STOCK PRICE VOLATILITY AND POLITICAL UNCERTAINTY:

EVIDENCE FROM THE INTERWAR PERIOD*

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Abstract:

In 1914, German stock market capitalization was higher relative to GDP than in the US, and the country financed a larger share of capital formation via equity. Many countries that have largely bank-based financial systems today had thriving equity markets at the beginning of the century. This paper examines the causes of the divergent paths of financial system development highlighted in the recent work by Rajan and Zingales. They emphasize the role of the Great Depression in determining subsequent developments. In this paper, I analyze the extent to which political uncertainty, driven by institutional fragility and the tumultuous politics of the 1920s and 1930s caused instability in equity markets. Stock prices swung widely during the Great Depression, contributing to the excess volatility highlighted by Shiller and undermining the case for markets-based financial systems. I examine the Merton/Schwert hypothesis that concern about the survival of the capitalist system was crucial. Using a panel data set on riots, demonstrations and other indicators of instability 32 developed and developing countries during the interwar period, I show that political instability caused drastic falls in stock prices. Much of the increase in volatility during the Great Depression can be explained by political factors. I estimate the probability of revolution and show that higher risks of turmoil are associated with greater volatility.

JEL: G12, G14, G18, E66, N22, N24, N12, N14

Keywords: Financial market development, stock price volatility, revolutions, asset pricing, equity premium, political uncertainty, worker militancy, Great Depression.

I. Introduction

One of the main aims of financial economics is to understand the link between asset prices and various sources of risk. While considerable attention has been devoted to the role of macroeconomic variables [Campbell and Cochrane (1999), Campbell (2000)] and the impact of correlations between different risks, the influence of political factors requires further investigation. This paper attempts to provide such an analysis, examining a *cause célèbre* – share price volatility during the interwar period.

When the Great Depression struck, aggregate stock market volatility in many advanced economies reached levels not seen before or since. Schwert [1989b] estimates that in the United States, there was a two- to threefold increase in variability. According to his measure, the monthly variation of stock returns peaked at over 20 percent in 1932.[1] Other developed countries experienced similar increases in volatility. This is all the more puzzling since most macroeconomic series showed markedly smaller increases in variability [Schwert (1989)], and because stock returns and their volatility in general are only weakly related to fundamentals [Cutler, Poterba and Summers (1989)].[2]

Why did stock market volatility increase so sharply during the interwar period? In his seminal paper, Schwert [1989] concludes that there is a "volatility puzzle". Conventional ARCH and GARCH models fail to capture the rise in share price variability [Pagan and Schwert (1990)]. Because all other likely explanations are insufficient, the most likely one is that the very survival of the capitalist system, even in the United States, was perceived to be at risk. As Robert Merton has pointed out, the Russian Revolution occurred little more than a decade earlier. In the case of a communist take-over, for example, private ownership of the means of production would have come to an end. Even relatively small changes in the probability of a momentous shock like this might lead to extreme swings in market sentiment. This suggests that examinations of stock volatility may be affected by a particular form of the "Peso problem" [Merton (1987), Schwert (1989)]. If correct, this interpretation

would also help to rationalize the very high ex-post returns that are at the heart of the "equity premium puzzle" [Rietz (1988)]. Some economists have used extreme swings in stock prices to argue that there is no rational explanation for them [Shiller (1981a)].[3] If possible regime changes that ultimately failed to materialize were partly responsible, this would be erroneous [Schwert (1989)].[4] Also, general unrest may have made it made it more likely that government involvement in the economy would increase. Returning to the relatively unfettered type of capitalism seen in the 1920s may have become an increasingly less likely prospect. As Schwert [1989b, 1146] argued: "With the benefit of hindsight, we know that the U.S. and world economies came out of the Depression quite well. At the time, however, investors could not have had such confident expectations."

Did fear about social unrest and of a violent challenge to the economic status quo contribute to share price volatility in the interwar period? I use data on political risk and stock price variability in a group of 32 countries during the interwar period, 1919-1939, to derive estimates of the variation in the probability of 'disaster'. If fear of a collapse of capitalism was to blame for the extreme stock volatility in the United States, countries facing a greater threat of communist takeover or other severe disruptions of the civic and legal order should have experienced particularly high equity return volatility. The data set, containing a number of relatively advanced countries as well as from the Far East and Latin America is useful in testing this proposition. While some of these nations – such as Germany, France, and the United Kingdom – went through extreme social upheavals and political turmoil, others such as Switzerland were largely unaffected. If the volatility of stock markets increased in response to mounting challenges to the capitalist order, we should find systematic associations in our panel both in the cross-sections and within each country over time.

In view of the recent literature on the political economy of democratization, the 1920s and 1930s are also a useful period to study.

Acemoglu and Robinson argue that, over the last 200 years, extending the franchise has effectively been a way for capital owners to commit credibly to future redistribution [Acemoglu and Robinson (2000; Acemoglu and Robinson (2001)]. If this is true, then any challenges by disaffected workers should be much more threatening once universal suffrage has been granted, and the ruling classes have run out of 'franchise cards' to play. By the end of World War I, most countries had more or less completed the process of giving the vote to the adult (male) population. Therefore, it could be argued that credible promises of additional future redistribution became increasingly harder to make within the existing political and social order.

The exercise is similar in spirit to recent work on the long-term evolution of financial markets and the political factors that influence their size [Rajan and Zingales (2000)], on interwar Germany [Bittlingmayer (1998)] and on emerging markets [Bekaert and Harvey (1997), Mei (1999)]. Bittlingmayer argues that the extreme levels of volatility in Germany during the early 1920s are driven by exogenous political events, such as the revolution of 1918/19, the Hitler putsch in Munich, and the French invasion of the Ruhr. Bekaert and Harvey show that country credit ratings based on surveys of businessmen are weakly associated with stock market volatility, and Mei finds that stock prices become less stable during elections. While Bittlingmayer presents no systematic test of the connection between political instability and stock return variability, Bekaert and Harvey only find a small effect of political risk. Also, their variable is – as they admit – a composite measure of political and macroeconomic uncertainty [Bekaert and Harvey (1997)].

There is a voluminous literature on the determinants of revolutions and their relation to demographic, economic and social conditions, with contributions from sociologists and economists [Goldstone and Merton (1986; DeFronzo (1991; Goldstone (1991; Grossman (1999)]. While the interactions are far more complicated than a simple immiserization model would predict – with economic distress leading to revolutionary bids for power – inequality and

instability appear reliably associated [Alesina and Perotti (1996), Muller and Seligson (1987)]. There is also some indication that revolutions are significantly more likely during recessions, when opportunity costs are relatively low [Gasiorowski (1995; Prezworski, Alvarez et al. (1996; Acemoglu and Robinson (2000; Acemoglu and Robinson (2001)]. There are therefore strong reasons to believe that, in the eyes of contemporaries, the Great Depression looked like an excellent opportunity for revolutionaries, spreading concern amongst capitalists owning the "means of production". The slump was protracted and led to unprecedented levels of unemployment. In countries where the 1920s had seen great increases in prosperity, inequality had probably reached relatively high levels [Piketty and Saez (2003); Galbraith (1962)].

The panel data set does not contain information on the threat of communist takeover and revolution itself. Instead, I use a number of variables that could reasonably be expected to help contemporaries gauge the strength of workers militancy and the dangers to the established economic and legal system. These include the number of general strikes, of riots and anti-government demonstrations, of violent attempts to overthrow the established order, as well as indicators of the stability of governments.

I find that these political indicators can help to explain the history of stock market volatility in the interwar period. After controlling for macroeconomic sources of variability, many – but by no means all – indicators of worker militancy and left-wing radicalism led to significant and large swings in the value of equities. Section 2 describes the data, and section 3 provides further historical background. In section 4, I present the main empirical results, using panel estimation to derive the impact of social unrest and political instability, and the final section concludes.

II. Data

The stock indices in this study are similar to the set employed by Jorion and Goetzmann [1999], and made available through Global Financial Data (GFD).[5] They are broad market indices, relative to the size of the domestic equity market that they represent. In most cases GFD has attempted to reconstruct the equivalent of commonly used indices such as the S&P-500 for more distant periods in the past (details in Appendix I). All series are deflated by the respective consumer price index. Despite these broad similarities, some differences should be noted. The number of shares varies considerably – the Norwegian stock index is modeled on the OBX-25, containing the 25 largest stocks by market capitalization, whereas the British and Dutch series represent all-share indices. Differences in the composition of indices (and the relative concentration of capitalizations) can have considerable influence on aggregate measures of volatility [Bekaert and Harvey (1997)]. In the empirical part of the paper, we will try to adjust for this by using fixed-effect regressions.

Average share prices could swing wildly – in June 1923, the German index gained 61 percent, only to lose 52 percent in August. By far the highest level of average volatility is recorded for Germany, Austria, and Poland. Countries such as Belgium, Italy and the United States are markedly more stable, with average volatility of 7 percent. The United Kingdom, Switzerland and Norway recorded amongst the lowest standard deviations, of only 3.1 and 2.6 percent.

All the countries in the sample show higher than average levels of volatility during the Great Depression, with a few notable exceptions. Germany and Austria saw the highest standard deviation of monthly returns during 1923, when the hyperinflation reached fever pitch, the French invaded the Ruhr, and the country was struggling to survive as a nation state [Feldman (1993)]. 1930-33 are by far the most common years for maximum variability of share prices – sixteen out of 32 countries see the peak in equity volatility in one of these years. In absolute terms, the United States, Sweden and Belgium

recorded relatively high levels of variability. Relative to average share price volatility, a broadly similar ranking emerges. In six out of ten countries, the standard deviation more than doubled from average to maximum, led by Germany, Australia, Sweden, the United States and Great Britain. In Belgium, on the other hand, volatility in 1931 rose by only half.

The data on civic unrest and political stability is from the cross-national data set, compiled by Arthur Banks under the auspices of the Center for Comparative Political Research at the State University of New York. In addition to a set of demographic and economic variables, it also contains information on the nature of the political system and social instability for a set of 166 over the period 1815-1973. Table II shows the main indicators for our subsample of 32 countries, and the data set as a whole. Overall, the interwar data set exhibits a relatively high level of political instability and violence. For most indicators of political uncertainty, the levels are 50 percent higher than the average observed in the larger data set. This is true of the number of assassinations, of general strikes, government crises, riots, and anti-government demonstrations. In three categories, the subsample actually appears more stable – there were fewer revolutions, purges and acts of guerrilla warfare than in the 166 country sample. The variability of our measures of political instability is considerable. While Germany scores very high on almost all measures of political fragility, recording a total of 188 events of unrest, Switzerland marks the opposite extreme. Only three acts indicating instability are recorded – two assassinations (in 1919 and 1923) and one riot (in 1932).

There is also plenty of change over time. While 1919 saw, for example, four times the average number of assassinations in the sample of 32 countries, there were almost none in 1936-38. The frequency of anti-government demonstrations reached more than twice is average level in 1932, and the number of riots peaked in 1934 at approximately twice its normal rate. Unsurprisingly, the tendency of governments to resort to violent acts of

repression also peaked during the tumultuous years of the Great Depression, with the frequency of purges reaching a high of 2.4 times its average level in 1934.

III. Political Instability and Civic Unrest during the Interwar Period

The countries in our dataset experienced two waves of domestic turmoil and heightened uncertainty. In each case, the continued existence of the established political and economic order was in question. Following the end of World War I and the Russian Revolution in 1917, chaos and civic unrest broke out in numerous countries. After the demise of the Habsburg dynasty and the disintegration of the Austro-Hungarian Empire, a large number of new nation states was formed. In Germany, the Emperor abdicated; revolution came when Navy sailors mutinied and widespread strikes broke out. Returning troops supporting the Social Democratic government were fighting former comrades seeking to establish a Soviet Germany, led by two leading communist intellectuals of the day, Rosa Luxemburg and Karl Liebknecht [Winkler (1985)]. Right-wing putsches such as the Kapp Putsch in 1920 and the Hitler Putsch in 1923 destabilized the new democratic order, already undermined by the harsh terms of the Versailles treaty. Leading political figures such as Matthias Erzberger and Walter Rathenau fell victim to political murder. A Belgian-French invasion of the industrial heartland, the Ruhr, as well as Communist uprisings in Saxony and Thuringia compounded problems [Bittlingmayer (1998)]. In the years 1919-23, there were 13 government crises, the same number of riots, and three general strikes. In France, there were waves of strikes in 1919 and 1920, considered by some observers as "a concerted attack upon the structure of bourgeois society" [Lorwin (1968), 334]. Nonetheless, these attacks ultimately failed – the trade union activist Merrheim observed that he "found in France a revolutionary situation without … any revolutionary spirit in the working classes" [Lorwin (1968): 335].

In the United States and Britain, demobilization after the end of the war did not lead to the same degree of extreme instability as in continental Europe. However, the very sharp contractions in output and employment in 1920/21, engineered in part to reduce prices and return to the gold standard at pre-war parities, led to a considerable rise in worker militancy. This occurred against the background of a considerable strengthening of organized labor. As in the other belligerent countries, the position of labor had improved as a result of the war effort – governments recognized unions and encouraged cooperation between them and employers.[6] Trade union membership in the British TUC (Trades Union Congress) soared from 2.2 million in 1913 to 6.5 million in 1920. In our data set, Britain records 39 riots between 1919 and 1922, 12 assassinations, 6 general or politically motivated strikes, and 5 major government crises over the period. The average number of days lost in industrial disputes soared from 4.2 million in 1915-18 to 35.6 million in 1919-23, the highest recorded value.[7] Dissatisfaction with the established order could take a number of forms. In the United States, there were 5 assassinations and four general or politically motivated strikes in 1919-23. Only one riot broke out, but 17 anti-government demonstrations were recorded. The total number of strikes increased sharply, to 3,630 in 1919, involving 4.2 million workers [Foner (1988)]. Fear of a Communist takeover took the form of the so-called "Red Scare". Following the founding of the Third International in March, two Communist parties were formed in 1919, and quickly became active in propaganda [Schmidt (2000)]. In response to bombs mailed to politicians, a widespread crack-down began, led by the Justice Department's Radical Division under J. Edgar Hoover.

The second half of the 1920s saw a considerable decline in worker militancy and political violence. The 'roaring twenties' brought prosperity to many countries, with some exceptions. The United States economy expanded rapidly, France reaped the benefits of currency stabilization under Poincaré, and Germany, with the help of foreign loans, experienced an upsurge in

activity after the end of the hyperinflation [Eichengreen (1992), Balderston (1993), Borchardt (1991)]. At the same time, Britain's economy – tied to gold at an overvalued exchange rate – continued to languish [Moggridge (1972)]. But even in those countries that did not experience booms, labor militancy was on the wane. With the exception of the general strike in Britain in 1926 [Flanders (1968)], labor movements created few troubles. The democracies of central Europe appeared to be stabilizing [Maier (1975)]. Riots declined to less than one-third their average frequency in the preceding half-decade; government crises, which had been running at an average of more than 10 per year in the early 1920s, fell to 3 in 1927, 2 in 1928, and 5 in 1929.

The second wave of unrest and politically motivated violence began in 1930, with the start of the Great Depression. Over the course of the crisis, industrial output in the United States and Germany fell by 40-50 percent from peak to trough, and between a quarter and a fifth of all industrial workers were unemployed over the period 1930-38 [Feinstein, Temin and Toniolo (1997)]. In the face of massive capital outflows and pressure on reserves as a result of banking panics in Germany, Austria and the United States, central banks first tried to defend the gold standard by a policy of deflation [Eichengreen (1992)]. Eventually, more and more countries abandoned the peg, either by devaluing or via a system of capital controls. Countries that remained on gold for a long time experienced the most severe contractions. France, which had initially avoided problems, eventually experienced major difficulties. Faced with a slump that extended into the second half of the 1930s, it was eventually forced to devalue in June 1937. Britain, which was amongst the first to abandon the gold standard, escaped relatively lightly.[8] Recovery in general came faster and in a more robust way to the countries that devalued earlier [Eichengreen and Sachs (1985)].

Economic difficulties were quickly reflected in the politics of the street and the factory floor. The total number of anti-government demonstrations soared from 22 in 1925-29 to 72 in 1930-34; riots rose from 62 to 108. The

number of politically motivated general strikes increased from 7 to 10. In Germany, there is clear evidence that high rates of unemployment did much to boost the fortunes of the Communist party, already one of the strongest in the world [Falter (1991)]. Recent research also demonstrates that areas in which incomes contracted particularly sharply saw the largest increase in votes for the Nazis [Stögbauer (2001)]. In Britain, the Bank of England decided to leave the gold standard instead of raising the (relatively low) discount rate – a decision that can only be understood as an attempt to avoid any further rise in unemployment, and the threat of instability that would follow from it [Eichengreen and Jeanne (1998)]. Apprehensiveness was accentuated by the mutiny of the Royal Navy in the port of Inverness in 1931.

In the United States, the Communist party expanded rapidly during the Great Depression, and union membership soared. As "Hoovervilles" spread around American cities, bitterness against the rich and civic unrest became more widespread. Arthur Schlesinger noted about the year 1931 that "a malaise was seizing many Americans, a sense at once depressing and exhilarating, that capitalism itself was finished" [Schlesinger (1957), 205]. The Hoover administration – despite its general willingness to balance the budget by whatever means necessary – opposed a cut in Army infantry units in 1931 because it would "lessen our means of maintaining domestic peace and order." [Schlesinger (1957), 256]. In a secret message to Congress, the President urged that troops be exempted from a 10 percent pay cut so that the nation would not have to rely on disaffected troops in case of internal troubles. William Z. Foster, one of the most outspoken Communists in the US, published his book *Toward Soviet America* in 1932. The party found rich grounds for its agitation amongst the millions of unemployed and impoverished [Schlesinger (1957), 256, 219]. In the same year, the so-called Bonus Army marched on Washington – veterans demanding that their bonuses be paid ahead of time. It took cavalry, infantry and tanks, commanded by General Douglas MacArthur, to regain control [Zinn (1999), 381-2].

Perhaps even more importantly, the crisis rapidly increased the chances of Franklin D. Roosevelt gaining office. While even the most conservative businessmen did not equate this with a communist take-over, worries about the continued existence of "capitalism as we know it" were rampant. As Schlesinger noted, the "New York governor was the only presidential candidate in either major party who consistently criticized business leadership, who demanded drastic (if unspecified) changes in the economic system, who called for bold experimentation and comprehensive planning." [Schlesinger (1957), 290-1] Worries about future economic policy were compounded by the increasing realization that a return to the so-called "New Era" of prosperity and growth was impossible. Faced with growing labor militancy and an increasing willingness to contemplate central planning among the mainstream parties, right-wing radicalism also began to gain a following. Some observers and politicians, including prominent US senators, began to call for a Mussolini-style government, and magazines such as *Vanity Fair* and *Liberty* argued the case for a dictatorship [Schlesinger (1957), 268].

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IV. Unrest and Volatility

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Average volatility in our sample shows two peaks, one during the early 1920s, and a second one during the Great Depression (Figure 2). These run broadly in parallel with the upsurges in political violence and worker militancy. In this section, I discuss the extent to which we can find a systematic association between the two. Some of our measures of political instability appear highly correlated with stock returns, as well as with each other. Table III presents pairwise correlations. Assassinations, strikes, acts of guerrilla warfare, riots, purges and revolutions are frequently correlated with each other. The correlation of stock price volatility with government crises is also evident and significant at the 10 percent level, as is the impact of riots and demonstrations. Growth is related to two political variables – demonstrations and the number of riots. This suggests that any possible link between share price volatility and

political instability has to be examined for a potential omitted variable problem, since a slump in growth could simultaneously raise worker militancy and lead to higher share price volatility.

This paper adopts a simple strategy to test the Schwert/Merton hypothesis empirically. Shiller [1981b] observed that, to account for observed stock price volatility, the risk of a catastrophic event does not only have to be sufficiently high to affect valuations, but the risk itself has to fluctuate substantially. If π is the probability of a catastrophic event, then

(1)
$$\prod_{j=0}^{k}(1-\pi_{t+j})$$

is the probability that no disaster occurs between time t and t+k. Using the standard, discounted dividend model, the expected price of equity can be rewritten as

(2)
$$p_t = E_t \sum_{k=0}^{\infty}(\prod_{j=0}^{k}(\gamma(1-\pi_{t+j})))d_{t+k}$$

where $\gamma = 1/(1+r_t)$, r is the real interest rate, and d is dividends. Shiller [1981b] argues that "the disaster model can explain the volatility of stock prices only if the probability of disaster changes substantially from period to period… the standard deviation of the probability that disaster will occur … must have exceeded 0.05 if movements in p_t are to be attributed to new information about current and future π." We will also have to show that π becomes large enough to influence *p* decisively.

Fixed Effects Estimation

As a first step, I demonstrate the extent to which equity prices slumped when political risk and labor unrest reached high levels. To this end, I estimate

(3)
$$r_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{it}$$

where r is the real return of the share price index, X is a set of macroeconomic controls, and π is an indicator of instability. Higher numbers of demonstrations (DEMO), riots (RIOT), anti-government strikes (STRIKE), government crises

(GCRISIS) and acts of guerrilla warfare (GUER) are systematically associated with lower stock prices, while GDP growth correlates with higher stock prices (Table III). The impact of these events is also large. Anti-government (including general) strikes coincide with a 3 percent drop in the main market index; demonstrations, government crises and acts of guerrilla warfare cause falls of 1.8 to 2.2 percent. These effect are independent of controlling simultaneously for GDP growth. This suggests, for example, that the surge in politically motivated strikes in the US in 1931 should have led to a fall in stock prices by between 12 and 19 percent – the actual decline was 32 percent.

Stock prices fell sharply when worker militancy and general political uncertainty increased. Interestingly, the standard deviation of unrest is high enough to have the potential to explain share price volatility. For the US, for example, where anti-government demonstrations registered a standard deviation of 0.061, Shiller (1981b) argued that the risk of catastrophe had to show a variability of at least 0.05 to account for "excess volatility". Therefore, if the risk of catastrophe moved with a surge in anti-government demonstrations, it could provide a good explanation. The fitted returns from a pooled regression of observed log price changes on strikes alone have a standard deviation of 0.042, compared to a sample average of 0.12 – thus easily demonstrating the potential to account for a good part of the higher-than-average volatility during the period.

To test for connections between the degree of political uncertainty and stock market volatility more formally, I estimate panel regressions of the type:

(4) $$\sigma_{it} = \alpha_i + \beta_2 \sigma_{\pi,it} + \varepsilon_{it}$$

where σ_{it} is the standard deviation of annual real stock returns in country i over a five-year interval t, and $\sigma_{\pi, it}$ is the standard deviation of the indicators of political and social instability discussed earlier. In order to obtain estimates of stock market volatility and the instability of political and social conditions at a common frequency, I group the data into five-year periods. Thus, our 32

cross-sections allow for a maximum of 4 observations each, for a maximum number of 128 observations.

Volatile political conditions, such as wide swings in strike activity, riots and the anti-government demonstrations are significantly correlated with higher stock price volatility. This is independent of the use of fixed effects, to control for country-specific volatility levels. The size of the estimated coefficients differs substantially across specifications. Simple OLS in Table IV, equations 1-3 suggests that a more volatile strike situation, combined with numerous demonstrations generates substantial stock market instability. However, there appear to be systematic country effects – as well as country-specific levels of social and political unrest, which helps to account for the differences in estimation results. Anti-government demonstrations and strikes emerge as strongly significant and large under both procedures. The effect of riots is more clearly discernible in the fixed-effects model, and assassinations and government crises also appear to add to stock market instability.

Ideally, we would like to control for the volatility of output directly. The variability of output can change substantially over time [Blanchard and Simon (2001)]. Unfortunately, only few of the countries in our sample actually have historical time-series of industrial output on a monthly basis that cover the period 1919-1939.[9] To examine the differential effects of recessions, I include the percentage change in real per capita income in the regressions. Controlling for the macroeconomic environment in this way leaves most of the results unchanged, with the possible exception of anti-government demonstrations, which become insignificant at customary confidence levels in the fixed effects model.[10] These results are similar to the recent finding that share price volatility in emerging markets is systematically higher during elections [Mei (1999)].

Using the standard deviation of monthly returns in country i at time t as a dependent variable generates easily interpretable results. Yet one of the well-observed regularities of equity returns is time-varying volatility – large

(positive or negative) returns tend to be followed by large (positive or negative) returns.[11] To address this issue, we can add lagged values of share price volatility to the basic regressions setup. Equations 11 and 12 do so. The size of coefficients on demonstrations and riots rises substantially, bringing them more closely in line with the estimates from OLS. Lagged volatility itself does not appear to be significant, however – while temporal dependence may matter in the short run, it is clearly much less of an issue over longer horizons.

How good is the model in explaining the increase in stock market volatility during the Great Depression? In the sample as a whole, share price volatility increases from a median standard deviation of 3.7 percent in 1925-29 to 5.3 percent in 1930-34. The median standard deviation of demonstrations rises from 0.7 percent to 3.2, a rise by 1.6 percent. The coefficient from eq. 1 predicts an increase in volatility by 1.1 percent, equivalent to two-thirds of the observed rise in volatility. The case of the UK provides a good example to illustrate the effects. Between 1925-29 and 1930-34, stock market volatility increased from 1.9 percent to 4 percent. The number of riots surged from 2 to 13. For the late 1920s, the standard deviation of riots is 1.2 percent; for the early 1930s, it is 6.8 percent. This alone should have caused volatility to increase by 0.8 percent. Thus, this simple indicator of political instability is sufficient to account for one third of the rise share price volatility – even if a large part of the observed increase is still unaccounted for.[12]

Political chaos and unrest, especially acts of labor militancy aimed against the government of the day and the political system more broadly, did contribute to higher volatility of stock returns during the interwar period. While the effect is not uniformly strong for all indicators of instability, a number of variables emerge as consistently significant. These are the number of strikes and anti-government demonstrations. Independently of the estimation strategy used, the inclusion of fixed effects, and the selection of sub-samples, these appear to be a considerable part of the story about highly variable stock returns during the Great Depression.

Sample Selection Bias

Not all countries are continuously observed during the entire period. In some cases, national stock markets took a while to be created, and to attract a sufficient number of listings to form an index. Ireland is a case in point. In other cases, significant political and economic turmoil led to the closure of stock markets. Where domestic strife lead in civil war, the closure of markets was commonplace. Spain after 1936 is a good example. This may bias our results – we effectively analyse the effect of domestic unrest and political instability conditional on the stockmarket staying open for business, and trading being sufficiently regular to compile the main market index. Yet most of the indicators of social instability are available for the whole period 1919-1939. This allows us to derive estimates that correct for sample selection bias, using the Heckman estimation method. We calculate

$$(5) \quad \sigma_{it} = \alpha_i + \beta_2 \sigma_{\pi,it} + \varepsilon_{it}, E(\varepsilon | \sigma_{\pi,it}) = 0$$
$$s_{it} = 1[\gamma Z + v \geq 0]$$

where $s_{it}=1$ if we observe σ_{it}, and zero otherwise. Z and $\sigma_{\pi,it}$ are always observed, and $\sigma_{\pi,it}$ is a subset of Z – we hypothesize that the same reasons that will make it more likely for a stockmarket to shut down are at work when share price volatility becomes high. If ε and v are correlated, there is evidence of sample selection bias. We can then add a correction term to the estimation that scales the inverse Mill's ratio by ρ, the correlation between v and ε:

$$(6) \quad \sigma_{it} = \alpha_i + \beta_2 \sigma_{\pi,it} + \rho \lambda(\gamma Z)$$

If ρ is zero, (6) collapses to (4). We can use some of the additional indicators of unrest not yet employed as part of $\sigma_{\pi,it}$ to augment Z.

Table IV gives the results. In every case, the χ^2-test for the significance of ρ shows that including the sample selection correction is valid. The coefficients on σ_{DEMO} and σ_{STRIKE} are substantially larger than under OLS, but

the coefficient on riots remains insignificant. The selection equations also demonstrate that unrest – in its various forms – makes it more likely for a stockmarket to disappear or close temporarily, thus bearing out the initial intuition. Greater instability thus spilled over from the volatility of equity prices into the wider context of market institutions.

IV estimates of the impact of unrest

Recessions are known to be systematically associated with higher stockmarket volatility [Schwert (1990), Schwert (1989)]. This raises the possibility of omitted variable bias. If generally poor economic performance led simultaneously to both greater worker militancy, associated with a higher perceived risk of political turmoil, and to higher stock volatility, the documented impact of our indicators of civic unrest may not be very revealing. Greater stock price instability would simply reflect poor economic performance. Either part of the shock from a downturn would be transmitted via social and economic unrest – with higher unemployment leading to a rise in economic misery and (perceived) threats to the survival of the capitalist system –, or the correlation could be entirely spurious. These potential problems need to be addressed since the preliminary data analysis in the introductory section showed that riots and the number of demonstrations were significantly and inversely correlated with growth.

Including growth explicitly can control for some of the bias. Yet adding further exogenous variables in the presence of multicollinearity cannot yield conclusive results. In addition to the link running from economic conditions to unrest and asset price instability, I argue that more deeply "embedded" features will make a country more prone to fray under pressure. This is the component that should be most relevant for the extreme conditions under which the disaster model is applicable. Table VII depicts the hypothesized causal relationships. Better economic performance should lead to lower stock market volatility, both directly and through reducing the incidence of

economically-motivated unrest (which may spill over into demonstrations with a political agenda etc.).

For the proposed instruments to be useful, we need to show that they are unaffected by contemporaneous political conditions, significantly related to unrest, and that the component of unrest driven by them contributes importantly to swings in asset prices. The first instrument I use is based on Comintern priorities and composition of its founding congress in 1919 to predict anti-government demonstrations, riots, and strikes. After the October Revolution, the new Soviet government expected that communists elsewhere could quickly seize power. The Third International, founded in Moscow in 1919, was launched by delegates from 34 countries – four of which had five votes each, the rest one each. This is a first indicator of differences in priority attached to individual countries, if an imperfect one. Also, because of the turmoil of civil war, few delegates traveled to Moscow for the Congress. Countries that did send their own delegates clearly had more highly developed Communist and Socialist parties. Finally, the extent of involvement with the new organization varied considerably, depending on intellectual, political and cultural proximity, as well as the importance assigned to a country by Lenin and his comrades. This is reflected by the delegates that signed the Manifesto.[13]

This suggests that three instruments can be derived from the early history of the Comintern. The number of votes allocated, the presence of delegates that traveled for the Congress, as well as the signatures of national representatives on the manifesto of the Third International are indicators of Communist strength that may have led to greater unrest in the 1920s and 1930s. Communist tactics varied over time and by country. Periods of agitation in favor of immediate revolution alternated with those when "building socialism in one country" was emphasized [Carr (1982); Weingartner (1970)]. The decisions in Moscow were clearly driven by expected economic conditions as well as the foreign policy aims of the Soviet Union; yet the strength of the

revolutionary impulse in each country was still partly influenced by the 1919 decisions about which countries should be on the vanguard of world revolution. The priority given to Germany in Communist planning is clearly demonstrated by the attempted revolutions in the autumn of 1923, as well by numerous earlier incidents. Because the variables are from the very beginning of our sample period, it is extremely unlikely that omitted variable biases can distort our results – economic events in 1931 cannot have determined involvement with the nascent Comintern in 1919.

In addition, we use the percentage of the population living in cities with more than 100,000 inhabitants. Crowd control was a perennial issue in 19th-century city planning, and many of the street-widening measures there served a military purpose [Foucault (1997)]. In Marx's and Engel's original writings, the rural population was not seen as key for future revolutionary transformations. Rather, it was the urban proletariat working in factories that should have been key for a violent overthrow of the established order [Marx (1872)]. In addition, we employ an indicator of fractionalization in parliament [Rae (1968)], which varies between 0 – only one party represented – and 10,000. Countries' constitutions differ systematically in the extent to which they aggregate voter's preferences into a stable, sizeable majority. Anglo-Saxon first-past-the-post systems do so to a much greater extent than proportional representation [Persson and Tabellini (2001)]. A very considerable component of fractionalization will therefore be broadly constant across time. Also, because elections only occur every few years, this variable is much less likely to be dominated by the effects of recent economic turmoil. Combined, these factors should account for a substantial part of instability not driven be contemporary economic shocks.

In Table VII, we use three dependent variables – the standard deviation of strikes, demonstrations, and riots, as well as the log of the sum of the absolute values of these (labeled log(Chaos)). We instrument using the indicators for initial importance to the Communist movement, as well as

urbanization and fractionalization in parliament. There is no strong theoretical reason for using either the standard deviation of stock returns or its logarithm as a dependent variable. In the case of instrumental variable estimation, it so happens that the log of volatility describes the underlying patterns better. The exogenous component in changes in demonstrations is clearly and strongly associated with stock market instability. Since the standard deviation of demonstrations rises by 1.5% in the US between the late twenties and the early thirties, we predict a log change of 0.21 – compared to an actual change of 0.9. Because of the evidence presented earlier that there may well be some selection bias, we re-estimate (both the first stage and the second stage) using the Heckman correction, and again find a considerable – if somewhat smaller – role for social unrest in raising stockmarket variability. Results for strikes and riots are similar, except that riots are not significant at customary levels if we use the Heckman procedure. We can aggregate the different indicators by using the log of Chaos. For every percentage point rise in the sum of strikes, demonstrations and riots, we find half a percentage point higher volatility.

Changes in the likelihood of international conflict could provide an alternative interpretation of our data. Wars cause massive disruption of production and can lead to wide-spread state intervention in the economy, as contemporaries must have been only too aware in the decades after World War 1. While no major armed conflicts broke out during the period, it could be argued that the much greater number of nation states after 1919, as well as the disputes created by the Versailles treaty, increased the likelihood of war.[14]. Yet it is hard to argue that the risk of armed conflict was high or highly variable before the late 1930s. For most of the countries in our dataset, only war with Germany would have been both possible and highly destructive. However, since the imperial army, navy and airforce had been thoroughly dismantled after 1919, it was not before Hitler's rearmament drive in the mid-1930s that this risk became significant. Even then, changes in the likelihood of war were probably gradual, and not marked by the high variability that would

be necessary for explaining stock price volatility. The periods of particularly large swings in stock prices – i.e. the early 1920s and early 1930s – were not marked by "war scares".

V. Conclusion

Political instability often coincides with major economic and financial crises. As the East Asian collapse and the Argentinean crisis in 2001 made clear, social breakdown and increasing political uncertainty can contribute to the downturns and amplify economic shocks. This paper analyses the connection between stock market volatility, labor unrest and the risk of revolution for a set of 32 during the interwar period. Even before the great slump during the early 1930s, growth in most countries was disappointing and intermittent at best. At the same time, left-wing attempts at overthrowing the established order as well as right-wing putsches were frequent; of the twenty-six democracies in Europe in 1920, thirteen had become dictatorships by 1938 [Bermeo (1997)].

During this tumultuous period, I find strong evidence in favor of such a between social unrest and stock market volatility. Anti-government strikes and demonstrations appear to have made equity investors in 32 developed countries significantly more jittery. Political risk helps to explain why some countries saw extraordinarily sharp swings in share prices, reaching a standard deviation of monthly returns of more than 40 percent in Germany in the early 1920s, and approximately half this level in the US in 1932.

On balance, between one third and half of the rise in volatility during the Great Depression can be explained by political factors. This provides direct evidence in favor of the Schwert/Merton hypothesis – the "volatility puzzle" during the Great Depression can partly be resolved if we account for the danger of a major political discontinuity, brought on by the social dislocation of the slump. Not only are dangers to the capitalist system in the US an explanatory factor during the depression, they are also important in understanding the

extreme volatility seen in some European stock markets during the 1920s and 1930s. It is therefore no accident that the "heyday of American communism" [Klehr (1984)] also saw violent swings in share prices; similar forces were operative in countries where the establishment had good reasons to worry about the ability to beat back revolutionary movements that tried to profit from the depression. As Schlesinger observed in the United States: "Now depression was offering radicalism its long awaited chance." [Schlesinger (1957), 206]. The argument that political risk during the Great Depression is partly to blame receives some additional support by the recent finding that unusually high levels of synchronicity of individual stock returns contributed substantially to aggregate volatility in the early 1930s [Morck, Yeung and Yu (2000)].[15]

This argument can be reinforced by using instrumental variable estimation to sidestep issues of causation. I do not argue that political violence, worker militancy and civic unrest were exogenous to changes in economic conditions. As the political and social history of the countries in our samples makes abundantly clear, the strength of radical movements often ebbed and flowed with the economic fortunes of their countries [Stögbauer (2001), Falter (1991)]. Many of the political systems that experienced particularly severe economic shocks saw considerable upheaval. Yet the extent to which political collapse followed economic misery varied considerably. While Germany and Italy became dictatorships during our period, the US democratic system survived an economic crisis that was as severe as Germany's. As recent work by Bittlingmayer [1998] has shown, uncertainty in general may well have aggravated the decline in industrial activity that was in part behind the upsurge in political violence and worker militancy. While some of the unrest in our sample was clearly caused by economic shocks, we use Comintern militancy, the fractionalization of parliament and urbanization rates to identify structural sources of instability that had a persistent effect throughout our period. This component also has a strong impact on stock market instability. This strongly suggest that some of the very high volatility in the interwar

period in general – and during the Great Depression in particular – was driven by fear of a significant discontinuity in the economic and political structure. As Schwert [1989b], has argued, such a risk is similar to a "Peso problem" – not easily measured ex post, but clearly relevant to the decision-making of economic agents at the time. While political chaos contributed to extreme stock price volatility, the results from our 32-country sample also imply that part of the "volatility puzzle" remains – the models developed in the empirical section are not able to fully predict the variability actually observed.

Our results also speak to the survival of stockmarkets. A society's willingness and ability to use equity markets as a source of finance and as a way of allocating ownership rights is closely linked to the wider social and political context. As the findings from sample selection estimation make clear, instability and unrest often undermined the ability to maintain "orderly markets", in part contributing the (temporary) disappearance of stock markets.

These findings suggest a clear agenda for future research. Recent work on US share returns that decomposes the variability of aggregate indices into the volatility of individual shares and the degree of "synchronicity" [Campbell, Lettau et al. (2001), Morck, Yeung and Yu (2000)] should be replicated for other countries during the interwar period. The Schwert/Merton hypothesis would receive further confirmation if panel evidence confirmed a systematic association between synchronicity on the one hand, and indicators of social unrest and political instability on the other. If the argument emphasizing political risks is correct, most of the increase in share price volatility should be driven by a higher degree of synchronicity. An alternative route for future research would be to construct indices of political risk at higher frequencies, using news-based techniques [Cutler, Poterba and Summers (1989)].

Tables

Table I
Real stock returns in 32 countries, 1919-1938

Continuously compounded monthly returns and measures of volatility, based on monthly returns. The standard deviation is calculated on the basis of monthly returns for each year. For details of the data, cf. the Appendix I.

	average volatility	Largest monthly gain	Largest monthly loss	average annual return	highest volatility	year of highest volatility	ratio max/ average
*Full sample**							
Australia	0.027	0.24	-0.13	0.063	0.094	1930	3.48
Belgium	0.070	0.27	-0.17	-0.064	0.105	1931	1.50
Canada	0.046	0.22	-0.30	0.048	0.122	1932	2.65
Denmark	0.025	0.18	-0.10	0.01	0.063	1925	2.52
France	0.057	0.20	-0.18	-0.027	0.095	1936	1.67
Germany	0.103	0.61	-0.52	0.055	0.435	1923	4.22
Italy	0.050	0.24	-0.21	-0.047	0.099	1932	1.98
Japan	0.042	0.20	-0.31	0.002	0.13	1920	3.10
Netherlands	0.044	0.23	-0.15	-0.025	0.085	1932	1.94
Norway	0.026	0.10	-0.09	0.010	0.053	1932	2.06
Poland	0.144	0.83	-0.87	-0.03	0.53	1923	3.68
South Africa	0.032	0.24	-0.38	0.05	0.108	1920	3.38
Sweden	0.046	0.18	-0.39	0.016	0.148	1932	3.22
Switzerland	0.041	0.27	-0.23	0.048	0.088	1931	2.16
UK	0.031	0.11	-0.11	0.018	0.064	1931	2.08
USA	0.071	0.35	-0.35	0.037	0.182	1932	2.58
Incomplete data							
Austria	0.369	0.77	-0.89	-0.22	0.64	1923	1.73
Chile	0.054	0.23	-0.15	-0.01	0.141	1932	2.61
Colombia	0.048	0.22	-0.23	0.21	0.097	1933	2.02
Czech Republic	0.035	0.14	-0.11	0.049	0.057	1921	1.63
Finland	0.034	0.14	-0.12	0.048	0.064	1937	1.88
Greece	0.068	0.25	-0.54	0.003	0.17	1931	2.50
Hungary	0.066	0.28	-0.30	0.043	0.138	1937	2.09
Ireland	0.018	0.04	-0.20	-0.04	0.06	1939	3.33
Mexico	0.055	0.35	-0.23	0.009	0.15	1931	2.73
New Zealand	0.023	0.07	-0.06	0.021	0.038	1932	1.65
Peru	0.022	0.12	-0.08	0.10	0.034	1939	1.55
Portugal	0.072	0.11	-0.25	0.11	0.104	1936	1.44
Spain	0.036	0.13	-0.14	0.033	0.061	1924	1.69
Uruguay	0.089	0.47	-0.50	0.07	0.27	1930	3.03
Venezuela	0.041	0.33	-0.13	0.29	0.096	1938	2.34
Yugoslavia	0.021	0.064	-0.07	-0.003	0.032	1939	1.52
Sample mean	0.060	0.256	-0.265	0.027	0.142	1931	2.374

Note: * One year or less of data missing.

Table II
Measures of Political Instability

The data is from Banks (1976), and shows the number of events per country and year. All data is for the years 1919-1939, where available. The last column gives the ratio of the average number of events in the 32 country sample divided by the average number of events in the 166 nation sample.

	32 Country Interwar Sample				166 Nation Sample				
	average	st.dev.	max	N	average	st.dev.	max	N	ratio averages
Number of assassinations	0.23	0.67	7	685	0.14	0.51	9	4066	1.64
general strikes	0.16	0.48	3	685	0.11	0.51	13	4066	1.45
guerrilla warfare	0.22	0.75	7	685	0.28	1.09	34	4066	0.79
government crises	0.46	0.94	6	685	0.30	0.73	7	4066	1.53
purges	0.29	0.7	5	685	0.34	1.01	34	4066	0.85
riots	0.87	2.16	22	685	0.64	2.18	55	4066	1.36
revolutions	0.17	0.50	4	685	0.20	0.56	6	4066	0.85
anti-government demonstrations	0.38	1.04	11	685	0.35	1.69	60	4066	1.09

Table III
Correlations of variables

Return is the log of the stock price index at time t, divided by its value at time t-1. Xcons is constrainst on the executive, according to the POLITY III dataset. The other variables are defined in the appendix.

	Return	Demo	Ass	Strike	Riot	Cris	Rev	Growth	Purge
Return	1								
Demo	-0.2080*	1							
Ass	0.0086	0.2439*	1						
Strike	-0.3763*	0.2824*	0.2276*	1					
Riot	-0.0504	0.5501*	0.2398*	0.3797*	1				
Cris	-0.1769*	0.5684*	0.0587	0.3372*	0.3974*	1			
Rev	0.0674	0.3824*	0.3409*	0.3436*	0.2525*	0.5096*	1		
Growth	0.2265*	-0.2400*	-0.0735	0.1543	-0.1914*	-0.0581	0.0188	1	
Purge	-0.1052	0.7575*	0.5125*	0.012	0.6709*	0.4881*	0.7965*	-0.3060*	1
Xcons	-0.1166	-0.0334	-0.1748*	-0.0267	-0.049	-0.1143	-0.2723*	-0.1673	-0.2194

* indicates significance at the 10% level

Table IV
Stock Prices and Civic Unrest

The table reports results for the regression

$$r_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{it}$$

Estimation technique is seemingly unrelated regressions (SUR). T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses. For data sources, cf. Appendix I. *, **, *** indicate significance at the 10, 5% and 1% level, respectively.

	1	2	3	4	5	6	7	8	9
DEMO	-0.018***							-0.011***	
	(5.5)							(2.7)	
ASSASS		0.03***							
		(6.9)							
STRIKE			-0.03***						-0.035***
			(4.6)						(4.1)
RIOT				-0.003***					
				(2.95)					
GCRISIS					-0.022***				
					(4.7)				
REV						-0.0025			
						(0.38)			
GUER							-0.022***		
							(5.2)		
GDP								1.79***	1.85
								(22.4)	(23.2)
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
adj. R²	0.03	0.03	0.029	0.028	0.033	0.002	0.029	0.135	0.14
N	479	479	479	479	479	479	479	393	393

Table V
Stock Price Volatility, Civic Unrest and Political Violence

The table reports results for the regression

$$\sigma_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 P_{it} + \varepsilon_{it}$$

Estimation technique is ordinary least squares and generalized least squares (GLS). T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses. For data sources, cf. Appendix I. *, ** indicate significance at the 10, 5% and 1% level, respectively.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
$\sigma_{i,\,t-1}$											-0.087 (0.8)	-0.013 (0.16)		
σ_{DEMO}	0.448*** (3.64)			0.53*** (4.0)		0.035*** (5.6)					0.15** (2.4)		0.014 (0.7)	
σ_{RIOT}		0.088 (1.2)					0.066*** (3.57)					0.14* (8.0)		
σ_{STRIKE}			0.77*** (3.74)		0.81*** (3.77)			0.05 (1.2)						0.067** (2.1)
σ_{ASS}									0.049*** (2.9)					
σ_{CRISIS}										0.049*** (1.98)				
GROWTH				0.16 (0.7)	-0.13 (0.6)								-0.09** (3.9)	-0.09* (3.8)
Fixed effects	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
adj. R²	0.11	0.0044	0.11	0.15	0.13	0.69	0.70	0.61	0.63	0.69	0.88	0.89	0.67	0.83
N	108	108	108	83	84	108	108	108	108	108	75	75	83	84

Table VI

The table reports results for the Heckman selection model:

$$\sigma_{it} = \alpha_i + \beta_2 \sigma_{\pi,it} + \varepsilon_{it}, E(\varepsilon | \sigma_{\pi,it}) = 0$$

$$s_{it} = 1[\gamma Z + v \geq 0]$$

where sample inclusion is defined on the basis of available stockmarket data. Z-score in parentheses, *, **, and *** indicate significance at the 10, 5 and 1% levels.

		1	2	3
MAIN EQUATION	σ_{DEMO}	0.56***		
		(3.22)		
	σ_{RIOT}		0.006	
			(0.04)	
	σ_{STRIKE}			0.91***
				(3.58)
SELECTION EQUATION	σ_{DEMO}	-8.87		
		(1.33)		
	σ_{RIOT}		-9.7*	
			(1.74)	
	σ_{STRIKE}			-18.95***
				(5.1)
	ASS	-27.5***	-19.3*	-4.1***
		(2.7)	(-1.8)	(10.3)
	STRIKE	26.6***	7.6	-7.6**
		(2.95)	(0.6)	(10.3)
	GUE	-0.51	-5.6	-3.4
		(0.07)	(0.7)	(9.7)
RHO			-0.9	-0.96	0.97
LAMBDA			-0.075	-0.1	0.08
LR(χ^2) for RHO=0			8.23***	14.5***	27.9***

Table VII
Stock Prices and Civic Unrest

The table reports results for the regression

$$\sigma_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 P_{it} + \varepsilon_{it}$$

where P is instrumented by a number of exogenous variables (equation 1, 3, 5 and 7). Estimation technique is generalized least squares (GLS). T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses. In equation 2, 4, 6 and 8, we estimate the Heckman selection model

$$\sigma_{it} = \alpha_i + \beta_2 \sigma_{\pi,it} + \varepsilon_{it}, E(\varepsilon|\sigma_{\pi,it}) = 0$$

$$s_{it} = 1[\gamma Z + v \geq 0]$$

For data sources, cf. Appendix I. *, ** indicate significance at the 10, 5% and 1% level, respectively.

	1	2	3	4	5	6	7	8
σDEMO	13.85*	8.14**						
	(1.9)	(2.4)						
σRIOT			7.47***	11.7**				
			(3.85)	(2.1)				
σSTRIKE					11.9**	11.23		
					(2.0)	(0.5)		
log(Chaos)							0.52*	0.38***
							(1.76)	(6.3)
Growth	3.98	2.45	-2.7**	-1.73	-2.5**	0.7	3.1	-3.6
	(0.9)	(0.7)	(2.1)	(0.5)	(1.99)	(0.2)	(0.9)	(1.6)
Instrumented	σDEMO	σDEMO	σRIOT	σRIOT	σSTRIKE	σSTRIKE	log(Chaos)	log(Chaos)
By	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign
	Votes	Votes	Votes	Votes	Votes	Votes	Votes	Votes
	Fraction	Fraction	Fraction	Fraction	Fraction	Fraction	Fraction	Fraction
	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban
	Travel		Travel	Travel	Travel	Travel	Travel	
Sample selection correction	NO	YES	NO	YES	NO	YES	NO	YES
Adj. R²	0.14		0.09		0.021		0.20	

FIGURES

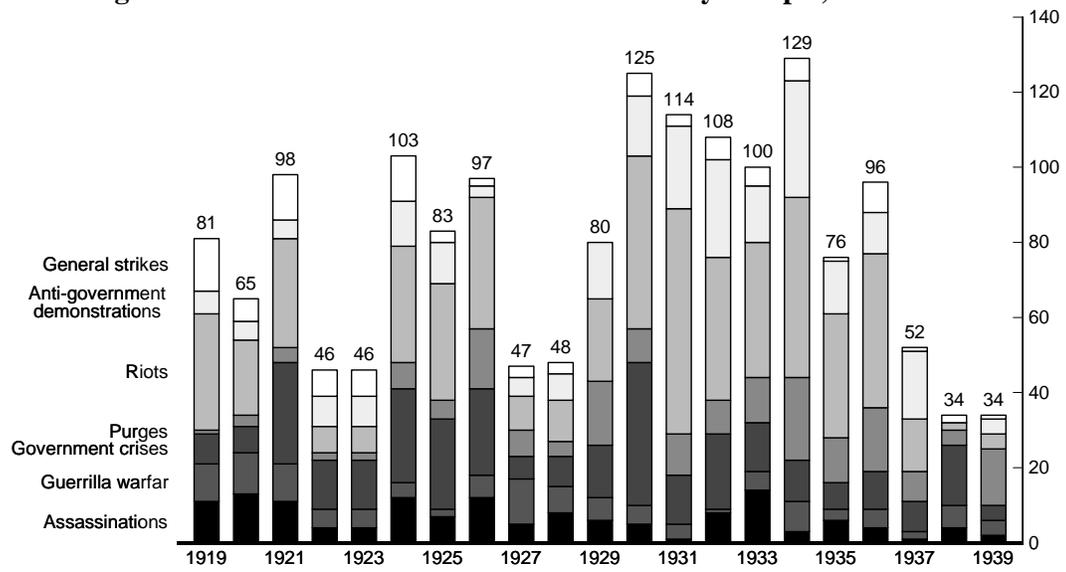## Figure 1: Political and civic unrest in 32-Country-Sample, 1919-1939

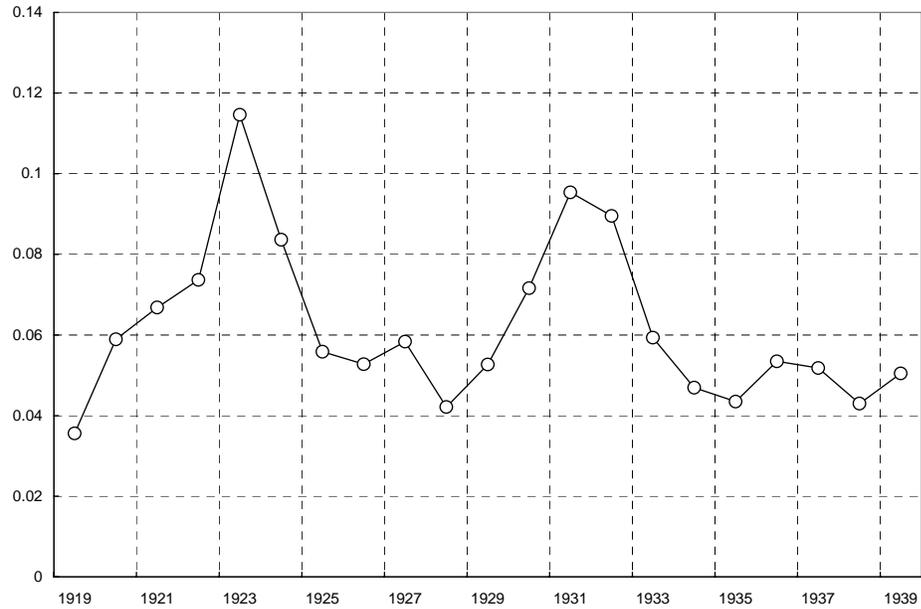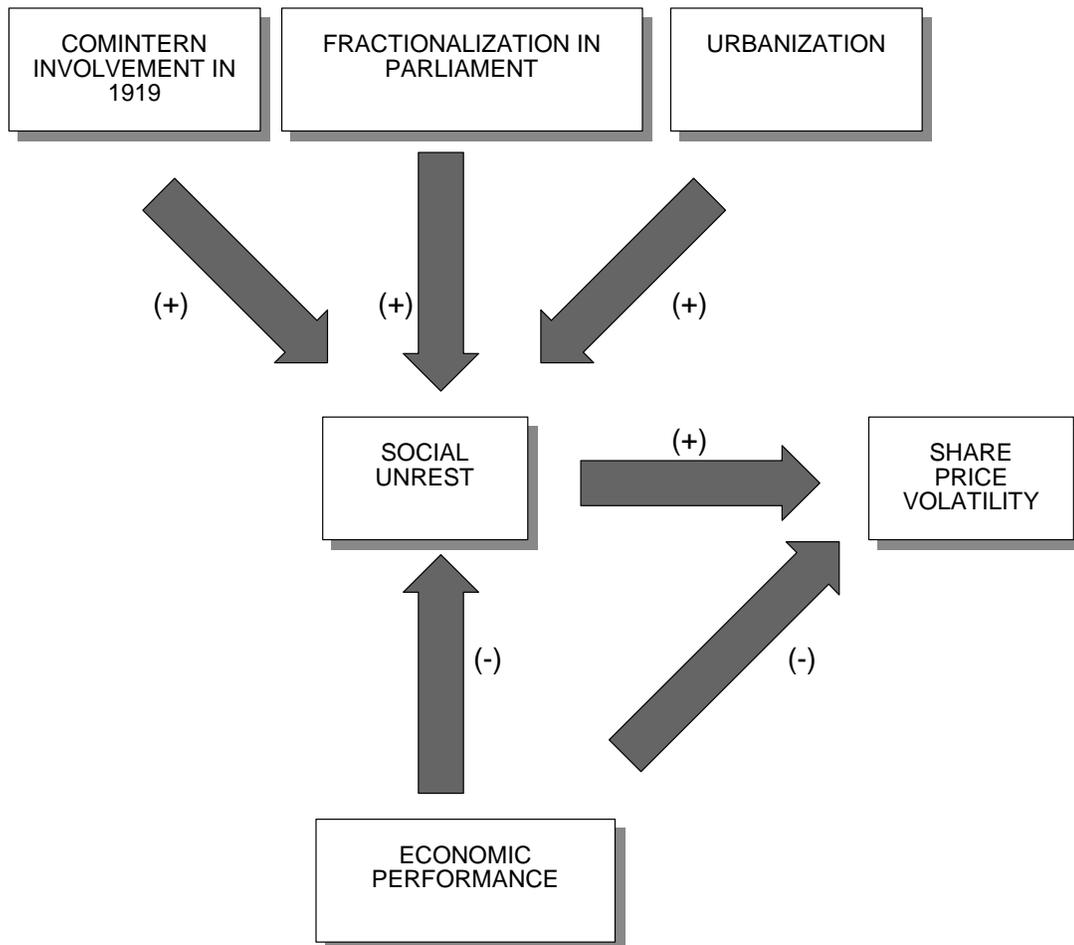## Figure 2: Stock Price Volatility in 32-Country Sample, 1919-1938

Figure 3: Hypothesized Relationships

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The stock price indices are from Global Financial Data (at http://www.globalfindata.com). The individual series used are given in Table VIII.

Table VIII: Data sources – Stock Indices and CPI

	Stock index	File	file for cpi price index
UK	UK-FTSE All Share Index	_FTSAV.csv	CPGBRM.csv
Belgium	CBB Spot Price Index	_BSPTD.csv	CPBELM.csv
USA	S&P-500	_SPXD.csv	CPUSAM.csv
France	SBF-250	_SBF250D.csv	CPFRAM.csv
Italy	BCI General	_BCIID.csv	CPITAM.csv
Netherlands	CBS All-Share	_CBSAD.csv	CPNLDM.csv
Sweden	Affarsvarlden General	_SWAVD.csv	CPSWEM.csv
Norway	OBX-25	_OBXD.csv	CPNORM.csv
Switzerland	Switzerland Price Index	_SPIXD.csv	CPCHEM.csv
Australia	ASX All Ordinaries	_AORD.csv	CPAUSM.csv
Austria	Wiener Börsenkammer	_WBKIM.csv	NA [real index]
Canada	TSX 300	_GSPTEM.csv	CPCANM.csv
Chile	Santiago Indice General de Precios de Acciones	_IGPAM.csv	CPCHLM.csv
Colombia	IBB General	_IBBM.csv	CPCOLM.csv
Czechoslovakia	Czech General Stock Index	_CZINDX.csv	CPCZEM.csv
Denmark	Copenhagen SE Index	_CSEIM.csv	CPDNKM.csv
Finland	HEX All Share	_HEXM.csv	CPFINM.csv
Greece	SMI Index		

The exception is Germany, where the hyperinflation limits data availability. I use the series compiled by Gielen [1992]. For the period after 1919, it is based on statistics compiled by the Imperial Statistical Office. His series is now widely accepted as the best available long-run equity index for Germany [Bittlingmayer (1998), Jorion and Goetzmann (1999)]. The growth rates of GDP per capita are taken from Maddison (1995); GROWTH is calculated as the difference between the natural logarithms of GDP in the preceding year and the current year.

The political variables and indicators of unrest are from Banks [1976]. The code numbers and definitions are given in Table IX.

Table IX
Definition of Political and Social Variables

The table gives the definitions of the various indicators of political violence, legislative efficiency and social instability used in our study. Source: Banks (1976).

Variable name	Variable number	Definition
ASS	91	The number of assassinations, defined as any politically motivated murder or attempted murder of a high government official or politician.
STRIKE	92	The number of general strikes, defined as any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority.
GUE	93	The number of acts of guerrilla warfare, defined as any armed activity, sabotage, or bombings carried on by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime.

CRISIS	94	The number of major government crises, defined as any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow.
PURGE	95	The number of purges, defined as any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition.
RIOT	96	The number of riots, defined as any violent demonstration or clash of more than 100 citizens involving the use of physical force.
REV	97	The number of revolutions, defined as any illegal or forced change in the top governmental elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government.
DEMO	98	The number of anti-government demonstrations, defined as any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.

FRACTURE   113   Party fractionalization index, based on a formula proposed by Rae (1968). The index is constructed as follows:

$$F = 1 - \sum_{i}^{n} \left(t_i \right)^2$$

where t is the proportion of members associated with the ith party in the lower house of the legislature.

PARLRES   121   Parliamentary responsibility, defined as the degree to which a premier must depend on the support of a majority in the lower house of a legislature in order to remain in office.

<u>Code</u>   <u>Definition</u>

0   Irrelevant. Office of premier does not exist.

1   Absent. Office of premier exists, but there is no parliamentary responsibility.

2   Incomplete. The premier is, at least to some extent, constitutionally responsible to the legislature. Effective responsibility is, however, limited.

3   Complete. The premier is constitutionally and effectively dependent upon a legislative majority for continuance in office.

CABCH	123	Major cabinet changes, defined as the number of times in a year that a new premier is named and/or 50% of the cabinet posts are occupied by new ministers.
EXECCH	124	The number of times in a year that effective control of the executive power changes hands. Such a change requires that the new executive be independent of his predecessor.
NELECT	127	The number of elections held for the lower house of a national legislature in a given year.
CHAOS		strike+demo+riot

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[1] Cf. also Sylla 1990.

[2] Uncertainty about these fundamentals can in part explain variability [David and Veronesi 2001].

[3] Cf. the critique in Kleidon 1986.

[4] Note that this is similar to the standard problem in bubble tests. Cf. Hamilton and Whiteman 1985, Hamilton 1986.

[5] The Jorion and Goetzmann dataset is not publicly available.

[6] Cf. Flanders 1968, 8-9; Lorwin 1968, 330-333; Taft 1958, 272-4.

[7] Flanders 1968, p. 65.

[8] The relatively limited scale of the slump in Britain must be put in the context of its sluggish performance over the period 1920-30. Cf. Feinstein, Temin and Toniolo 1997.

[9] Data is available for Germany, the US, and France. Re-estimating the baseline results does not reduce the size or significance of the coefficients on unrest and uncertainty.

[10] Under random effects, we find a significant coefficient.

[11] For an overview, cf. Campbell, Lo and MacKinlay 1997, ch. 12.2.

[12] A simple regression of US share price volatility on US CHAOS (plus an intercept) gives a predicted value of 15 percent, equivalent to 4/5 the observed level of share price variability.

[13] The list of signatures is from Communist International., Degras and Royal Institute of International Affairs. 1956. On the history of the Comintern, cf. Nollau 1961.

[14] Cf. Alesina and Spolaore 2000, Alesina and Spolaore 1997 for models of international conflict and the conditions under which an increase in the number of nations can lead to a higher probability of war.

[15] They also demonstrate that lower synchronicity is systematically associated with "better government" (defined as a composite measure of the risk of expropriation, government corruption, and the risk of the government repudiating contracts). A similar issue is explored in White and Rappoport 1994.