption.

More details on both of these discussions are highlighted in the literature review, which is the next section. Following that we will present the salient features of our research design, data, and methodology. Subsequent sections contain our empirical results, and conclusions.

Literature Review

There are numerous determinants of inflation ranging from purely economic, such as persistent budget deficits, to purely non-economic, such as natural disasters. In a monetary economy based on fiat money there is no automatic nominal anchor such as a gold standard. So both economic and non-economic factors can generate the speculation that strengthens expected inflation. The issue is thus; how to fill this void and keep expected inflation within a pre-determined comfort zone. One solution grind out of the debates concerning benefits of discretionary versus rule based policy is the institutional structure called central bank independence, which is based on the findings of Kydland, Prescott (1977) and Barro and Gordon (1983).

However, as noted by Cukierman (1992), the negative relationship between CBI and inflation does not hold for developing countries. Here, weak institutional structures arising from unobserved economic activity (known as a shadow or informal economy), corruption, and the lack of de facto CBI may explain this deviation. This is the context in which this study seeks to contribute to the literature; by looking beyond CBI for the causes of high and persistent inflation in some economies.

The case for independent central banks became well known in the 1990s and formalized when New Zealand became the first country to implement CBI¹. Within a decade a number of central banks in other developed as well as developing² economies had been given autonomy. This of course did not translate to falling inflation in each

¹ See Cukierman (2008) and Alesina and Stella (2011) for review of literature.

² The State Bank of Pakistan became independent in 1994

case. Hayo and Hefeker (2002) are of the view that studies that link CBI to low inflation incorrectly assume CBI as exogenous, when in fact it should be considered endogenous. Complementing this insight, Robinson et al., (2008) provide evidence that de facto institutional reforms are not sufficient to achieve the objective of low inflation unless backed by the requisite level of political will.

These observations offer a partial explanation of why developing countries, including those with formally independent central banks, continue to face high inflation. Such varying inflation outcomes draw attention to other possible determinants of inflation. One of these is openness, which was posited by Stanley Fischer (1982), to share a negative relationship with inflation because the loss of seigniorage by fixing the exchange rate puts political pressure on domestic policymakers to increase fiscal discipline. Using the time inconsistency framework, Romer (1993), builds upon Rogoff's³ (1985) observation that surprise monetary expansion results in a currency depreciation which moderates the inducement to expand. So, inflation and openness are negatively related because openness provides a check on the policymakers incentive for a monetary expansion.

Romer's (1993) evidence was reinforced and extended (for example in Campillo and Mirron (1997) and Lane (1997) using large cross sectional data sets), to find that the negative relation between openness and inflation holds for developing economies as well and that CBI is not the most important determinant of inflation. Terra (1998) argues that the negative relationship in Romer (1993) may be due to high debt burden which is an omitted variable in Romer's analysis. Less open economies need a larger devaluation to generate the trade surplus required for debt repayment and this raises the domestic cost of external liabilities, requiring a larger private to public sector transfer. Given weak tax revenue collection, this transfer will be in the form of an inflation tax. Al-Nasser et. al (2009) use a large panel dataset for 1950-1992 and find that the inflation-openness inverse relationship is not restricted to a time frame or set of countries.

Political instability has been used in some studies as a variable to examine the determinants of inflation. This is an extension of the time inconsistency literature and is also a useful point to begin a discussion about optimal tax considerations. Roubini and

³ Rogoff (1985) built upon the KPBG model to introduce the notion of the "conservative" central banker who would be more inflation averse than welfare maximizing, and hence overcome the inflation bias.

Sachs (1989) find that larger deficits are associated with political factors, departing from previous work on budget deficits which attributed them to tax smoothing hypotheses based on the equilibrium model of fiscal policy⁴.

A similar point is made by Cukierman et. al (1992). They find that more unstable or polarized political systems are more prone to scenarios where the revenue collection capabilities of a government are constrained deliberately by inefficient tax systems. A similar discussion about deficit bias is carried out by Calmfors and Wren-Lewis (2011) where it is argued that debt accumulation may be strategically used as a constraint, placed by the current regime on future governments. This is related to Campillo and Miron's (1997) finding of a positive relationship between political instability and inflation; possibly because political instability makes it less easy for policymakers to commit to low inflation, also because countries with more political instability face a higher optimal inflation tax because of higher underground activity, and additionally because political instability is likely to translate into weak policies causing a divergence of "natural and socially optimal output and unemployment rates".

Similarly, Cukierman, Edwards, and Tabellini (1989) posit that seigniorage as a source of government revenue is used more frequently in politically unstable societies than it is in stable and homogenous countries because given tax evasion or high collection costs, it is relatively easy to gather⁵.

The presence of a large shadow economy⁶ can be inflationary because it raises the likelihood that public expenditures will be met through an inflation tax, which is a relatively easy means for the government to extract revenues from the shadow sector (Canzoneri and Rogers, 1991; Nicolini 1999; Cavalcanti and Villamil, 2003; and Koreschkova, 2006; in Mazhar and Meon, 2012).

⁴ This approach is attributed to Barro (as cited in Roubini and Sachs, 1989) and argues "that actual tax and deficit policies are a reflection of an intertemporal optimization over a long time horizon by the budgetary authorities, who choose their policies to reduce the excess burden of taxation for a given path of government spending".

⁵ The evidence on the impact of political institutions on inflation is not unmixed. For example, Mijiyawa (2011) finds that democracy increases inflation if it stimulates money creation and compromises trade liberalization.

⁶ Within the literature there is often an overlap between the description of the term 'shadow economy' and other terms such as unofficial economy, underground economy, undeclared activities, informal economy hidden economy, clandestine activities, black economy, etc. which describe similar types of economic activity. For the purpose of this study it is worth noting that all of these terms involve income that is unreported and hence not taxed.

There are numerous descriptions of the shadow economy. Schneider (2012) presents the taxonomy of underground activities⁷. This can be classified as either illegal or legal activities. Within each of these categories a distinction may be made between those activities that rely on monetary transactions and those that rely on non monetary transactions. The former category contains activities that are hidden because they are illegal and sometimes criminal, or even when legal, carried out by those seeking to evade or avoid taxes.

A broad definition⁸ of the shadow economy is found in Schneider (2012); “unreported income from the production of legal goods and services, either from monetary or barter transactions – and so includes all productive economic activities that would generally be taxable were they reported to the state (tax) authorities” .

The size of the shadow economy has been found to share a positive relationship with inflation. This is so because the inflation tax tends to be used to meet budgetary requirements when large sections of the economy are unrecorded and hence untaxed (Canzoneri and Rogers, 1991; Nicolini, 1999; cited in Mazhar and Meon, 2012). Other studies that discuss the optimality of the inflation tax in the context of large shadow sectors are Cavalcanti and Villamil (2003), and Koreschkova (2006). In their empirical analyses Mazhar and Meon (2012) find a positive relationship between the size of the shadow economy and inflation, and a negative relationship between the size of the tax burden and the shadow economy. The literature thus not only indicates a compelling relationship between inflation and the shadow economy given public debt, but also highlights the importance of the shadow economy as a factor that threatens fiscal stability.

How does the shadow economy relate to other determinants of inflation, particularly those discussed earlier here? The literature that focuses specifically on the relationship between the shadow economy and other economic variables appears limited, with two notable exceptions; one of these is the studies that examine the relation between

⁷ For more details please refer to Appendix 2 where a taxonomy of shadow economies as used in Schneider (2012) is presented.

⁸ Schneider’s (2012) analysis deliberately excludes illegal activities (for instance crime including drug production and human trafficking) and also the production of goods and services that are consumed within the household, including childcare.

the shadow economy and corruption; the other is the studies that relate the shadow economy to financial sector development.

In a study that focuses on the positive relationship between inflation and corruption, Al-Marhubi (1999) finds that one of the reasons for the increased reliance on the inflation tax is the tendency of businesses to go underground in response to corruption. Buehn and Schneider (2011) use a structural equation model to study corruption and the shadow economy as distinct latent variables and find that the shadow economy and corruption are complementary variables. This discussion can be related to studies that find that inflation to be linked to political instability. This is so because the weak state is related to poor contract enforcement (Acemoglu, 2008) which diminishes the benefits of being formal (Schneider, 2012). Gordon (2005) finds that a major source of the differences between tax policy in developed and developing countries is the value of financial intermediation. In richer countries the value added by the financial sector is considerable and as a result firms will choose to operate in the formal sector, hence resulting in a smaller shadow economy.

Huang and Wei (2003) model corruption as the reduced ability of governments to collect tax through formal channels. Corruption in their study is hence used as a proxy for weak institutions. Among the interesting conclusions they arrive at is that an inflation targeting policy is sub optimal for developing countries because of the widespread presence of bureaucratic corruption. Given that corruption and the shadow economy complement each other, it may be posited that CBI is less effective given the presence of a large shadow economy. This result is consistent with previous studies that examine the relationship between CBI and inflation (Campillo and Miron, 1997).

A possible relationship between openness, inflation, and the shadow economy is mentioned by Bowdler and Malik (2005) who posit that openness increases the revenues obtained from taxing tradables which are easier to monitor than non tradables which will find it relatively easier to operate in the shadow economy⁹.

Methodology and research design

⁹ This hypothesis is developed by Bowdler and Malik (2005) in the specific context of a situation where a government in period of low revenues might consider other means to meet budgetary requirements.

The above discussion sets the tone for interesting questions that necessitate the merging of some threads of literature. In particular, this study seeks to learn more about the shadow economy's effect on inflation in a political context.

Such a relationship may be posited as follows; politically stable regimes have less of an incentive to follow inflationary policies, particularly expenditures that will need to be financed through an inflation tax. The presence of a large shadow economy reduces the likelihood that the regime will not need to use the inflation tax. In other words, even though shadow economies reduce tax collection from non-inflationary sources, a politically stable regime is less likely to run a deficit requiring seigniorage revenue. So, it may be asked; what type of government is less/ more likely to use the inflation tax to finance its expenditures; and, what are the factors that enhance the need to use the inflation tax?

This discussion may be presented in the form of a set of hypotheses;

Hypothesis 1: A large shadow economy increases inflation

Hypothesis 2: Political stability reduces inflation

As a corollary of above two hypotheses we also test the following hypothesis:

Hypothesis 3: A large shadow economy reduces the effect of political stability on inflation

So, the focus of this study is on the relationship between three variables. These are inflation, the shadow economy, and political stability. The approach used is akin to the 'quasi experiment' method discussed by Stock and Watson (2011). Here a source of variation is used 'as if' it were randomly assigned and used to examine the relationship between an independent and dependent variables.

In this case, the source of variation is the shadow economy, which may be used to examine the relationship between inflation and political stability. A dummy variable is constructed with a value of 1 for those countries where the shadow economy¹⁰ is

¹⁰Data sources available in the next section and in Appendix 1

consistently above 25% and a value of 0 for those countries where the shadow economy is consistently below 15%, over the period of analysis. This not only insulates our empirics from the issues related to reverse causality that plagued the previous empirical studies (e.g. Mazhar and Meon, 2012) but also avoids the occurrence of discrepancies arising from measurement issues of categorical variables nonetheless allows us to adequately capture the separate influence of larger and smaller shadow economies¹¹. As a result, our dataset is purged of those countries where the shadow economy range, as percentage of GDP, is consistently between 15% and 25%.

The purging of the dataset allows the study to emphasize the effect on the dependent variable of shadow economies that are either relatively large or relatively small. This step is of particular use in this study where the interaction effect of the shadow economy and political stability will be examined. This is detailed below.

For a second set of regressions the focus is on the interaction effect of the shadow economy and political stability. For this purpose a multiplicative interaction term is constructed using the shadow dummy and a measure of political stability¹². To study the relationship of the shadow economy and political stability with inflation, when both phenomena are actively present in an economy, the marginal effects of our variables of interest are examined; that is the marginal effects of political stability and the shadow economy, on inflation¹³.

For the purpose of carrying out checks of empirical robustness a set of control variables is prepared based on the literature reviewed earlier. The model may be specified as below;

Specification 1

$$\text{Inflation} = \beta_0 + \beta_1(\text{Shadow economy dummy})^{14} + \beta_2(\text{Political stability}) + \beta_4(\text{Controls}) + \varepsilon$$

Specification 2

$$\text{Inflation} = \alpha_0 + \alpha_1(\text{Shadow economy dummy})^{15} + \alpha_2(\text{Political stability}) +$$

¹¹ The median size and also the average size of the shadow economy in the dataset is 33% of GDP

¹² Please refer to appendices

¹³ This is done using the margins command in STATA 12 which can numerically estimate marginal effects of y of with respect to x.

¹⁴ The coefficient β_0 measures the marginal effect of the shadow economy dummy variable on inflation in the absence of political stability (Political stability = 0).

$$\alpha_3 (\text{Shadow economy dummy} * \text{Political stability}) + \alpha_4 (\text{Control variable}) + \varepsilon$$

Thus α_3 in specification 2 allow us to capture the influence of political stability on inflation as a function of shadow economy. A positive significant value of α_3 would imply that the inflation reducing effect of political stability will be diluted with an increase in the size of the shadow economy.

Data and choice of variables

We use a large panel data set of 162 countries over 1999 to 2007 period. The size of the dataset used ranges from 476 to 849 observations, for each specification. The dependent variable is inflation. The measure for this is annual percentage change in the Consumer Price Index (CPI), as estimated by the World Bank. For estimates of the shadow economy the data set prepared by Schneider et al. (2010) is used, which covers 162 countries from 1999 to 2007. These estimates are derived using MIMIC methodology which is considered superior to other methods used to estimate shadow economy. Moreover, the estimates of Schneider et al., (2010) enjoys high correlation with the estimates develop using structural model of an economy (Mazhar and Meon, 2012). For political stability the indicator available from the World Bank's Worldwide Governance Indicators website is used.

Other regressors include a term to control for development; this is the logarithm of Gross Domestic Product per capita based on Purchasing Power Parity. This was obtained from the World Development Indicators dataset. It is expected that GDP will have a negative relationship with inflation

Openness is also included as a control variable given its importance¹⁶, particularly in the time inconsistency literature, as a determinant of inflation. For this the Penn World Table database is used. In this, openness is calculated as the ratio of imports and exports to GDP. This variable is expected to have a negative relationship with inflation.

The other control variables are institutional in nature and attempt to capture the propensity of policymakers to pursue objectives that are not the same as those desired by the public. For this purpose transparency is included using a measure of corruption which

¹⁵ Ibid

¹⁶ Particularly Romer (1993) and Campillo and Miron (1997)

is taken from the Heritage Foundation database, based on Transparency International estimates is using a 10-point scale, where a higher score indicates less corruption and the lowest score indicates a very corrupt government. This is expected to be negatively correlated with inflation.

As a further control for institutional quality, the Voice and Accountability measure from the Worldwide Governance Indicators dataset is used. This variable relies on various sources that reflect transparency, accountability, electoral process etc. to capture political participation and freedom. This is expected to be negatively related to inflation.

Model

The regressions are run on the STATA 12 software package and results are obtained using ordinary least squares with panel corrected standard errors¹⁷. Since the data is a large set of cross-sectional time-series, the study is exposed to a number of different potential estimation issues, namely heteroskedasticity, autocorrelation, and missing data. The magnitude of each of these issues varies with regression approaches. The approach assumed to be most appropriate is selected, but a series of robustness checks are conducted to determine whether the estimates reported are so fragile as to lose significance with a different specification. The important conclusion of the robustness checks is that the findings are stable, given a number of different specifications.

Results

The results are summarized in Table 1 and Table 2, which contain estimates from the regressions using the shadow economy dummy for size, and the regressions containing the interaction term respectively.

The significance of the models is confirmed by Wald Chi-square statistics which allow for the rejection of the null hypothesis that there is no relationship between the dependent variable and independent variables.

¹⁷ The `xtpcse`, `hetonly` command in version 12 of Stata was used to run the regressions. This provides estimates in which the standard errors are panel corrected only for panel level heteroskedasticity (StataCorp, 2011). An alternative approach is to use feasible generalized least squares (FGLS). We opted not to use this approach based on Beck and Katz's (1995 cited in StataCorp, 2011) finding that FGLS is likely to result in inaccurate standard error estimates.

The first set of regressions indicates that the effect of the shadow economy on inflation is diminished in the presence of political stability. This is apparent from the results because the shadow economy is not statistically significant whereas political stability is statistically significant. This outcome is nearly consistent across this set of regressions as different control variables are added and removed. The single exception here is when openness is used as a control. In this case both the shadow economy and political stability are significant at the 1% and 5% level, respectively. To account for this it may be assumed that openness raises taxation revenues obtained from tradables which are more easily gathered than those from non tradables which will find it relatively easier to operate in the shadow economy, as mentioned in Bowdler and Malik (2005).

Given the above specification, it is worth noting that the statistical significance of the term for political stability gives the marginal effect of political stability on inflation when the shadow economy is small (or non-existent). It is necessary to examine this prediction in more depth.

For this purpose an interaction term is introduced. The inclusion of this (using the same set of control variables) indicates that the interaction term and the shadow economy share a statistically significant relationship with inflation, whereas the effect of political stability is no longer significant. The shadow economy is statistically significant in all specifications that include the interaction term. This implies that the effect of political stability on inflation is the outcome of its interaction with the shadow economy.

To examine this further, the marginal effects of the component variables of the interaction term are examined. This indicates that both variables are associated with inflation, though the association of the shadow economy is stronger.

Table 1: Does shadow economy size effect inflation?

Cross sectional regressions: Pooled Least Squares

| Dependent variable = inflation | | | | |
|--------------------------------|--------|----------|--------|--------|
| | 1 | 2 | 3 | 4 |
| Shadow | -0.645 | 4.733*** | -0.686 | -0.567 |

| | | | | |
|----------------|-----------|----------|----------|---------|
| | (2.756) | (0.844) | (1.982) | (2.789) |
| PolStab | -4.045*** | -1.057** | -3.749** | -4.453* |
| | (1.417) | (0.429) | (1.793) | (2.680) |
| GDP | -1.093 | | | |
| | (0.949) | | | |
| OPEN | | -0.007 | | |
| | | (0.004) | | |
| VA | | | -2.049** | |
| | | | (0.987) | |
| Corrupt | | | | -0.0299 |
| | | | | (0.032) |
| Observations | 845 | 476 | 849 | 770 |
| Countries | 122 | 68 | 122 | 114 |
| R-squared | 0.035 | 0.047 | 0.037 | 0.029 |
| Prob > chi2 | 0.000 | 0.000 | 0.000 | 0.000 |

*Panel corrected standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; constant is included but not reported*

Table 2: Is there an interaction effect of the shadow economy on political stability?

Cross sectional regressions: Pooled Least Squares

| Dependent variable = inflation | | | | |
|--------------------------------|---------|----------|----------|----------|
| | 1 | 2 | 3 | 4 |
| Shadow | 3.432** | 5.471*** | 4.134*** | 3.163*** |
| | (1.368) | (0.657) | (0.722) | (1.079) |

| | | | | |
|-----------------------|---------------------|-----------------------|----------------------|---------------------|
| PolStab | 0.861 (0.886) | -0.003 (0.386) | 2.292* (1.194) | 0.923 (0.805) |
| Shadow*PolStab | -5.128** (2.098) | -1.126* (0.604) | -6.209*** (2.308) | -5.533* (2.975) |
| GDP | -1.112 (0.954) | | | |
| OPEN | | -0.00715 (0.00446) | | |
| VA | | | -2.265** (1.023) | |
| Corrupt | | | | -0.0463 (0.0344) |
| Observations | 845 | 476 | 849 | 770 |
| Countries | 122 | 68 | 122 | 114 |
| R-squared | 0.037 | 0.047 | 0.039 | 0.03 |
| Prob > chi2 | 0.000 | 0.000 | 0.000 | 0.000 |

*Panel corrected standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; constant is included but not reported.*

Table 2.1 Marginal effects for the interaction term above (with same controls as previous)

| | | | | |
|----------------|--------------------|--------------------|--------------------|--------------------|
| Shadow | 4.88*** (1.112) | 5.69*** (0.641) | 5.89*** (0.986) | 4.58*** (0.941) |
| PolStab | -3.80** (1.323) | -1.00** (0.405) | -3.35** (1.669) | -4.06* (2.473) |

*Delta method standard errors are reported in parenthesis for the marginal effects
*** p<0.01, ** p<0.05, * p<0.1*

Discussion

Political stability is an important determinant of inflation because less stable governments are more inclined to use the inflation tax; firstly because of their tendency to use inefficient economic policies, and secondly because they are prone to using debt accumulation as a strategic tool to constrain future governments. The presence of a large

shadow economy may enhance both likelihoods. The results in this study imply that inflation through debt accumulation and policy failure is likely to occur in an economy with (i) more shadow activity and (ii) less political stability.

In particular, inefficient or distortionary policies, as mentioned in Campillo and Miron (1997) and Acemoglu et al. (2008) may be revisited in the context of inflation given that the size of the shadow economy changes the role of political stability. In the same vein, the tendency of outgoing regimes to strategically constrain incoming governments through a debt burden may also be appraised differently where and when a large shadow economy is present.

The above contentions may be examined in more depth by emphasizing the mechanism through which the shadow economy fuels inflation; thus the hypothesis that political stability is more likely to be an important indicator of inflation in countries where a large shadow economy is present.

These predictions are supported by empirical evidence derived through the use of an econometric model and panel dataset covering over 100 countries over the 1999 – 2007 time period. Both political stability and shadow economy size have an effect on inflationary tendencies. This is apparent from a quick analysis of the marginal effects of these variables. It is of course important to mention that the shadow economy has a stronger effect.

The empirical results indicate that political stability might have a moderating effect on the relationship between the shadow economy and inflation. The first set of estimates corroborates the literature that shows an inverse relationship between political stability and inflation; the second set of estimates reveals that this same relationship might not remain intact when the interaction effect of the shadow economy and political stability is considered. This implies that the association between political stability and inflation relies on the size of the shadow economy.

Conclusion

Among the contributions that this study hopes to make is the finding that inflation is the result not only of both the shadow economy and political stability, but that there is an interaction effect between the two variables. This observation provides the basis for some assumptions about economies that tend to be less politically stable; they are more

prone to higher inflation, and that when this is the case, it is likely to be an outcome of shadow economy activity which, as noted in the existing literature, causes policymakers to rely on the inflation tax to meet revenue requirements. Political stability of course also makes it less likely that governments will use debt accumulation and its inflationary tendencies as a tool to constrain their successors. When the debt burden is manipulated for political purposes, it is likely that the size of the shadow economy will influence the extent to which governments are constrained by it.

Such conclusions are relevant from the standpoint of public policy and contribute to the literature on the inflationary impacts of the shadow economy. These findings imply that policy makers may have to address the effects of political factors and/or the main drivers of the shadow economy in order to control inflation.

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Appendix 1: Variable definitions and sources

| Variable | Description | Source | Abbreviation used in STATA | Notes |
|-----------------------|--|-----------------------------------|----------------------------|--|
| Inflation | Annual percentages of average consumer prices are year-on-year changes. | IMF WEO September 2011 | inflation | Dependent variable. Variable of interest. |
| Shadow economy | Shadow economy as a percentage of GDP | Schneider et al. (2010) estimates | Shadow | Used to construct dummy variable to represent economies with large shadow economies. Variable of interest. |
| Political Stability | Measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional means. | World Governance Indicators 2012 | PolStab | Variable of interest. |
| GDP | Gross domestic product based on purchasing-power-parity (PPP) per capita GDP. | IMF WEO September 2013 | GDP | Used in logarithmic form as a control variable. |
| Openness | Ratio of imports plus exports to GDP. | Penn World Tables 7 | OPEN | Control variable |
| Control of Corruption | Uses Transparency International's Perceptions Index (CPI) which is based on a 10-point scale. Higher score indicates less corruption and the lowest score indicates very corrupt govt. | Heritage | Corrupt | Control variable |

| | | | | |
|--------------------------|---|----------------------------------|----|------------------|
| Voice and Accountability | Captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. | World Governance Indicators 2011 | VA | Control variable |
|--------------------------|---|----------------------------------|----|------------------|

Appendix 2 Shadow economy taxonomy taken from Schneider (2012)

Table 2.1: A Taxonomy of Types of Underground Economic Activities¹⁾

| Type of Activity | Monetary Transactions | | Non Monetary Transactions | |
|--------------------|---|-------------------------------------|--|---|
| | Tax Evasion | Tax Avoidance | Tax Evasion | Tax Avoidance |
| ILLEGAL ACTIVITIES | Trade with stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling; fraud, human, drug-, and weapon-trafficking | | Barter of drugs, stolen goods, smuggling etc. Produce or growing drugs for own use. Theft for own use. | |
| LEGAL ACTIVITIES | Unreported income from self-employment; wages, salaries and assets from unreported work related to legal services and goods | Employee discounts, fringe benefits | Barter of legal services and goods | All do-it-yourself work and neighbor help |

¹⁾ Structure of the table is taken from Lippert and Walker (1997, p. 5) with additional remarks.