HARD CURRENCIES FOR HARD TIMES. TERROR ATTACKS AND THE CHOICE OF MONETARY ANCHORS

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(Received 11 March 2009; in final form 7 June 2010)

As terror’s victims increase, hard currency commitments gain effectiveness in reducing inflation, and central bank independence loses its effectiveness, because terror reduces transparency and the number of veto players in domestic politics. PCSE (Panel-Corrected Standard Error) estimations of inflation are run on pooled cross-section time-series sample of 87 countries from 1975–2005. When the trend level rises to 100 victims annually a currency board reduces inflation by up to 7.5%, and an independent bank raises inflation by up to 8%. When victims exceptionally exceed the trend by 100, a currency board reduces inflation by 2.5%, and an independent bank raises it by 2%.

Keywords: Terror; Currency boards; Central banks; Transparency

JEL Codes: E31, E58

1. INTRODUCTION

In the 1990s and especially the first half of the 2000s, news of terrorist activities and plots to blow up airline jets and sensitive facilities have acquired a prominent place in the headlines. The attempt to bomb the World Trade Center (WTC) in 1993, the bombing of the American embassy in Kenya in 1998, the 2003 attack in Bali, the 2004 and 2005 bombings in, respectively, Madrid and London, and of course, the 9/11 destruction of the WTC are only a few of the more infamous examples. These spectacular attacks have been generally aimed at undermining what the perpetrators perceived as American hegemony or the western world’s oppression of Muslims worldwide. However, many other terror campaigns have been launched in an avowed attempt to reallocate national resources or to promote a national struggle, such as the Basque, Kashmiri, Northern Irish, Palestinian or Tamil causes.

Terror attacks are not a new phenomenon in political conflict. The attempt to spread anxiety and a sense of insecurity in the public, and undermine its trust in state institutions is as old as the state. However, as citizens’ expectations of state institutions grew, the rationale of terror attacks strengthened. And since terror attacks are most effective when more imminent and potent dangers do not distract the public’s attention, the use of them is more prevalent in times of peace among the major powers. Arguably, market economies are especially sensitive to terror attacks because their functioning depends on individual perceptions and expectations much more than economies with heavy or absolute government control.

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Thus, as the cold war ended in the early 1990s, the market system (with or without democracy) spread to hitherto command economies and even market economies were further liberalized and deregulated, terror attacks seemed to become a greater concern for individuals and to have acquired higher priority on the agenda of decision-makers. Figure 1 shows that the total number of terror-related injuries and fatalities in the world displays a clear upward trend since the 1990s. Therefore, it is no surprise that academic interest in the political-economic implications of terror attacks has also increased recently.

As the next section shows, the existing literature acknowledges the detrimental effects that terror may have on the credibility of government macroeconomic policies precisely at a time when it is ever more important. However, relatively little has been written on the way by which institutions can minimize these effects and increase the trust of economic agents in government macroeconomic policies and the credibility of these policies. How should the anchors of monetary policy adjust to terror attacks?

This study argues that as terror attacks become more deadly and devastating hard currency commitments gain credibility and effectiveness in reducing inflation, and central bank independence loses some of its credibility and effectiveness. The reason for this is that terror

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1 Following Bernhard et al. (2002) ‘credibility’ is understood in this study to involve ‘persuading private agents that the monetary policymaker will not exploit the flexibility inherent in a fiat standard to achieve short-run output gains.’
attacks reduce transparency in decision making processes and reduce the intensity of the domestic political struggle, thus diminishing the importance of domestic cleavages.

This study does not attempt to explain the political-economic motives of terrorists. This is not to suggest that terrorists are irrational, or that government foreign and security policies do not affect the way they organize or the frequency, deadliness or timing of their attacks; only that inflation and the choice of monetary anchors have little effects on underlying terrorist motives.

The rest of the paper proceeds as follows. The next section 1 surveys the literature on the economic effects of terror attacks and develops the argument of this study. Section 3 details the research design and Section 4 reports the results of econometric estimations and tests. Section 5 provides conclusions.

2. THE ECONOMIC EFFECTS OF TERROR ATTACKS

2.1. A Survey of the Literature

Terror attacks may seem trivial compared with the devastation wrought by wars and large-scale armed conflicts, but they do take their toll. While death, injury and damage to property are the most visible effects of a terror attack, its indirect effects are more harmful. There are many definitions to terror and a comprehensive discussion of them is beyond the scope of this paper. However, common to all definitions is that terror is a specific case of politically-motivated violence, the threat or use of which is designed to cause anxiety among a group wider than its immediate victims, and erode its trust in the governing authority. Terror attacks can be sponsored by one state against another, launched by foreign non-governmental organizations, or home-grown. It can be directed at civilians or at government agents and soldiers, but it is often indiscriminate (the personal identity of the victims is not known in advance to the terrorists) and it depends on publicity to be effective.

A central feature of terror attacks is that, in spite of the low probability of being harmed, they generate extreme fear among individuals. Even a very low increase in the risk of terror attacks can slow the economy significantly, by reducing the value of the future compared with the present and so undermining investment and income in the long run. Many studies found an inverse relationship between the number and destructiveness of terror attacks on the one hand, and growth, savings and investment on the other.

Public military expenditure may compensate for the negative shock to private consumption and investment. Defense spending can stimulate economic growth if enough of it is spent locally and generates positive spillover effects on the non-defense sectors. However, this is likely to be a small and often short-term effect. On balance, terror attacks administer a negative shock to aggregate demand.

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2 See Blomberg and Hess (2002); Blomberg et al. (2004); Burgoon (2006); Ferrero (2006); Frey and Luechinger (2004); Garfinkel (2004); Sandler (2000); Schelling (1991); Siqueira and Sandler (2006); and Wilkinson (2001).
4 See Arunatilake et al. (2001); Brück and Wickström (2004); and Walkenhorst and Dihel (2002).
5 See for example Blomberg et al. (2004); Bloom (2005); Brauer et al. (2004); Buckelew (1984); Garfinkel (2004); Gupta et al. (2004); and Sandler and Enders (2004).
6 See Abadie and Gardeazabal (2003); Acemoglu and Robinson (2001); Addison (2003); Alesina and Perotti (1996); Alesina et al. (1996); Berrebi and Klor (2005); Eckstein and Tsiddon (2004); Rodrik (1999); and Stewart and FitzGerald (2001).
7 See Arora and Bayoumi (1993); Arunatilake et al. (2001); Bayoumi et al. (1993); Blomberg et al. (2003); Knight et al. (1996); and Shieh et al. (2002).
While fear adversely affects demand, other indirect effects of terror attacks generate a negative shock to aggregate supply. Objective transaction costs increase due to enhanced security measures. Insecurity and uncertainty complicate business plans and raise the costs of doing business in general, domestically as well as internationally.\(^8\) Indeed, government anti-terror policies can exacerbate the business environment by increasing the risk of retaliation by the terrorists (Zussman and Zussman, 2006).

In addition to these demand and supply shocks, terror attacks also adversely affect government credibility. To begin with, if their negative supply-side effects are large enough, terror attacks can cause a deterioration in the fiscal accounts by eroding the tax base (because business is jeopardized) and by lowering the efficiency of tax administration (Ndikumana, 2001). However, even if these effects are mild, terror attacks still create an environment that is ever more dependent on credible government policies because of the damage to the financial sector.

The effects of terror attacks on the real economy as discussed above are reflected in financial markets where asset values respond negatively to expected terror-related losses (Abadie and Gardeazabal, 2003). Developments in the financial sector in turn can affect the level of liquidity available to the real economy. Thus, a weak financial sector can amplify the effect of terror attacks and push the economy into recession or even crisis.

The resilience of an economy and its ability to swiftly recover from terror attacks can be attributed to the availability of adequate liquidity by a stable financial sector and credible monetary authorities. This is evident, for example, in the great cross-country variation in the way that the 9/11 attacks in the US affected financial markets in spite of the level of integration among national financial markets and the speed with which news spread around the world. The reactions of financial markets were less severe where regulatory authorities reacted by adding sufficient liquidity (Chen and Siems, 2004). All the more so in the face of a sustained terror campaign, credible policies are needed to allow markets to adjust efficiently, offer a safe haven of lower-risk government debt, and thus support the value of the currency (Eldor and Melnick, 2004). In contrast, when the banking sector is weak and government instruments lack credibility, a conflict can undermine confidence in the domestic currency due to fear of inflation and depreciation (Addison et al., 2002). Thus, strong institutions and credible government policies are essential for minimization of the costs of terror attacks.

2.2. The Basic Model

Compared with large-scale conflicts, to which typically most if not all of the national resources are subordinated, the fight against terror uses only a small part of resources and allows the economy to function more or less as in times of peace. In spite of the risks and uncertainty, investors and savers, producers and consumers, employers and workers, all make long-term plans and generally assume that they will benefit in the future from their current decisions. In this sense, terror attacks do not fundamentally change the rules of the market economy game.

Thus, in contrast to large-scale conflicts, which typically involve restrictions on capital flows, governments fighting terror may remain interested in attracting investors and in maintaining their credibility. Indeed, greater economic deterioration is often among the terrorists’ aims. Governments fighting terror try to project a business-as-usual attitude, but this attitude is challenged by the economic effects of terror attacks. Thus, governments have to try harder to maintain their policy credibility and the institutions that enhance it at a time when this

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\(^8\) Barbieri and Schneider (1999); Brück and Wickström (2004); Nitsch and Schumacher (2004); and Reuveny (1999–2000).
credibility is ever more important. However, how precisely do terror attacks affect the effectiveness of these institutions?

To provide an answer to this puzzle, this study builds on recent work that argues that the more transparent domestic political processes are, and the more fragmented domestic political systems are, the more effective central bank independence would be in reducing inflation, and the less effective would be a currency commitment. The reason for this is that the credibility of government policy, which is an unobserved cause of low inflation, depends on policy’s transparency (Broz, 2002), but is hampered by a proliferation of selfish veto players in the domestic political system (Keefer and Stasavage, 2002). An independent central bank can provide credibility when there are many veto-players, but does not in itself make policy more transparent. On the other hand, a currency board provides transparency (either the exchange rate commitment is maintained or it collapses), compensating for a potential lack of it in public decision-making, but it is undermined when there are many veto players, which destabilize cabinets and long-term commitments.

Thus, when it is more difficult for the public to observe policymakers’ actions a currency board is more effective in ensuring credibility and reducing inflation than a free float, but greater central bank independence will not be effective because there are subtle and less visible ways for the government to pressure the bank than firing the governor or revoking its statute. When there are multiple veto players in government, granting central bank independence would be effective in ensuring credibility and reducing inflation, but a currency board would not be more effective than a free float (Lohmann, 1998).

To put these insights in formal terms, the following analysis is adapted from the Barro-Gordon model. Assume a credibility-seeking government with the loss function in equation (1) (see Annex 2). $\pi$ is the rate of price inflation, $y$ and $y_n$ are respectively output and the natural level of output, and $\lambda$ stands for the relative importance of output goals compared with inflation goals. In short, the government is merely seeking to bring inflation as close as possible to zero, and to keep output at its natural level.

Equation (2) represents the Phillips Curve ($\pi^e$ is the expected rate of inflation and $\gamma$ is the sensitivity of output to inflationary surprise). Substituting equation (2) for $y$ in equation (1) yields equation (3). This version of the loss function is minimized when inflation reaches the level given in equation (4). $\pi^i$ is the optimal level of inflation from the government’s point of view. Substituting equation (4) for $\pi$ in equation (3) yields, in equation (5), the level of loss for the government when this loss is minimized. Clearly, the government has an interest in lowering inflationary expectations. However, government policy is only one of a few determinants of inflation.

Inflation is a weighted average of inflation in an anchor currency ($\pi_A$) and domestic inflation ($\pi_D$). In equation (6), $\alpha$ is the degree of economic isolation from an external anchor ($0<\alpha<1$); 0 = a currency board; 1 = autarky. Domestic inflation is, in turn, a weighted average of the government’s desired levels of inflation ($\pi_G$) and the central bank ($\pi_B$). In equation (7), $I$ represents the degree of central bank legal independence ($0 = $ by law policy is dictated to the bank; 1 = bank is by law completely independent); $R$ represents the degree of transparency of the national political and legal systems ($0 = $ utter lack of rule of law – government is unchecked; 1 = central bank operates in a rule-based completely transparent environment); $F$ represents the degree of fragmentation of the political system ($0 = $ one political group dominates politics; 1 = extreme fragmentation). All of these three parameters range between zero and one. Thus,

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9 As in Broz (2002) the term ‘effectiveness’ in this context relates to the magnitude of decline in the rate of inflation that is associated with adopting a certain monetary anchor.

10 According to Broz (2002) ‘transparency is the ease with which the public can monitor the government with respect to its commitments’.
the government is better able to determine domestic inflation when it can dictate policy to the central bank, transparency and the rule of law are weak, and it faces little political opposition. Substituting equation (7) for \( \pi_B \) in equation (6), and assuming for simplicity that the central bank always aims at zero inflation \( (\pi_B = 0) \) yields the definition of inflation in equation (8).

The public is assumed to be familiar with this definition of inflation but is uncertain about \( \pi_G \), being skeptical to some degree about the government’s intentions. Thus, expected inflation \( (\pi^e) \) is defined in equation (9) almost identically as in equation (8), with the one difference that \( \pi_G^e \neq \pi_G \). In other words, while central bank dependence, legal obscurity, and single-party politics make it easier for the government to set its desired policy, they also raise inflationary expectations, which make it harder for the government to achieve its goal.

Inflationary expectations cannot be assumed to perfectly forecast inflation in the long run (such that \( E(\pi^e) = \pi \), or \( E(\pi_G^e) = \pi_G \)) because in a realistic setting the government enjoys some information advantage over the public (it can abuse monetary policy before the public will learn of this), especially in terror-stricken countries, and is therefore suspected of having a time-inconsistency problem. Thus, expectations are shaped by credibility enhancing mechanisms.

Substituting equation (8) for \( \pi \) and equation (9) for \( \pi^e \) in equation (3), and minimizing the loss function with \( \pi_G \) yields the government’s optimal policy in equation (10). Substituting equation (10) for \( \pi_G \) in equation (8) and simplifying yields the level of inflation under government optimization in equation (11), which is equivalent to the level of inflation in equation (4). Equation (11) tells us that countries with independent central banks, high transparency, strong rule of law, and political fragmentation tend to have lower inflation. Indeed, transparency and fragmentation increase the effectiveness of central bank independence in reducing inflationary expectations and through them, actual inflation (equations (12)–(14) show respectively that \( \partial \pi^*/\partial R < 0; \partial \pi^*/\partial IR < 0; \partial \pi^*/\partial IF < 0 \)). Equation (15) shows that a currency board (low \( \alpha \)) can reduce inflation if the inflation in the anchor currency is low enough (specifically if \( \pi_A < (1-IRF)\pi_G^e \)), but less so under high transparency and fragmentation (equations (16) and (17) show that \( \partial \pi^*/\partial \alpha R < 0; \partial \pi^*/\partial \alpha F < 0 \)).

2.3. The Argument

Terror attacks have direct effects on inflation. As the discussion at the beginning of this section shows, inflation can rise (if terror attacks mostly disrupt production and depress aggregate supply and tax revenue – the physical factor) or fall (if attacks mostly depress aggregate demand – the fear factor) in the wake of terror attack.

Central to this paper’s arguments, terror attacks affect inflation by affecting the effectiveness of monetary anchors: terror attacks reduce transparency \( (R) \) and political fragmentation \( (F) \), raising inflationary expectations in equation (9), and actual inflation in equation (11).

Terror attacks reduce the transparency of political processes because of the asymmetry of information and the encroachment on the rule of law that the fight against them often involves. Information on government security activity is naturally privileged. Some officials and politicians may be better informed by the security forces than others and this can obscure the work of parliament and other state institutions. Citizens are deprived of some of their rights in order to improve the effectiveness of the security effort. The executive branch increasingly ‘cuts corners’, withholds information and downplays judicial considerations in its fight against the terrorists; it often argues that the media and the judicial system are too open or slow to allow urgent responses to emerging threats and are easily manipulated by terrorists. Thus, the rule of law and transparency erode.

Since reduced transparency is an institutional change it is likely to have mainly long-term causes and effects. For this reason, transparency is more likely to diminish in response to a
sustained terror campaign, than to an exceptional attack that is not perceived by the government and the public to be part of the long-term trend of terror-related violence and destruction. Of course, it is not always easy to immediately tell whether a given attack is exceptional or rather signals a new trend. Thus, decisions taken in the wake of an exceptional attack can sometimes have lasting effects too (such as waging war). However, if a certain terror attack is retrospectively judged to have been exceptional, the decisions that it inspired (although not all of their implications) are expected to be eventually reversed (troop pullout).

For example, the French government cited its fight against terrorists in the 1990s as the reason for its pre-1998 reluctance to respect its commitment under the Schengen agreement to allow free movement of people (a basic principle in the European Union). The governments of Italy, Poland and Romania are alleged to have tacitly allowed the CIA in recent years to kidnap suspected terrorists in their territory and/or detain them there in unofficial jails. Under the Aznar government, Spanish security forces covertly eliminated or interrogated Basque terrorists. Similar incidents were attributed to British forces in Northern Ireland during the 1970s.

Extra-judicial killings of Palestinian terrorists by the Israeli security forces became a norm during the Intifadeh of the 2000s. These were first directed at ‘ticking bombs’ but were later extended to extremist political activists as well. In 1992, in the wake of the first Intifadeh, the Rabin government deported overnight 400 Palestinian Islamists to Lebanon. While the Israeli judicial system was consulted at the time, it was hurried and heavily leaned upon by Rabin, and its legality remained debated. The legality of the demolishing of houses of Palestinian terrorists and their families during the 1980s and 1990s was also dubious.

Extra-judicial killings have for many years been part and parcel of life in Columbia, which was rife with militias, guerrilla forces and rogue soldiers and policemen, to the point where it was hard to distinguish legal from illegal activity. All of these examples show that governments often see the rule of law as an impediment in their long-term fight against terrorists (Wilkinson, 2001).

An exception that proves the rule is the Patriot Act in the US, which allowed the executive branch greater powers in surveillance, eavesdropping and detention of suspects. While some elements in the US government may have exceeded these powers the main point here is that the US government sought to legalize its new policies, which came against a backdrop of many protections on civil liberties, and the US remains one of the most open societies in the world. This is compatible with the general belief of the American public and most state institutions (after the initial shock has subsided) that the 9/11 terror attacks were exceptional (if tragic and devastating) and that America was capable of preventing similar attacks on its soil without abandoning the rule of law. In other words, the transparency of policymaking in the US was only marginally eroded in the early 2000s because 9/11 is not perceived to signal a new trend in terror attacks (i.e. similarly devastating attacks are not expected to become routine).

While the above discussion emphasizes challenges to the rule of law in the area of security, it is known that, to the extent that the government’s conduct is unlawful, such conduct tends to be repeated in the long term into all areas of government activity and cannot be restricted to security matters (see Broz’s discussion of transparency). Thus, the reduced transparency brought about by a sustained terror campaign would eventually affect the government’s relations with the central bank and imply a bias in favor of an exchange rate commitment in providing policy credibility and reducing inflation. Put differently, a higher level of regular transparency would be required to compensate for the terror-related loss of transparency, if terror attacks are not to eventually influence the effectiveness of monetary institutions. In formal terms, $R$ falls in the long term with more terrorism.
Hypothesis 1: The more destructive terror attacks are in a given country, the less transparent would its domestic political process become and the more (less) effective an exchange rate commitment (an independent central bank) would be over the long-term in reducing inflation.

A second way in which terror attacks influence the effectiveness of monetary anchors is the tendency they may have to foster national unity. The potential negative economic effects of terror attacks can reduce the intensity of the fight over the redistribution of income among legitimate political forces, and motivate collective action (Garfinkel, 2004). Such feelings of national unity may have especially visible results when they generate greater support for a foreign war or a domestic anti-terror campaign, which entail human and financial sacrifice. Less visibly, national unity may also support more centralized decision making and ‘package deals’ or reforms that were hitherto contested.

However, this argument should be qualified. As noted above, domestic players form expectations about the normal level of terror-related violence and destruction. The majority of terrorist attacks fit into this long-term familiar trend of devastation, and thus, these attacks do not generate the necessary magnitude of threat. For example, distributional politics were not dampened in the long term by terror attacks in the UK and Italy during the 1970s and 1980s. Palestinian terror attacks were hardly ever enough to sustain political coalitions in Israel for long periods of time.

In contrast, greater national unity can be expected in response to exceptional, off-trend attacks, because they exert greater fear than routine attacks (Yechiam et al., 2005). However, the national unity effect of terror attacks tends to fade during the following weeks or months, as the public realizes their exceptionality, and politics-as-usual resumes. Of course, decisions taken at the height of patriotic feelings can also have lasting effects as described above, and undoing them when national unity subsides could be costly or only partly possible. However, eventually, the lack of sufficient domestic political support for sustaining such decisions or policies can be expected to result in policy change.

For example, the 9/11 attacks produced unusually wide and deep feelings of national unity and patriotism in the US, which was reflected in the support for military operations in Afghanistan and Iraq. Public outrage over an attack on a coastal bus near Tel Aviv in 1978 and the March 2002 attack on the Park Hotel in the city of Natanya provided, respectively, the Begin and the Sharon governments with the domestic support they needed to launch Israel’s first invasion of Lebanon and a major military offensive to crush the second Palestinian Intifadeh.

Greater national unity was also the British response to the July 2005 bombings in London. In Russia, public outrage over terror attacks on a theatre in Moscow and a school in Beslan produced sufficient national unity for Putin to respectively wage war in Chechnya and consolidate power in the central government at the expense of provincial governors.

Deprived of its role as a guardian of the collective good that rises above sectoral interests, the central bank is more likely to operate in the wake of an exceptional terror attack against a single veto payer – the government – that may pressure the bank to accommodate its policy. All the more so if the public cares less about economic issues when terrified by such a terror attack, and does not monitor government–bank relations.

In contrast, dampened distributive struggles would make it easier to maintain the macro-economic policies required to maintain a fixed exchange rate, giving greater credibility to such a commitment. Thus, again, terror attacks make an independent central bank less credible and less effective in reducing inflation, and exchange rate commitments more credible and more effective in reducing inflation. In formal terms, $F$ falls in the short-term with more terrorism.

Of course, not all of the governments in the examples given above attempted to stabilize their exchange rates. However, this paper does not predict that terror-stricken governments
will necessarily opt for a fixed exchange rate, only that, if they did, terror attacks would increase the effectiveness of the peg in reducing inflation compared with a free float. Irrespective of their experience with terror attacks, many governments have chosen inflationary policies over macroeconomic stabilization, and terror attacks are not argued here to affect this choice.

Hypothesis 2: The more destructive are exceptional (off-trend) terror attacks in a given country, the less intensive would its domestic political struggle become and the more (less) effective an exchange rate commitment (an independent central bank) would be in reducing inflation.

3. RESEARCH DESIGN

3.1. Sample and Method of Estimation

This study uses a pooled time-series cross-sectional annual national data set. The sample consists of 31 years (1975–2005) and 87 non-Communist countries, including 29 OECD member states (all pre-2010 members except Luxembourg), eight additional EU member states, nine additional non-EU transition economies (bringing the total of transition economies in the sample to 19), 12 additional Latin American countries, five Arab countries, seven additional non-Arab Asian countries and 17 additional non-Arab African countries (see Table I). Higher frequency data are unavailable for such a diverse sample in certain variables, especially inflation.

This study uses a Prais-Winsten estimator, which calculates Panel-Corrected Standard Error (PCSE) estimates for linear cross-sectional time-series models (Stata 9 software package). The disturbances are assumed to be heteroskedastic and contemporaneously correlated across the panels. First-order lagged dependent variables are included in most regressions.

3.2. The Dependent Variable

The measure of price inflation used in this study is INFLATION, which is the adjusted annual percentage change in consumer price inflation, based on the World Bank’s World Development Indicators database. Where this series was unavailable, the GDP deflator was used instead. Adopting the method used by Cukierman et al. (1992), the rate of inflation in percentage points ($\pi$) in each observation is transformed with the following formula to reduce the weight of outlying observations: $(\pi/100)/(1+\pi/100)$. Thus, INFLATION returns a value of 0 for an inflation rate of 0%, 0.5 for an inflation of 100%, and 1 for an infinite rate of inflation (see Table II). For negative rates of inflation the formula used is $(\pi/100)/(1–\pi/100)$. INFLATION represents $\pi^*$ in the formal discussion above.

3.3. Independent Variables

To test its hypotheses, this study uses two independent variables, which are expected to be negatively associated with INFLATION. BOARD is a dummy variable scoring 1 for either ‘Currency board arrangements’ or ‘Exchange arrangements with no separate legal tender’, as classified in the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions. BOARD represents $1–\alpha$ in the formal discussion above.

BANK is a proxy index for legal central bank independence, based on Cukierman’s (1992) method and an analysis of the legal documents in force during the sample period. It ranges from 0 (no independence at all) to 1 (full independence). This series is based on additional data.
from Cukierman * et al. (2002), Jácome and Vázquez (2005) and the author’s own analysis for countries and years not covered by the above sources.¹¹ BANK represents I in the formal discussion above.

¹¹ In Cukierman’s original study a behavioral measure of central bank independence was preferred over the legal measure in the case of developing countries. However, such a measure is endogenous, and the control for transparency and the rule of law in this study improves the legal measure’s relevance, even for developing countries. I thank Alex Cukierman for his helpful comments on this matter.
3.4. Intervening Variables

In accordance with equation (9), the intervening variables are political fragmentation ($F$) and transparency ($R$). Political fragmentation is relatively easily measured in functioning democracies, for example by using the distribution of seats in the legislature among political parties. However, in semi-democracies and autocracies data on the strength of political groups are distorted or non-existent. Indeed, many of the sample countries are either not fully democratic, or have become democratic only in recent years (see discussion below on DEMOCRACY, and its descriptive statistics in Table II). Thus, the proxies used for political fragmentation must be relevant and reliable regardless of the political system. LANGUAGE and FRAGMENT both range from 0 (a society made of a single group) to 1 (a society made of an infinite number of groups). They are calculated as the inverted sum of squares of the shares in the population, of the groups that make up each country’s society.

$\text{LANGUAGE}$ considers only linguistic cleavages while FRAGMENT repeats this calculation for ethnic and religious cleavages too, and takes in each observation the maximum value of the three.

Obviously, LANGUAGE and FRAGMENT are very crude proxies of political fragmentation. There are other important cleavages, such as socio-economic classes. And of course, in different countries, fundamental cleavages may translate differently into political divisions, according to institutional features, such as electoral law. However, in addition to their objectivity to the political system, LANGUAGE and FRAGMENT are exogenous to other variables

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12 This formula is based on Rae’s (1971) fragmentation index.
13 Ethnic and religious composition data is based on CIA Factbook, while linguistic composition data, which relates to mother tongue languages, is based on Gordon (2005). For lack of better data, the same LANGUAGE and FRAGMENT values are used for each country during the entire sample period. However, in the majority of cases ethnic, religious and linguistic stability seems anyway plausible.
and can be regarded as a fundamental cause of political schism rather than merely its reflection. In such a large sample high FRAGMENT values can be assumed to be associated with fragmented democratic governments (Lijphart, 1999), or autocracies that yield to many special interests. Even autocratic regimes, where veto players may be obscure and not easily identifiable, can be potentially unstable when they preside over fragmented societies.

Three proxies for transparency (R in the formal discussion above) are used in this study. DEMOCRACY is an index of institutionalized democracy, ranging from 1 for completely democratic regimes to 0 for completely autocratic regimes, based on the POLITY2 variable in the Polity IV project database. Thus, DEMOCRACY reflects the degrees of openness and competitiveness of political participation and executive recruitment, and the extent of constraints on the exercise of power by the executive. CORRUPTION is Transparency International’s Corruption Perception Index divided by ten, ranging from 1 for a perfectly clean political system to 0 for the most corrupt system. PRESS FREEDOM is based on Freedom House’s Freedom of the Press: A Global Survey of Media Independence. It ranges from 1 for a country in which print and broadcast media is the most free to report, to 0 for the least free country.

3.5. Terror Attacks

To test the hypotheses of this paper, TERROR is a measure of the deadliness and devastation of terror attacks. As explained in Section 4, TERROR is used alternatively as an intervening variable and as an instrument in two-step estimation. As in Clauset et al., (2007), TERROR is based on the sum of the number of injuries and fatalities in terror attacks in each year and country. This number is adjusted in a similar method described above for INFLATION (with the sample’s average number of injuries and fatalities replacing 1 in the denominator). Data are taken from The Memorial Institute for the Prevention of Terrorism’s (MIPT) Terrorism Knowledge Base (TKB).

Israel suffered the highest cumulative number of terror-related injuries and casualties according to the TKB – 7897 people during the sample’s 31 years. The US, Kenya and Japan also stand out with 7495, 5408 and 5111 people respectively. However, many of these are victims of singular events: the 9/11 attacks in the US, the 1998 al-Qaeda bombings in Kenya and the 1995 subway attack in Japan. Other sample countries with large numbers of victims, which are more evenly spread out over the years, are India (5796), post-Soviet Russia (4945), Colombia (3524), Turkey (2548), the Philippines (2536), Algeria (2147), France (1506) and Egypt (1038).

To be sure, the number of victims is not the only measure of terror attacks used in the literature. For example, scholars have tried to characterize terrorist incidents, their timing, the number and makeup of the terrorist groups involved, their victims and the losses of life and property that they caused (Blomberg et al., 2004). Eldor and Melnick (2004) distinguished between different types of targets and attacks, as well as the location of attacks and their frequency.

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14 See: http://www.cidcm.umd.edu/inscr/polity/index.htm. Democracy is also used as an instrument in two-step estimation in the next section.
15 See: http://www.transparency.org/index.php/policy_research/surveys_indices/cpi. Because this index is available only since 1995, and for many of the sample countries only later, CORRUPTION is calculated for each country as a temporally-constant, multi-annual average.
17 Thus, the formula used is victims/(22+victims) and TERROR, which ranges between 0 and 1, returns the value 0.5 for observations with 22 victims.
However, these distinctions are too detailed to be either useful or practical in a large sample such as the one used in this study. The relevance of much of this information is specific to an attack’s place and time and often eludes any meaningful cross-section comparison. For example, in Northern Ireland, Kashmir and Israel, it matters on which side of the dividing line the attack occurred. However, there are no similarly important geographical lines for al-Qaeda’s attacks. Information on terrorists or damages may also not always be available or reliable in such a diverse sample. Simply counting the number of attacks is susceptible to reporting bias, which is typical especially of attacks with no injuries and fatalities (Clauset et al., 2007), but can also occur in highly devastating events. For example, do the terror attacks of 9/11 constitute one or three events?

A measure of the impact of terror attacks could consider their media coverage, the possible symbolic value of their targets or timing and any other factor contributing to the psychological background of the attacks. More important, data on terror alerts, rather than observed attacks, could more accurately measure the effects of terror attacks on transparency, because many terror attacks may be foiled without publicity, but still affect transparency. However, there is no such available measure, especially for such a large and diverse sample of countries.

Arguably, the number of fatalities and injuries could be normalized to population size (i.e. divided in each observation by the size of the relevant country’s population). However, the psychological and political effects of terror attacks may not be proportional to population size. Indeed, the results presented in the next section did not change significantly when TERROR was adjusted to population size.

3.6. Control Variables

In addition to its interactions with the independent variables, TERROR must be specified separately in the regressions as a non-interactive variable in order to control for the non-monetary economic effects of terror attacks. As discussed above, depending on the balance of effects on aggregate demand and supply, TERROR’s coefficients can be negative or positive. Arguably, with relatively low levels of destruction the former effect of terror attacks should dominate the latter and TERROR’s coefficient should be negative.

INCOME is the logarithmic transformation of per capita PPP GDP in 2000 US dollars (based on World Bank data). It is supposed to capture the effect of the natural price-equalization process that trade generates between low-income countries and high-income countries, and is expected to be negatively associated with INFLATION. OIL is a dummy variable for the years of the oil shocks (1975, 1980–1981 in this sample), and is expected to be positively associated with INFLATION. Finally, CFA94DEV is a dummy variable controlling for the effect of the 1994 one-off devaluation against the French frank of the common currencies of the West African Economic and Monetary Union (WAEMU) and the Economic and Monetary Community of Central Africa (CEMAC in French).

4. RESULTS

Tables III and IV detail estimation results for the independent variable INFLATION. The Durbin $h$ statistics in all tables are weak, which means that the null hypothesis of no serial correlation cannot be rejected and therefore the coefficients’ estimates can be regarded as reliable. All regressions feature strong general Wald statistics, which test for the null hypothesis that all of the coefficients are zero. For each regression the tables also show Wald tests for the possibility that a sub-group of coefficients is redundant (i.e. all of these coefficients are zero).
These tests are run first on the group of all coefficients with $p$ values higher than 0.05 (if there are any coefficients with $0.05 < p \leq 0.10$), then on the group of coefficients with $p$ values higher than 0.10 (if there are more than one coefficient with such a $p$ value), and finally on the group of coefficients of variables of special theoretical interest.

The purpose of testing the significance of these sub-groups of coefficients is to find out whether their specification as a group in the model is helpful. This is important because the specification of variables in a model is based on theoretical grounds, in the context of which the variables form a whole. Thus, while a coefficient that is statistically insignificant on an individual basis may be regarded as having a value close to zero it may yet be considered as an essential part of the model if it belongs to a statistically significant group of theoretically meaningful coefficients.

### 4.1. Testing the Base Model

Table III tests the base model, as laid down in equation (11). This table reports results for six variants of the basic regression of inflation as a function of political economy covariates. The variants differ in the operational definitions of the intervening variables. BOARD and BANK are each interacted with each of the intervening variables in order to estimate the effect of transparency and political fragmentation on the effectiveness of currency boards and independent central banks in reducing inflation. For example, BOARD $\times$ FRAGMENT is the product of BOARD and FRAGMENT. Therefore, its coefficient is meant to measure how political fragmentation affects the relationship between currency boards and inflation. Whenever countries opted for a currency board, inflation in the anchor currency ($\pi_A$) is assumed to have been sufficiently low as to maintain $\beta\pi*\alpha > 0$ (see equation (15)). Thus, $\pi_A$ is not specified in Table III’s regressions.

Each regression in Table III specifies a different combination of one of the two measures of political fragmentation and one of the three measures of transparency. In accordance with the discussion above, all five interactive variables involving BOARD are expected to be positively associated with INFLATION (because $\beta\pi*/\alpha\beta\gammaR < 0$ and $\beta\pi*/\alpha\beta\gammaF < 0$ in equations (16) and (17) and BOARD stands for $1-\alpha$), while the five interactive variables involving BANK are expected to be negatively associated with INFLATION (because $\beta\pi*/\beta\gammaR < 0$ and $\beta\pi*/\beta\gammaF < 0$ in equations (13) and (14)).

The government’s relative preference for output goals ($\lambda$) and the sensitivity of output to inflationary surprise ($\gamma$) are not specified in Tables III and IV because they do not need to be controlled for in testing the hypotheses (the factor $\lambda\gamma/(1+\lambda\gamma^2)$ is applied uniformly to all variables in equations (11)–(17)). Of course, if either $\lambda$ or $\gamma$ were close to zero then all of the coefficients of the independent and intervening variables in Tables III and IV would be zero as well. In this sense, the effects of $\lambda$ and $\gamma$ are reflected in the regressions’ general Wald tests (which clearly are not zero).

Most of the coefficients in Table III have the expected signs, with the main exceptions of BANK and the interaction between BOARD and DEMOCRACY. It seems that without sufficient social and political fragmentation and sufficient transparency in politics, central bank independence may actually be associated with higher inflation. Perhaps under these conditions the formal independence of the bank is a guise, behind which the government can better abuse the public’s inflationary expectations.

Another insight from Table III’s results is that autocracy in itself (represented by low values for DEMOCRACY) may be a poor proxy for transparency’s influence on currency boards’ effectiveness in reducing inflation, compared with pervasive corruption (represented by low values for CORRUPTION). In other words, while the benefits of a currency board may be enjoyed by some democracies as well as by autocracies, corrupt countries depend on
Table III: PCSE Regressions of the Adjusted Rate of Inflation with Institutional Features

<table>
<thead>
<tr>
<th>Regression number</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
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<td>C</td>
<td>0.068***</td>
<td>0.029</td>
<td>0.077***</td>
<td>0.056**</td>
<td>0.019</td>
<td>0.061**</td>
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<tr>
<td>(0.026)</td>
<td>(0.022)</td>
<td>(0.025)</td>
<td>(0.025)</td>
<td>(0.023)</td>
<td>(0.025)</td>
<td></td>
</tr>
<tr>
<td>BOARD (−)</td>
<td>−0.021</td>
<td>−0.067*</td>
<td>−0.020</td>
<td>−0.027</td>
<td>−0.073**</td>
<td>−0.031</td>
</tr>
<tr>
<td>(0.025)</td>
<td>(0.035)</td>
<td>(0.029)</td>
<td>(0.028)</td>
<td>(0.036)</td>
<td>(0.033)</td>
<td></td>
</tr>
<tr>
<td>BOARD × LANGUAGE (+)</td>
<td>0.009</td>
<td>0.039</td>
<td>0.008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.024)</td>
<td>(0.031)</td>
<td>(0.024)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOARD × FRAGMENT (+)</td>
<td></td>
<td></td>
<td></td>
<td>0.013</td>
<td>0.045</td>
<td>0.016</td>
</tr>
<tr>
<td>(−)</td>
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<td>(0.029)</td>
<td>(0.032)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>BOARD × DEMOCRACY (+)</td>
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<td>−0.010</td>
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</tr>
<tr>
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<td>(0.019)</td>
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<tr>
<td>BOARD × CORRUPTION (+)</td>
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<td></td>
<td>0.068*</td>
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</tr>
<tr>
<td>(0.043)</td>
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<td></td>
<td></td>
<td>(0.037)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOARD × PRESS FREEDOM (+)</td>
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<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>(0.029)</td>
<td>(0.022)</td>
<td></td>
</tr>
<tr>
<td>BANK (−)</td>
<td>0.009</td>
<td>0.027*</td>
<td>−0.002</td>
<td>0.009</td>
<td>0.032**</td>
<td>0.002</td>
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<td>(0.032)</td>
<td>(0.016)</td>
<td>(0.031)</td>
<td>(0.030)</td>
<td>(0.015)</td>
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<td>BANK × LANGUAGE (−)</td>
<td>−0.046**</td>
<td>−0.043**</td>
<td>−0.040**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(0.021)</td>
<td>(0.019)</td>
<td>(0.021)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BANK × FRAGMENT (−)</td>
<td>−0.026*</td>
<td>−0.027**</td>
<td>−0.019</td>
<td></td>
<td></td>
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<td>(0.015)</td>
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<td>(0.014)</td>
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<td></td>
</tr>
<tr>
<td>BANK × DEMOCRACY (−)</td>
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<td>−0.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td>(0.027)</td>
<td></td>
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</tr>
<tr>
<td>BANK × CORRUPTION (−)</td>
<td>−0.068***</td>
<td></td>
<td>−0.066***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.016)</td>
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<td></td>
<td>(0.017)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BANK × PRESS FREEDOM (−)</td>
<td></td>
<td></td>
<td></td>
<td>0.002</td>
<td>−0.001</td>
<td></td>
</tr>
<tr>
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<td>(0.029)</td>
<td>(0.029)</td>
<td></td>
</tr>
<tr>
<td>INCOME (−)</td>
<td>−0.005*</td>
<td>−0.000</td>
<td>−0.006**</td>
<td>−0.004</td>
<td>0.001</td>
<td>−0.004*</td>
</tr>
<tr>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td></td>
</tr>
<tr>
<td>OIL (+)</td>
<td>0.017</td>
<td>0.021**</td>
<td>0.019*</td>
<td>0.017</td>
<td>0.021*</td>
<td>0.018*</td>
</tr>
<tr>
<td>(0.011)</td>
<td>(0.011)</td>
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</tr>
<tr>
<td>CFA94DEV (+)</td>
<td>0.243***</td>
<td>0.269***</td>
<td>0.243***</td>
<td>0.243***</td>
<td>0.269***</td>
<td>0.243***</td>
</tr>
<tr>
<td>(0.031)</td>
<td>(0.034)</td>
<td>(0.030)</td>
<td>(0.031)</td>
<td>(0.034)</td>
<td>(0.030)</td>
<td></td>
</tr>
<tr>
<td>LAG</td>
<td>0.759***</td>
<td>0.763***</td>
<td>0.748***</td>
<td>0.764***</td>
<td>0.766***</td>
<td>0.752***</td>
</tr>
<tr>
<td>(0.033)</td>
<td>(0.032)</td>
<td>(0.034)</td>
<td>(0.032)</td>
<td>(0.032)</td>
<td>(0.034)</td>
<td></td>
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<tr>
<td>R square</td>
<td>0.72</td>
<td>0.74</td>
<td>0.70</td>
<td>0.72</td>
<td>0.74</td>
<td>0.70</td>
</tr>
<tr>
<td>Wald tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>− general</td>
<td>845.96***</td>
<td>1061.5***</td>
<td>749.26***</td>
<td>845.40***</td>
<td>1038.7***</td>
<td>733.52***</td>
</tr>
<tr>
<td>− redundant variables (p&gt;0.05)</td>
<td>16.95**</td>
<td>16.29**</td>
<td>15.12**</td>
<td>28.76***</td>
<td>7.62</td>
<td>21.35**</td>
</tr>
<tr>
<td>(p value)</td>
<td>(0.018)</td>
<td>(0.012)</td>
<td>(0.019)</td>
<td>(0.000)</td>
<td>(0.107)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>− redundant variables (p&gt;0.10)</td>
<td>15.02**</td>
<td>1.72</td>
<td>11.47**</td>
<td>16.34**</td>
<td>2.12</td>
<td>17.19**</td>
</tr>
<tr>
<td>(p value)</td>
<td>(0.020)</td>
<td>(0.424)</td>
<td>(0.043)</td>
<td>(0.022)</td>
<td>(0.346)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>− redundant interactive variables</td>
<td>7.44</td>
<td>22.82***</td>
<td>4.90</td>
<td>3.74</td>
<td>18.57***</td>
<td>1.94</td>
</tr>
<tr>
<td>(p value)</td>
<td>(0.114)</td>
<td>(0.000)</td>
<td>(0.298)</td>
<td>(0.443)</td>
<td>(0.001)</td>
<td>(0.747)</td>
</tr>
<tr>
<td>Durbin h statistic</td>
<td>0.776</td>
<td>0.644</td>
<td>0.916</td>
<td>0.756</td>
<td>0.650</td>
<td>0.898</td>
</tr>
<tr>
<td>(p value)</td>
<td>(0.438)</td>
<td>(0.520)</td>
<td>(0.360)</td>
<td>(0.450)</td>
<td>(0.516)</td>
<td>(0.369)</td>
</tr>
</tbody>
</table>

Notes: All regressions use a Prais-Winsten estimator, which assumes heteroskedastic disturbances and first-order serial autocorrelation. Column entries are parameter estimates, standard errors in parentheses (p values in parentheses for Wald, and Durbin h tests). Signs by variables’ names indicate their expected relationship with the dependent variable.

* 0.05 < p ≤ 0.10. ** 0.01 < p ≤ 0.05. *** p ≤ 0.01.

it, democratic or not. Corruption is especially potent in eroding the effectiveness of central bank independence in reducing inflation (see the highly significant coefficients of BANK × CORRUPTION in Regressions (2) and (5)). As for PRESS FREEDOM, like DEMOCRACY it returns mixed results when interacted with the independent variables.
Most of the coefficients in Table III suffer from relatively weak statistical significance on an individual basis. However, the strong Wald tests at the bottom of the table indicate that taken collectively as a model they should not be regarded as having a value of zero. This conclusion is true as a general observation for Regressions (1), (3), (4) and (6), as the tests for variables with $p>0.05$ and $p>0.10$ show. However, from a theoretical point of view, the more important finding is that the interacted proxies for transparency and political fragmentation as a group do not seem to contribute much to the model in these same regressions (see weak Wald tests at the second row from the bottom). In contrast, these variables are very significant to the model as a group in Regressions (2) and (5). The tests for the latter two regressions can be interpreted to imply that only the coefficients of INCOME (in both regressions) and OIL (in Regression (5) only) can safely be regarded as insignificant.

Similar results were obtained when BOARD was expanded to include cases declared as ‘Other conventional fix peg arrangements’ in the IMF classification, but the coefficient of this expanded version of BOARD was smaller in absolute terms (i.e. a currency board is unsurprisingly more effective in reducing inflation than a regular peg). Controlling for inflation in the anchor currency ($\pi_A$) returned similar results too, which can be explained by the relatively low rates of inflation in the anchor currencies of all of the sample’s currency boards, as assumed above. Substituting a measure of world average inflation for OIL did not significantly change the results either.

When the specifications of Table III were repeated using lagged independent and control variables (except for OIL and CFA94DEV) to capture any possible lagged effects on the rate of inflation, the results were similar, but coefficients were smaller (in absolute terms) and weaker in their statistical significance on an individual basis. Interestingly though, CORRUPTION was found to enable a strong lagged effect on the effectiveness of central bank independence and lagged DEMOCRACY was found to influence currency boards in the expected direction. Given the results in Table III, DEMOCRACY and PRESS FREEDOM are dropped at this stage.

4.2. Testing the Hypotheses

Table IV introduces TERROR to the specifications of Regressions (2) and (5) in order to test the hypotheses presented above. Since it is hypothesized that the effects of terror attacks on national unity tend to be transitory, while their effect on transparency tends to be long-term in its nature, trended values of TERROR are used to test Hypothesis 1, and off-trend values of TERROR are used to test Hypothesis 2.

Ideally, TERROR’s effect on transparency and political fragmentation should be tested in two-step estimation. Such estimation can show in the first step how terror reduces transparency and political fragmentation, and in the second step run Regressions (2) and (5) with instrumented (fitted) values of CORRUPTION and LANGUAGE or FRAGMENT. This indeed, is the method applied for testing Hypothesis 1 in (second-step) Regressions (7) and (8) in Table IV and (correspondingly first-step) Regressions (11) and (12) in Table V. As required in two-step estimation, CORRUPTION is run in Table V on all of the exogenous variables in the second-step regression as well as the instruments. The instruments are trended TERROR, and DEMOCRACY, which as an alternative measure of transparency is expected to be positively related to CORRUPTION. Hypothesis 1 is supported if in the first

\[\text{Although CORRUPTION’s values are temporally fixed, BANK’s are not.}\]
\[\text{TERROR’s values are trended with the Hodrick-Prescott filter (with a factor of 100). Using a polynomial fit in time with four trend terms instead of the Hodrick-Prescott filter did not yield meaningfully different results.}\]
<table>
<thead>
<tr>
<th>Regression number</th>
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<th>(8)</th>
<th>(9)</th>
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</tr>
</thead>
<tbody>
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<td>C</td>
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<td>0.092</td>
<td>0.029</td>
<td>0.020</td>
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<td></td>
<td>(0.057)</td>
<td>(0.059)</td>
<td>(0.024)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>BOARD (−)</td>
<td>−0.116***</td>
<td>−0.101**</td>
<td>−0.067*</td>
<td>−0.074**</td>
</tr>
<tr>
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<td>(0.043)</td>
<td>(0.042)</td>
<td>(0.035)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>BOARD × LANGUAGE (+)</td>
<td>0.072**</td>
<td>0.039</td>
<td>0.072**</td>
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</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.032)</td>
<td>(0.033)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>BOARD × LANGUAGE × TERROR (off trend) (−) [H2]</td>
<td>0.013</td>
<td>0.011</td>
<td>0.013</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.046)</td>
<td>(0.048)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>BOARD × FRAGMENT (+)</td>
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<td>0.045</td>
<td>0.057</td>
<td>0.045</td>
</tr>
<tr>
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<td>(0.036)</td>
<td>(0.033)</td>
<td>(0.036)</td>
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</tr>
<tr>
<td>BOARD × FRAGMENT × TERROR (off trend) (−) [H2]</td>
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<td>0.015</td>
<td>0.018</td>
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</tr>
<tr>
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<td>(0.041)</td>
<td>(0.043)</td>
<td>(0.041)</td>
</tr>
<tr>
<td>BOARD × CORRUPTION (+)</td>
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<tr>
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<tr>
<td>BOARD × CORRUPTION × TERROR (trend) (−) [H1]</td>
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<td>(0.041)</td>
<td>(0.044)</td>
<td>(0.041)</td>
</tr>
<tr>
<td>BOARD × INSCORRUPTION (+) [H1]</td>
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<td>0.109**</td>
<td>0.148**</td>
<td>0.109**</td>
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<td>(0.063)</td>
<td>(0.052)</td>
<td>(0.063)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>BANK (−)</td>
<td>0.011</td>
<td>−0.005</td>
<td>0.027*</td>
<td>0.032**</td>
</tr>
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<td>(0.083)</td>
<td>(0.078)</td>
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<td>(0.016)</td>
</tr>
<tr>
<td>BANK × LANGUAGE (−)</td>
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<td>−0.045**</td>
<td>−0.054**</td>
<td>−0.045**</td>
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<tr>
<td></td>
<td>(0.022)</td>
<td>(0.020)</td>
<td>(0.022)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>BANK × LANGUAGE × TERROR (off trend) (+) [H2]</td>
<td>0.009</td>
<td>−0.007</td>
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</tr>
<tr>
<td></td>
<td>(0.041)</td>
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<tr>
<td>BANK × FRAGMENT (−)</td>
<td>−0.024*</td>
<td>−0.027**</td>
<td>−0.024*</td>
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<tr>
<td></td>
<td>(0.015)</td>
<td>(0.013)</td>
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<tr>
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<td>(0.037)</td>
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<tr>
<td>BANK × CORRUPTION (−)</td>
<td>−0.073***</td>
<td>−0.071***</td>
<td>−0.073***</td>
<td>−0.071***</td>
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<td>(0.019)</td>
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<tr>
<td>BANK × CORRUPTION × TERROR (trend) (+) [H1]</td>
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<tr>
<td>TERROR (trend)</td>
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<td>(0.010)</td>
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<tr>
<td>TERROR (off trend)</td>
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<td>0.002</td>
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<tr>
<td>INCOME (−)</td>
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<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.002)</td>
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<tr>
<td>OIL (+)</td>
<td>0.018*</td>
<td>0.018*</td>
<td>0.021*</td>
<td>0.021*</td>
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<td>(0.011)</td>
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<tr>
<td>CFA94DEV (+)</td>
<td>0.242***</td>
<td>0.243***</td>
<td>0.269***</td>
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<tr>
<td></td>
<td>(0.031)</td>
<td>(0.031)</td>
<td>(0.034)</td>
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<tr>
<td>LAG</td>
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<td>0.768***</td>
<td>0.761***</td>
<td>0.765***</td>
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<tr>
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<td>2099</td>
<td>2120</td>
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<tr>
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<td>Wald tests</td>
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<td>945.10***</td>
<td>1089.3***</td>
<td>1070.9***</td>
</tr>
<tr>
<td>– general</td>
<td>15.32**</td>
<td>20.32**</td>
<td>18.50*</td>
<td>9.29</td>
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<td></td>
<td>(0.032)</td>
<td>(0.016)</td>
<td>(0.071)</td>
<td>(0.411)</td>
</tr>
<tr>
<td>– redundant variables (p&gt;0.10)</td>
<td>11.89*</td>
<td>12.00</td>
<td>4.86</td>
<td>5.57</td>
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<tr>
<td></td>
<td>(0.065)</td>
<td>(0.010)</td>
<td>(0.772)</td>
<td>(0.695)</td>
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step CORRUPTION is found to be negatively associated with trended TERROR and in the second step the coefficients of BOARD × INSCORRUPTION and BANK × INSCORRUPTION (instrumented CORRUPTION) are larger (absolutely) and statistically more significant than the coefficients of BOARD × CORRUPTION and BANK × CORRUPTION in Table III.

However, political fragmentation cannot be instrumented for lack of endogenous proxies in this sample. LANGUAGE and FRAGMENT measure linguistic, ethnic and religious cleavages, which change very slowly and cannot be conceived of as responding to terror. Thus, instead of instrumenting political fragmentation, for the sake of testing Hypothesis 2, off-trend TERROR is specified in Regressions (7)–(10) in Table IV as a second-order interactive variable, mediating between LANGUAGE and FRAGMENT on the one hand, and BOARD or BANK on the other hand.

For example, the interactive variable BOARD × LANGUAGE × TERROR is the product of these three variables and its coefficient measures the short-term effect that terror attacks have on the sensitivity of currency boards’ effectiveness to idiosyncratic social fragmentation. This specification assumes that political fragmentation is a linear function of an idiosyncratic element (I) and an endogenous element (E): I has both a direct effect on F and an indirect effect, mediated by the endogenous element (political institutions): F = aI + bEI. In accordance with the discussion above, E is hypothesized to be negatively sensitive to off-trend TERROR.
Since $\mathcal{F} / \mathcal{G} \text{TERROR} = b_1 \mathcal{F} / \mathcal{G} \text{TERROR}$, off-trend TERROR’s effect on political fragmentation is negative. Using a second-order interactive variable to test Hypothesis 2 is also compatible with the derivative $\mathcal{F} / \mathcal{G} = a + bE$.

Hypothesis 2 is supported if: (1) BOARD × LANGUAGE × TERROR and BOARD × FRAGMENT × TERROR are negatively associated with INFLATION; (2) BANK × LANGUAGE × TERROR and BANK × FRAGMENT × TERROR are positively associated with INFLATION; (3) the sum of the coefficient of each interactive variable and the coefficient of its interaction with off-trend TERROR (for example BOARD × LANGUAGE and BOARD × LANGUAGE × TERROR) is zero, thus indicating that off-trend TERROR
reverses and neutralizes the effect of political fragmentation on the effectiveness of currency boards and central banks.

This method of testing is also applied to Hypothesis 1 in Regressions (9) and (10) in Table IV. The reason for this is that INSCORRUPTION’s ability to capture TERROR’s effect is limited because CORRUPTION has a fixed value for each country throughout the sample period and thus can have only cross-sectional sensitivity to trended TERROR. Specifying trended TERROR as an intervening variable interacted with CORRUPTION may capture some of the missing variance. For example, BANK × CORRUPTION × TERROR measures the long-term effect that terror attacks have on the sensitivity to political transparency of the effectiveness of the independent central bank. Avoiding the two-step method also allows for the specification of trended TERROR as a non-interactive independent variable in Regressions (9) and (10), to estimate its direct economic effects on inflation. This cannot be done if TERROR is an instrument. Hypothesis 1 is supported if BOARD × CORRUPTION × TERROR is negatively associated with INFLATION, and BANK × CORRUPTION × TERROR is positively associated with INFLATION.

Most of the coefficients in Table IV have the expected signs. Hypothesis 1 is supported in Regressions (7) and (8) by the signs of the coefficients of BOARD × INSCORRUPTION, and the fact that they are larger and more statistically significant than the coefficients of BOARD × CORRUPTION in Table III. Results for BANK × INSCORRUPTION are more ambiguous (coefficient is negative only in Regression (7), and not statistically significant). The J statistics in Table IV are weak, which means that the second-step exogenous variables (in Regressions (7) and (8)) and the instruments in Table V are not correlated with the second-step disturbances. In Table V trended TERROR is strongly and negatively associated with CORRUPTION. Hypothesis 1 is also supported in Regressions (9) and (10) both by the signs of the coefficients of the variables that interact with trended TERROR and by the respective tests for sums of coefficients at the bottom section of the table. CORRUPTION’s idiosyncratic effects in Regressions (9) and (10) appear larger (in absolute terms) and statistically more significant than its effects in Table III (compare the coefficients of BOARD × DEMOCRACY and BANK × DEMOCRACY in both tables).

As for Hypothesis 2, the results support the effect of terror attacks on the interaction between central banks and social fragmentation. However, with regard to the interaction between currency boards and fragmentation Hypothesis 2 is supported only by the sums of coefficients at the bottom of Table IV, not by the interactive coefficients of TERROR. BANK also continues to defy expectations.

TERROR’s direct (economic) effects on inflation are very small and not statistically significant on an individual basis, although in Regressions (9) and (10) they belong to a significant group of variables. To the extent that these effects are significant, they are negative. This can be interpreted to mean that the price-depressing demand side effects of terror attacks tend to slightly dominate their supply-side price-raising effects. This is true both in the long term (trended TERROR) and short term (de-trended TERROR). But again, on balance, these are rather negligible effects.

As in Table III most of the coefficients in Table IV feature relatively weak statistical significance on an individual basis. However, the strong Wald tests for the group of institutional and terror variables in Regressions (9) and (10) support the relevance of these variables to the model. The weak results for the corresponding tests in Regressions (7) and (8) suggest that, overall, the second-step model has relatively weak explanatory power.

When these specifications were repeated using lagged variables, Hypothesis 1 was supported again, and Hypothesis 2 was also supported if TERROR was not de-trended. In other words, terror attacks make currency boards more effective in providing policy credibility, but this effect is lagging.
5. CONCLUSIONS

As terror attacks become more deadly and devastating worldwide in the 1990s, increasingly liberalized market economies are facing a challenge that requires adjustments to their political economic institutions. Terror attacks both increase the risks to government credibility and the importance of this credibility. This study argues that as terror attacks become more deadly and devastating, hard currency commitments gain credibility and effectiveness in reducing inflation, and central bank independence loses some of its credibility and effectiveness. The reason for this is that terror attacks reduce transparency in decision making processes and reduce the intensity of the domestic political struggle, thus diminishing the importance of domestic cleavages.

As a general observation, currency boards are found in this study to be more effective in reducing inflation compared with conventional pegged arrangements, which represent softer commitments, and compared with fully independent central banks. Without sufficient social and political fragmentation and sufficient transparency in politics, greater central bank independence may actually be associated with higher inflation. The reason for the relative ineffectiveness of central banks under such conditions is perhaps that the formal independence of the bank can be used as a guise, behind which the government can better abuse the public’s inflationary expectations.

The effect of currency boards in reducing inflation is also found to be more prolonged than that of central banks, detectable even with a year’s lag. Corruption is found to be a better proxy than democracy for transparency’s influence on currency boards’ effectiveness in reducing inflation. While the benefits of a currency board may be enjoyed by autocracies as well as by some democracies, corrupt countries depend on it, whether they are democratic or not, and this effect is again detectable even with a year’s lag. Corruption is especially potent in eroding the effectiveness of central bank independence in reducing inflation.

The study generally supports its hypotheses. In accordance with Hypothesis 1, under a currency board when the trend level of terror attacks rises from zero to 100 victims annually (fatalities and injuries), annual inflation falls on average by around 2.5 percentage points through terror’s effect on transparency (for detailed calculations see Annex 1). In perfectly non-corrupt countries inflation may fall by as much as 7.5 percentage points. Getting off a currency board under these conditions raises annual inflation on average by 9 percentage points. Under a perfectly independent central bank a sustained terror campaign of the above magnitude raises annual inflation on average by 4 percentage points and in a perfectly non-corrupt country by 8 percentage points. Making the central bank perfectly dependent under these conditions reduces annual inflation by 4 percentage points.

In accordance with Hypothesis 2, under a currency board, an exceptional year, when the number of terror’s victims exceeds the trend level by 100, generates on average a fall in annual inflation of 2.5 percentage points through terror’s effect on political fragmentation. Getting off a currency board under these conditions raises annual inflation by 10 percentage points. Under an independent central bank a similarly exceptional year raises annual inflation by 2 percentage points. Making the central bank perfectly dependent under these conditions reduces annual inflation by 3.5 percentage points.

However, the tendency of terror attacks to weaken the effect of political fragmentation on the effectiveness of currency boards is observable only with a year’s lag. This suggests that the ‘national unity’ effect of terror attacks is not necessarily short-term in its nature, but that it comes with a lag.

The relative weakness of the evidence for the ‘national unity’ effect of terror attacks may result from the old Prisoner Dilemma. Even when all legitimate forces acknowledge that they are in a joint predicament, each might want the others to make the required compromise that
would enable cooperation. In addition, it matters whether the terrorists are affiliated somehow to any of the domestic players or rather, are perceived as a collective threat. For example, although Shin Fein has recently become a legitimate political force in Northern Ireland it is hard to see how Republicans and Unionists would draw closer in response to a resumption of terror attacks by the IRA. Thus, greater national unity in response to terror attacks could indeed be weak. Further research may shed more light on the relationship between terror-induced national unity and inflation.

In addition to providing support for its argument this study also contributes to the literature with an improved methodology than previously used. While available political science literature on the political economy of monetary anchors focuses either on the effects of transparency or on the effects of fragmented coalitions, this study aims to better control for the interactions between these variables, by specifying all of them in a single regression. The empirical part is based on a much larger and updated sample than previously employed by political scientists studying the political economy of monetary anchors, and on a Prais-Winsten regression, which better controls for serial correlation. A special effort is made to use proxies that are exogenous, and relevant to democracies as well as autocracies. A more comprehensive study that would be based on higher frequency data or on terror alerts (rather than observed attacks) could arrive at perhaps better results.

The fight against terror is likely to go on for an extended period of time. Indeed, it may very well be a tragic feature inherent to a global liberalized economy. Obviously, credibility is not the only consideration in determining the monetary anchor of an economy. For example, it is often argued that countries may want to retain national autonomy to balance asymmetric shocks to their economies. However, countries that prefer to maintain monetary independence under conditions of greater threat from terror attacks must fully embrace democracy and fight corruption more vigorously.

ACKNOWLEDGMENTS

The author acknowledges the helpful suggestions of William Bernhard, Alex Cukierman, John Freeman, David Leblang, Leo Leiderman, Gerald Schneider, an anonymous referee, participants in a workshop on ‘Political Events, Financial Markets, and Trade’ held in Konstanz, Germany in January 2007, and participants in the 2007 Israel Economic Association Annual Meeting. The author also acknowledges the support of the Kurt Lion Foundation in organizing the workshop and a research grant from the Leonard Davis Institute for International Relations. The author is grateful to Amir Kazir and the Bank of Israel for granting him access to the Bank’s library. Nizan Feldman and Tsvika Machlof provided excellent research assistance.

References


ANNEX 1 – CALCULATION OF TERROR’S ESTIMATED EFFECT ON INFLATION

Terror’s Effect on Inflation through Transparency (Hypothesis 1)

According to the two-step method (Regressions (7) and (8), (11) and (12)): trended TERROR’s coefficients in Table V are around −0.01. BOARD × INSCORRUPTION’s coefficients in Table IV are around 0.13. Assume a country under a currency board and an average INFLATION level (0.107, or 12% inflation in this sample). When the trend level of TERROR rises from zero to 100 victims (fatalities and injuries) annually (trended TERROR=0.82) INFLATION falls by 0.82×0.01×1×0.13=0.011, to 0.096, or 10.6% annual inflation in that year. If such a country were to get off its currency board, INFLATION would rise by 0.11 (BOARD’s individual coefficient) – 0.061 (the elimination of BOARD × INSCORRUPTION, when the average value for INSCORRUPTION (in both first-step regressions) is 0.47: 0.13×1×0.47) + 0.011 (the elimination of the above terror effect) = 0.6, to 20% annual inflation. The effect of terror on the effectiveness of an independent central bank is negligible in the two-step method: BANK × INSCORRUPTION’s coefficients in Table IV are around −0.02 and not statistically significant.

According to the interactive variable method (Regressions (9) and (10)): BOARD × CORRUPTION × TERROR has statistically insignificant coefficients. However, as explained above, TERROR is understood to neutralize the interactive variables (the sums of coefficients are not significantly different from zero). The coefficients of BOARD’s interactions with CORRUPTION are around 0.08. By neutralizing this effect, under an average level of CORRUPTION (0.48), a sustained terror campaign of the above magnitude generates a fall in INFLATION of 0.031 (0.08×1×0.48×0.82), to 8.2% annual inflation in that year. However, for a clean country (CORRUPTION=1) this estimate rises to 0.066, which means that inflation is reduced from 12% to 4.3%. If a country were to get off its currency board under these conditions of terror, INFLATION would rise by 0.07 (BOARD’s individual coefficient), to 22% annual inflation (regardless of the level of CORRUPTION, the coefficient of which is neutralized by TERROR).

Under a perfectly independent central bank a sustained terror campaign of the above magnitude raises INFLATION for the average country by 0.028 (0.07×1×0.48×0.82), to 16% annual inflation in that year, and in a perfectly clean country by 0.057 to 20% annual inflation. If a clean country were to make its central bank perfectly dependent under these conditions, INFLATION would fall by 0.03 (BANK’s individual coefficient), to 8.3% annual inflation (regardless of the level of CORRUPTION).

Terror’s Effect on Inflation through Political Fragmentation (Hypothesis 2)

According to the interactive variable method (Regressions (7)–(10)): TERROR neutralizes all of the interactive variables. The coefficients of BOARD’s interactions with LANGUAGE and FRAGMENT are around 0.055. The average observation in the sample has a value of 0.33 for LANGUAGE and 0.51 for FRAGMENT. An average fragmentation level of 0.42 is taken. Thus, an exceptional year, when the number of terror’s victims exceeds the trend level by 100, generates a fall in INFLATION in that year of 0.019 (0.055×1×0.42×0.82), to 9.6% annual inflation. If an average country were to get off its currency board under these conditions, INFLATION would rise by 0.07 (BOARD’s individual coefficient), to 22% annual inflation.

The coefficients of BANK’s interactions with LANGUAGE and FRAGMENT are around −0.040. By neutralizing this effect, under an independent central bank an exceptional year of the above magnitude of terror victims generates a rise in INFLATION in that year of 0.014
(0.04×1×0.42×0.82), to 14% annual inflation. If an average country were to make its central bank perfectly dependent, INFLATION would fall by 0.03 (BANK’s individual coefficient), to 8.3% annual inflation.

ANNEX 2 – EQUATIONS

(1) \[ L_G = \frac{1}{2} \left( (\pi - 0)^2 + \lambda (y - y_n)^2 \right) \]

(2) \[ y = y_n + \gamma (\pi - \pi^e) \]

(3) \[ L_G = \frac{1}{2} \left( \pi^2 + \lambda \gamma^2 (\pi - \pi^e)^2 \right) \]

(4) \[ \pi^* = \frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \pi^e \]

(5) \[ L_G^* = \frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \frac{(\pi^e)^2}{2} \]

(6) \[ \pi = (1 - \alpha)\pi_A + \alpha \pi_D \]

(7) \[ \pi_D = (1 - \text{IRF})\pi_G + \text{IRF}\pi_B \]

(8) \[ \pi = (1 - \alpha)\pi_A + \alpha (1 - \text{IRF})\pi_G \]

(9) \[ \pi^e = (1 - \alpha)\pi_A + \alpha (1 - \text{IRF})\pi_G^e \]

(10) \[ \pi_G^* = \frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \pi^e_G - \frac{(1 - \alpha)\pi_A}{(1 + \lambda \gamma^2)\alpha(1 - \text{IRF})} \]

(11) \[ \pi^* = \frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \left( (1 - \alpha)\pi_A + \alpha (1 - \text{IRF})\pi_G^e \right) \]

(12) \[ \frac{\partial \pi^*}{\partial I} = -\frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \alpha \text{RF} \pi^e_G \]

(13) \[ \frac{\partial \pi^*}{\partial I \partial R} = -\frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \alpha \text{F} \pi^e_G \]

(14) \[ \frac{\partial \pi^*}{\partial I \partial F} = -\frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \alpha \text{RF} \pi^e_G \]

(15) \[ \frac{\partial \pi^*}{\partial \alpha} = \frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \left( -\pi_A + (1 - \text{IRF})\pi_G^e \right) \]

(16) \[ \frac{\partial \pi^*}{\partial \alpha \partial \alpha} = -\frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \text{IF} \pi^e_G \]

(17) \[ \frac{\partial \pi^*}{\partial \alpha \partial \text{F}} = -\frac{\lambda \gamma^2}{1 + \lambda \gamma^2} \text{IR} \pi^e_G \]