Rational or irrational? Financial market responses to terrorism in 19th century Russia

Bournemouth University

Christopher A. Hartwell (Bournemouth University and Kozminski University)

Daniel L. Treisman (UCLA)

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Historical Background: Political Instability in Tsarist Russia

- **Imperial Russia, on the surface, a bastion of calm, shattered only by revolutions in 1905 and 1917**
  - Uneducated, scattered, and quiescent populace (serfdom until 1861)
  - Ruling elite collecting patronage from their offices
  - No rule of law
  - A stable autocracy

- **Reality was very different:**
  - A weak institutional structure given unlimited power but encapsulated in the personality of the Tsar
  - Decades of peasant unrest and rebellion related to serfdom, 1789 through 1861
  - Transition to modern-day forms of terrorism, including political assassinations, bombings, and secret cells

Historical Background: Political Instability in Tsarist Russia (II)

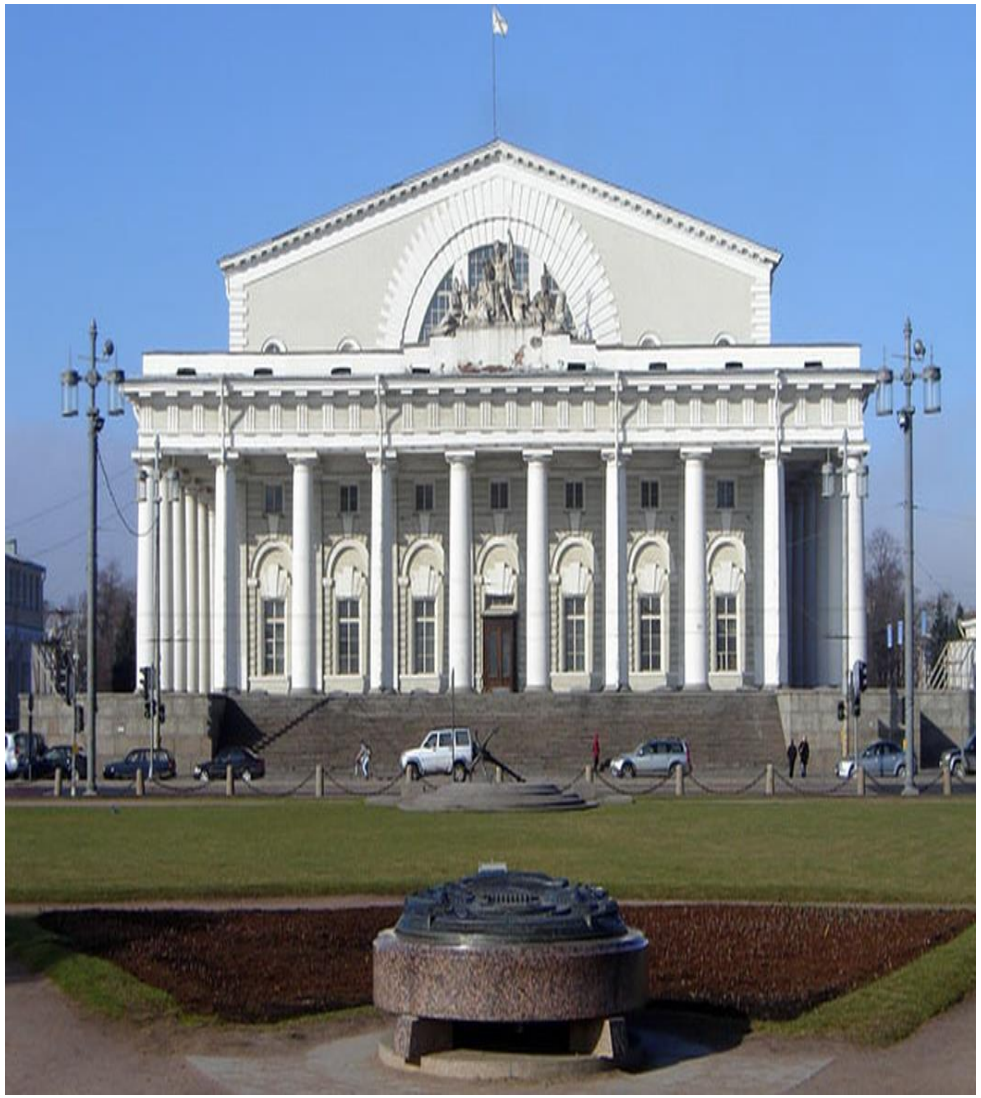
- **Assassination of Tsar Alexander II and rise of *Народная воля* ("The People's Will") ushers in an era of reaction and recrimination**
- **High-profile assassinations continue from the 1880s through to the revolutionary era**

THE ASSASSINATION OF THE LATE CZAR OF RUSSIA—THE EXPLOSION OF THE SECOND BOMB.

Financial Markets Under the Tsar

Russian political and economic institutions may have been weak, but financial ones were relatively strong

- Ukhov (2003): “Russia[n government] was a leader in using public capital markets and especially foreign markets and foreign intermediaries to finance her ambitions and development.“
- 1805-1807: Tsar allows for creation of limited liability corporations and sets three forms of corporate governance (full/limited partnerships and corporations)
- Government begins issuing domestic bonds in 1809-1810 to finance foreign wars
- First stocks traded on the St. Petersburg Stock Exchange in the 1830s
- Corporate law of 1836: “The goal of the law was to encourage corporate capitalism in the style of Western Europe while maintaining bureaucratic control in the traditional Russian style,” including outlawing futures (Goetzmann and Huang 2018).
- Law of 1893 removes this prohibition, encourages speculation



Two Research Questions

- **How did various types of political instability feed through to various financial institutions in Tsarist Russia?**
  - Put another way, did institutional volatility manifest itself in financial volatility? How long and how much?
  - Did it matter what type of political instability/mode of attack it was?
  - Did it matter where it took place?

- **Was terrorism or political instability self-defeating in changing institutions?**
  - Did informal political instability translate into formal political change?

A Work in Progress – Comments Welcome!

The Theory: Rational versus irrational responses to terrorism

- **Financial markets respond to events which affect present value of discounted future cash flows or environment in which cash flows are earned**
  - Firm-specific, macroeconomic environment, or policy/institutional changes
- **Institutional changes or policy reversals may cause increased volatility over a longer period**
  - Rules of the game changing rather than just an accounting tweak
- **Institutional volatility can be either formal or informal political instability (Hartwell 2017)**
  - Formal: elections, constitutional changes, falls of government
  - Informal: terrorism, external conflict

The Theory: Rational versus irrational responses to terrorism (II)

Rational responses

- *Rational* firm/financial market response to terrorism should have several facets:
  - Industry- or sector-specific characteristics (e.g. Boeing after September 11th, 2001 – see Drakos 2004)
  - Geographic/spatial aspects of the attack
  - Methods used (i.e. suicide versus remote detonation, see Jain and Mukand 2004)
  - Understanding of the ramifications of the incident for investment and/or economic climate (i.e. isolated incident or game-changer)
    - Repeated bouts of terrorism may create regime/institutional uncertainty while each individual event may not
    - "Markets perceive these events as unusual, they do not see their effects as long-lasting" (Chesney *et al.* 2011)

The Theory: Rational versus irrational responses to terrorism (II)

Irrational responses

- **Terrorism has an element of surprise (hence informal stability)**
  - "Firms operating in wealthier, or more democratic countries, face greater volatility in stock returns relative to firms operating in developing countries" (Essaddam and Karagianis 2014)
- **Firms underestimate terrorism risk in daily operations then overestimate in the face of terrorist acts (Willis 2007)**
  - Lack of understanding of the source may create prolonged uncertainty, incorrect risk assumptions
- **Bias towards judging a country risk profile by high-visibility acts instead of structural issues**
  - Assassinating the sovereign might not change the economic environment, but years of mismanagement might
- **Perceptions of terrorism may be colored by the overall health of the economy or point on the business cycle**
  - Entirely unexpected or "just one more thing" on top of a string of them?
  - Healthy economies better at absorbing shocks of terrorism (Johnston and Nedelescu 2006), perhaps for perceptions as well
- **Government response to terrorism may be irrational and increase transaction costs to firms (Brueck and Wickstroem 2004).**

Expected Answers to Research Questions

- **How did various types of political instability feed through to various financial institutions in Tsarist Russia?**
  - Uprisings and terrorism would have been seen as an existential threat in a weak institutional environment, and thus could have affected both short- and long-term volatility (rational response)

- **Was terrorism or political instability self-defeating in changing institutions?**
  - The backlash that Tsarist Russia created against terrorists may have crushed short-term institutional change but led to longer-term shifts (irrational action!)

Data and Empirical Approach

New and unique monthly dataset on financial markets and terrorism in 19th-century Russia

Proxies for Financial Returns and Volatility

- Long-term bond yields (1789-1914, including bonds sold on the Amsterdam market)
- Spread on Russia/UK sovereign bonds (1789-1914)
- St. Petersburg Stock Exchange Returns (1865-1914)

Data (II): Types of Instability

- **Hand-coded episodes of political instability and terrorism monthly from 1789 to 1914 based on several English- and Russian-language sources**
- **Use both individual events and cumulative (12 month rolling total) numbers**

type of volatility	definition
Successful Assassination	A major public figure was assassinated; if shot in one month and died in another, month is coded 1 from the attack itself
Terrorist Attack	An attack (bombing, mass shooting) which resulted in fatalities; also, any unsuccessful assassination attempts are included here
Political Instability Russia	Assassinations and terror attacks only in Russia proper, not on the periphery of the Empire. Excludes the Caucasus and Poland but includes attempts on the Tsar, the royal family, and Ministers made outside of Russia
Political Instability	Strikes, uprisings, peasant rebellions, or other mass movements which resulted in fatalities or the use of state force to suppress; includes the earlier categories as well
Political Instability and Conflict	All earlier categories plus Russia's involvement in external conflict, wars, or interventions abroad

Methodology for financial effects

- Asymmetric Component GARCH-in-Mean (ACGARCH-M)
  - Helps to understand long and short-term effects of terrorism
  - Permanent and transitory components in the conditional variance
  - Contains a threshold term to also make effects asymmetric
  - Base model: $$Y_t = \mu + \pi x_{t-1} + \rho M'_{t-1} + \boxed{\delta \sigma_t^2} + \varepsilon_t$$
  - LT Volatility: $$q_t = \omega + \alpha(q_{t-1} - \omega) + \gamma(\varepsilon_{t-1}^2 - \sigma_{t-1}^2) + \theta_1 Z_{1t}$$
  - ST Volatility: $$\sigma_t^2 - q_t = \beta_0(\varepsilon_{t-1}^2 - q_{t-1}) + \beta_1(\varepsilon_{t-1}^2 - q_{t-1})d_{t-1} + \beta_2(\sigma_{t-1}^2 - q_{t-1}) + \theta_2 Z_{2t}$$

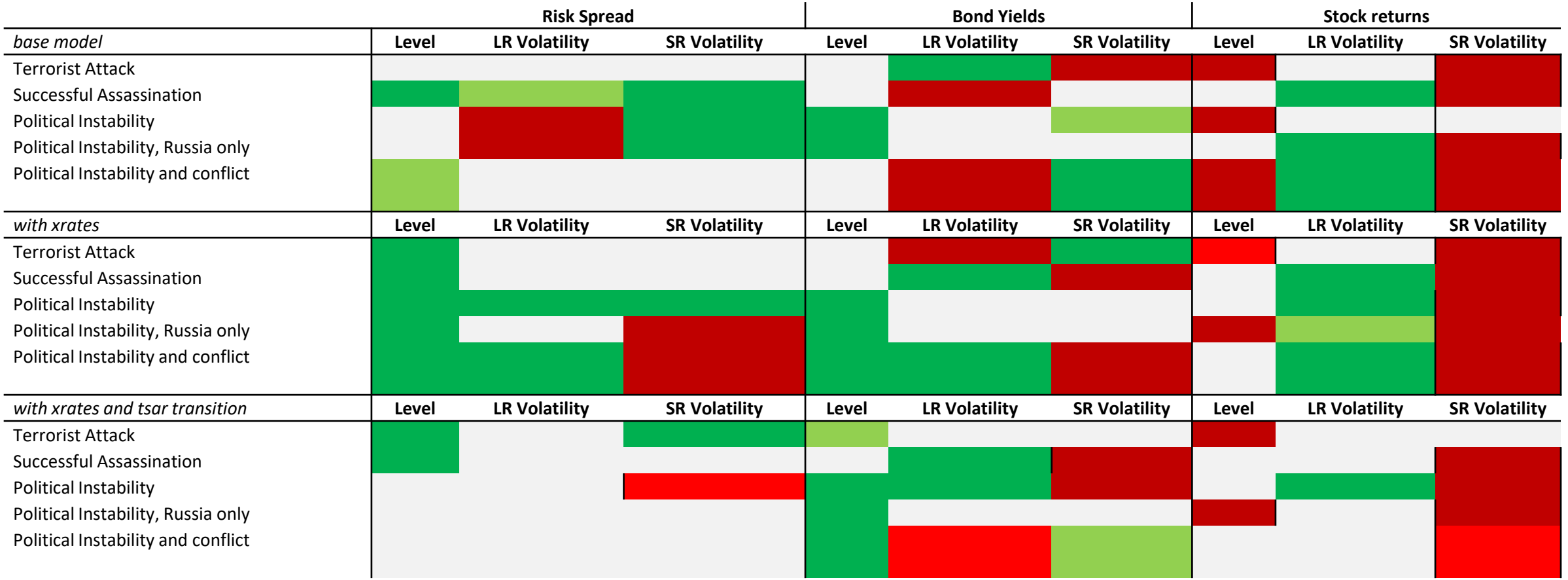
Methodology (II)

Paucity of controls (the *Z* vector)

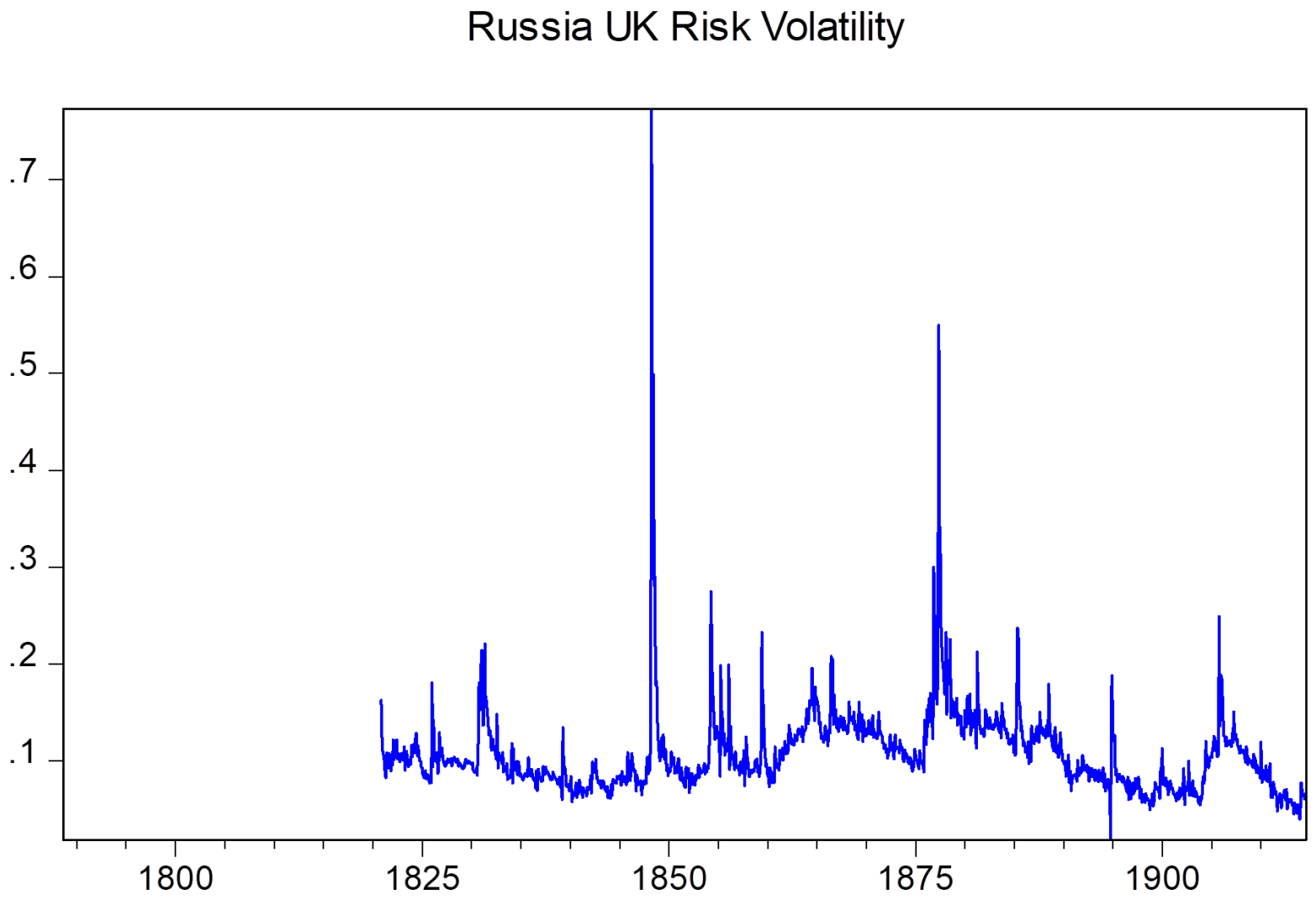
- **Monthly data from 19th century Russia is difficult to find**
  - ACGARCH models also have problems with convergence with too many parameters

- **As of right now, only three plausible controls used:**
  - World price of gold (proxy for global economic conditions)
  - Ruble/Dutch guilder exchange rate (proxy for Russian economic conditions)
  - A dummy for formal political transitions (i.e. when the Tsar changed over)

Heatmap Summary of Results, Terrorism v. Financial Markets

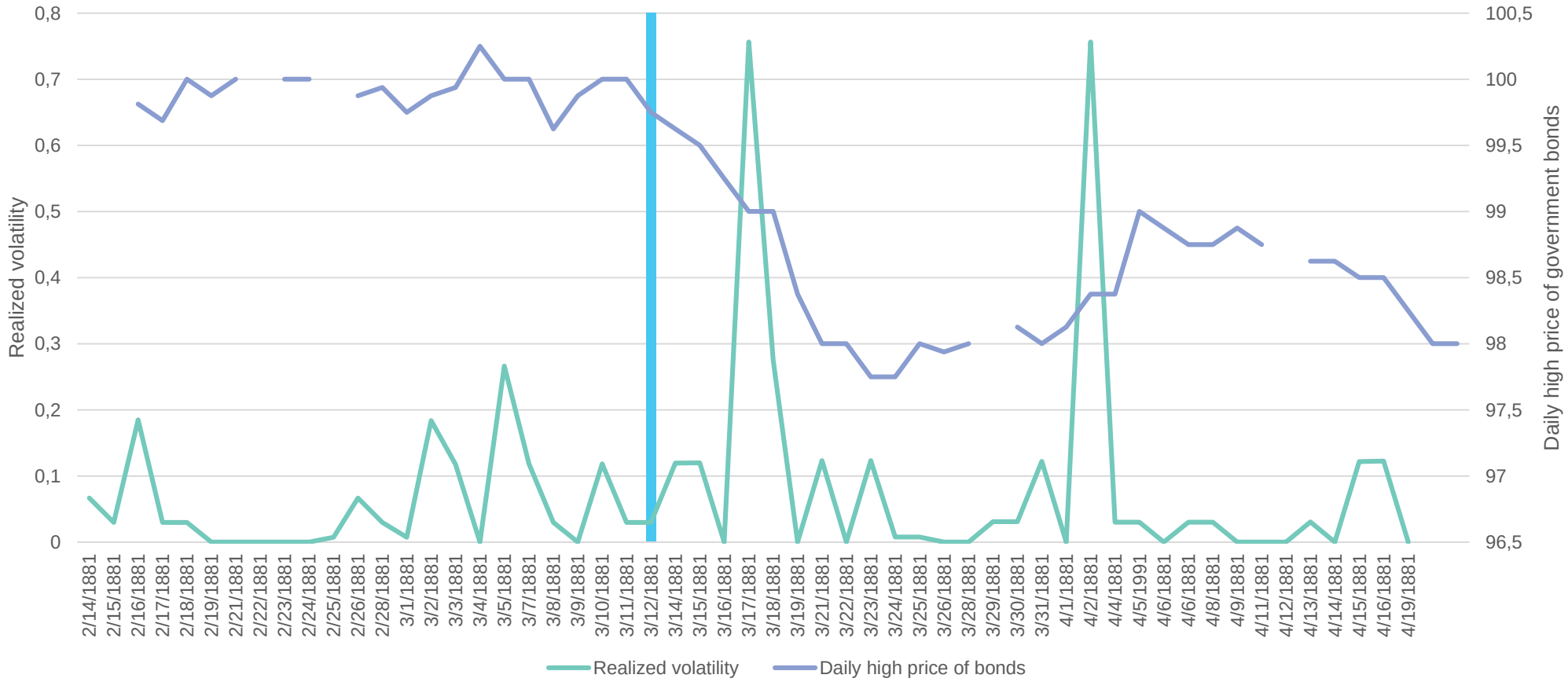


Terrorism v. Bond Spreads, full model

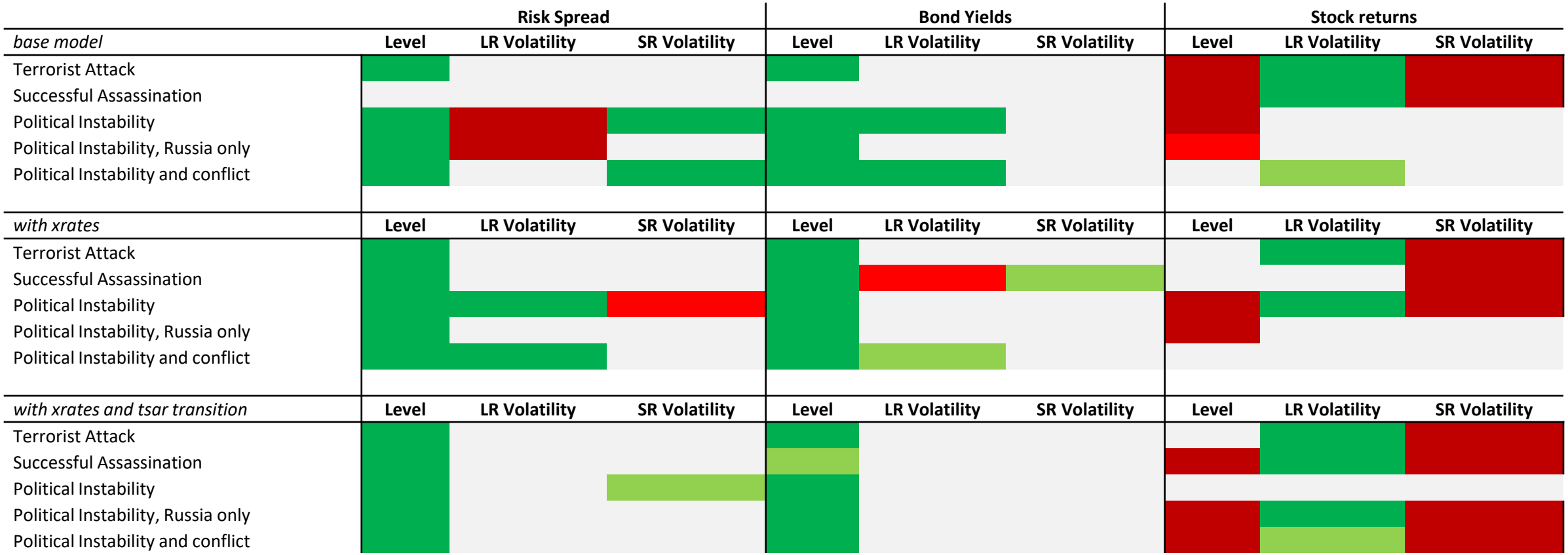


Delving into Daily Data – the Assassination of the Tsar, 1881

- Looking at volatility in bond markets a month before and after the sovereign was assassinated, volatility comes down very quickly
  - They BLEW UP THE TSAR! And markets flinched but didn't crumble.



Heatmap Summary of Results, Cumulative Terrorism v. Financial Markets



negative and significant (5% level)

negative and significant (10% level)

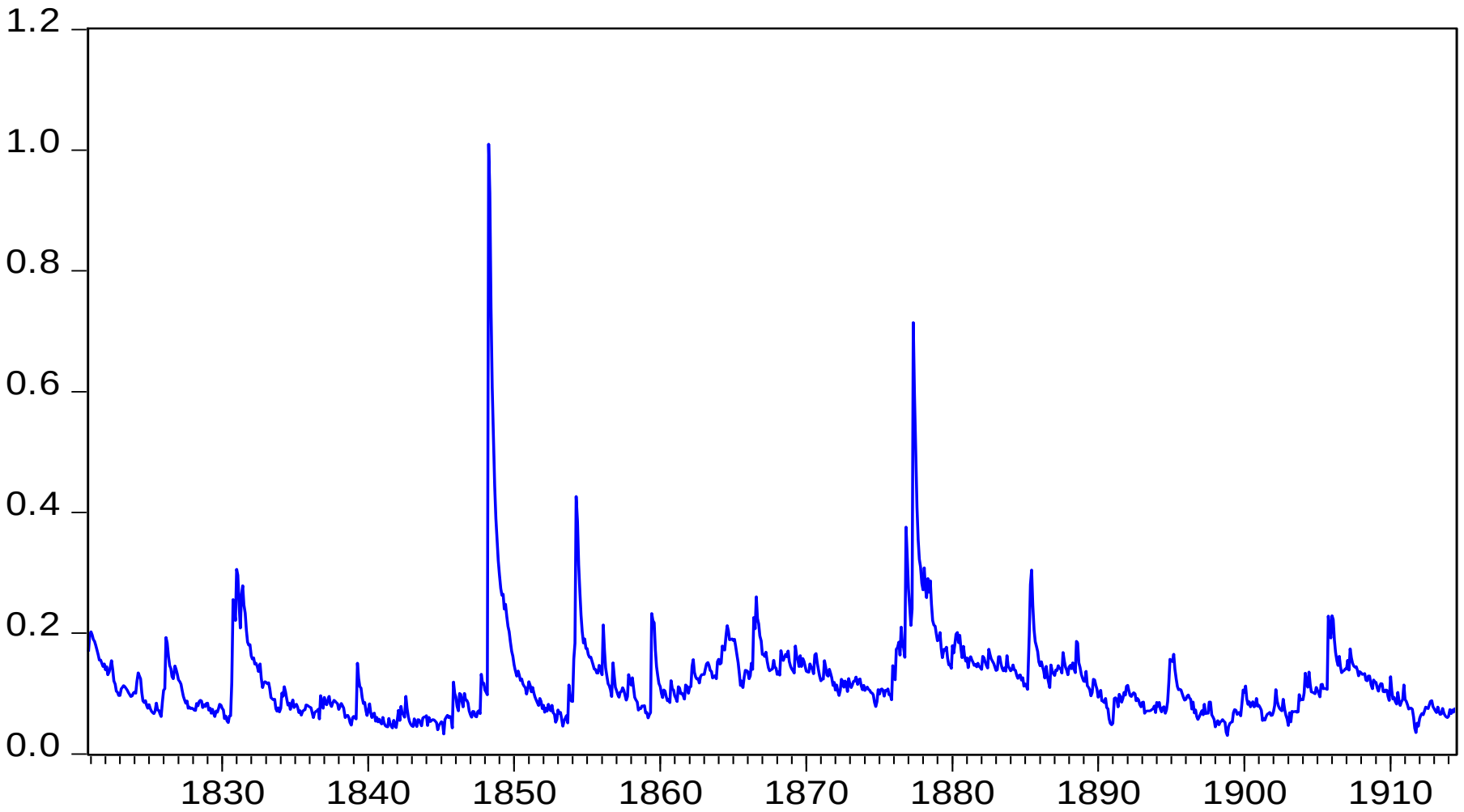
positive and significant (5% level)

positive and significant (10% level)

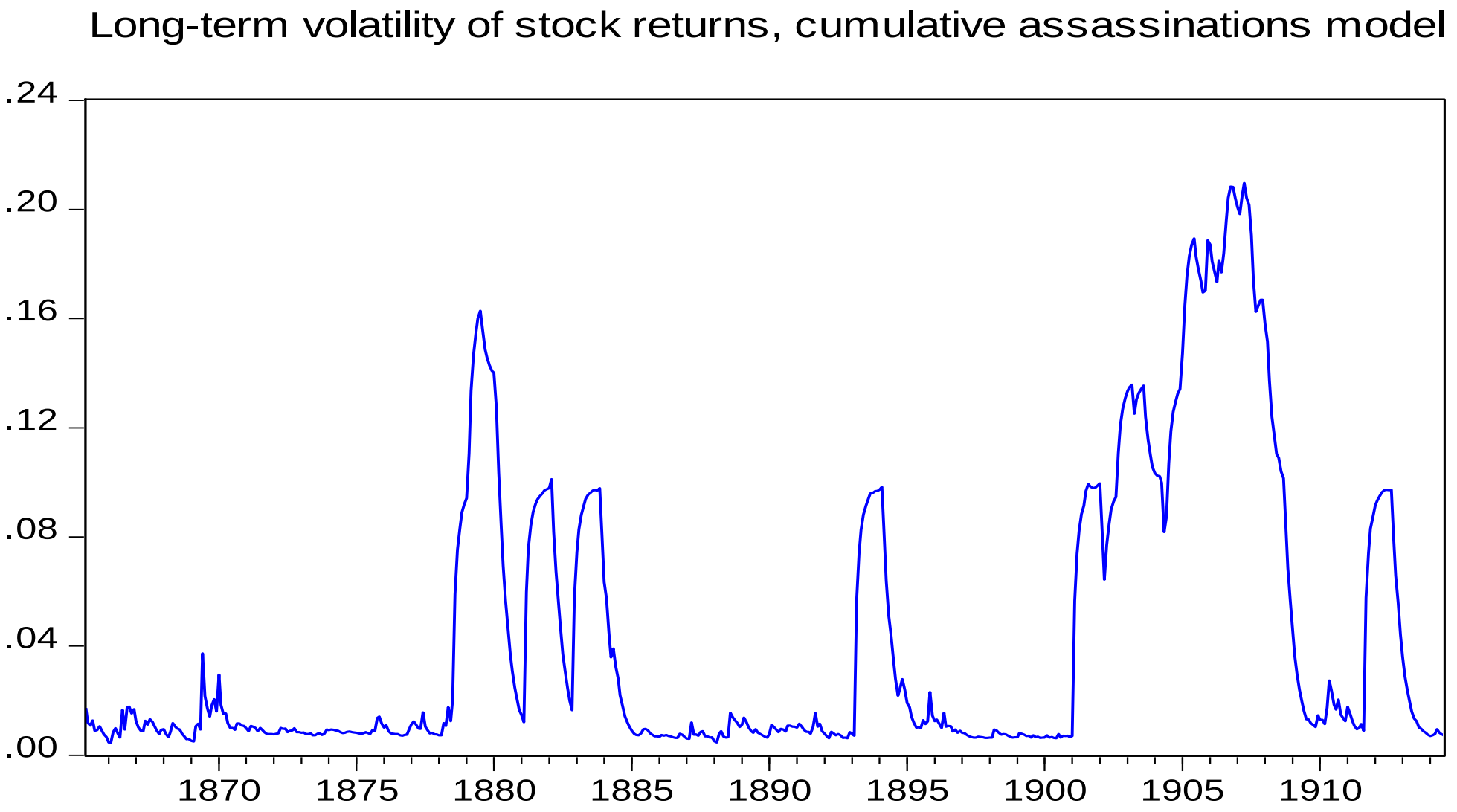
insignificant

Effects of Cumulative Terrorism on Bond Volatility

Short-term Conditional variance, LT Bond Yields, Cumulative Assassinations

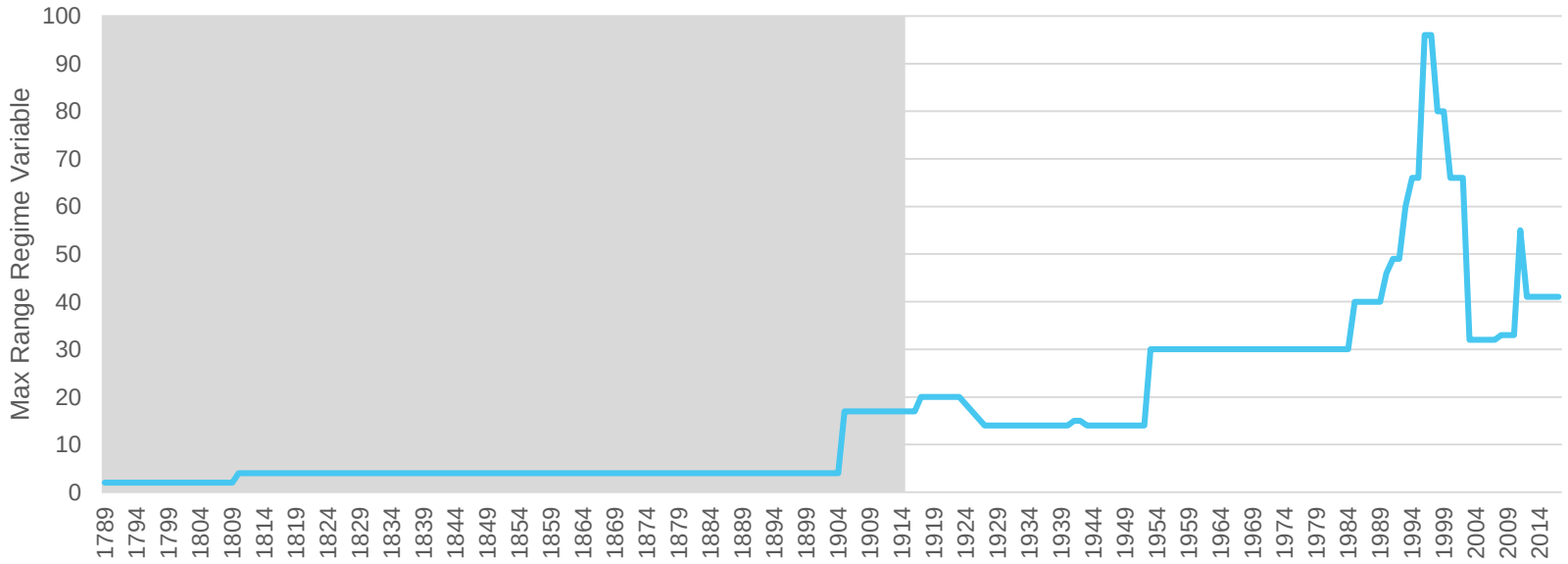


Long-term Effects of Cumulative Terrorism on Stock Markets



Was Terrorism Self-Defeating?

- In many instances, terrorism or uprisings in the Tsarist world led to severe backlashes and repression
- From the lens of 1917, we could plausibly say that terrorism begat terrorism
- From an institutional change perspective, terrorism may have had little short- to medium-term effect.



Was Terrorism Self-Defeating? Methodology

- Given slow-moving nature of regime variable, dual use of a negative binomial model and an IV-Poisson model:

Base form of:

$$\mu = \exp(X_t, \beta + \epsilon_t)$$

Where

$$\Pr(Y = y_i|\mu_t, \alpha) = \frac{\Gamma(y_i + \alpha^{-1})}{\Gamma(\alpha^{-1})\Gamma(y_t + 1)} \left(\frac{1}{1 + \alpha\mu_t}\right)^{\alpha^{-1}} \left(\frac{\alpha\mu_t}{1 + \alpha\mu_t}\right)^{y_t}$$

- Which is the conditional likelihood of a regime shift given the presence of a terrorist attack

Was Terrorism Self-Defeating? Results

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	NB	IV	NB	IV	NB	IV	NB	IV	NB	IV	NB	IV	NB	IV	NB	IV	NB	IV
Terrorism variables																		
Terrorist Attack	0.17	0.43																
	1.81**	1.27																
Cumulative Terrorist Attacks			0.07	0.08														
			4.60***	2.96***														
Successful Assassination					0.21	2.64												
					1.82*	12.63***												
Cumulative Assassination							0.15	0.29										
							6.24***	6.18***										
Political Instability																		
Cumulative Political Instability									-0.02	-0.14								
									3.17***	4.47***								
Political Instability, Russia Only											-0.10	-0.14						
											2.16**	1.76*						
Cumulative Instability, Russia Only													-0.01	-0.18				
													2.14**	2.13**				
Political Instability and Conflict															-0.15	-0.25		
															3.63***	4.42***		
Cumulative Instability and Conflict																	-0.02	-0.11
																	4.33***	3.25***
Control variables																		
Hansen's J-statistic p		0.3132		0.2835		0.6771		0.2197		0.2903		0.3894		0.387		0.3259		0.3795
n	1157	1122	1157	1122	1157	1122	1157	1122	1157	1122	1157	1122	1157	1122	1157	1122	1157	1122

Conclusions and where to from here?

- **It appears that financial markets in Tsarist Russia were efficient in their assessment of the effects of informal political volatility**
  - Able to separate political violence from threats to underlying economic fundamentals
  - Differentiation by financial instrument, as to be expected

- **However, persistent and cumulative terrorism may have created more doubts about the regime's viability and increased longer-term volatility**
  - but without threatening the basis for profitability of firms.

- **Final result that terrorism may have encouraged some measure of liberalization**
  - if markets expected that terrorism would have encouraged liberalization (i.e. that terrorism was effective), then the markets also would have expected that reform (rather than collapse) of the Tsarist regime was underway.

- **In this sense, perhaps the Tsarist political institutional matrix was not as weak as is commonly perceived.**

Again, a work in progress – comments welcome!

Bournemouth University

Большое спасибо!

Thank you!

Dziękuję bardzo!