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The fiscal background of the Russian revolution

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This article examines important aspects of the interaction between the fiscal history and political events of tsarist Russia's final years in the light of macroeconomic theories of government budget constraints. Using econometric tests of intertemporal stability and techniques of intervention analysis, I find that tsarist Russia had achieved a sustainable peacetime balance in its fiscal relations by the eve of World War I, but that this balance was lost under the strain of wartime financial difficulty.

1. Introduction

Recent work in both macroeconomics and economic history has contributed much to our understanding of the interaction between government finance and concrete historical events.[1] Based on macroeconomic theories concerning fiscal sustainability, this article investigates whether financial policies contributed to the events of tsarist Russia's final years. In particular, my research focuses on (1) the relationship between patterns of government expenditures and revenues in late tsarist Russia and (2) the long-term sustainability and short-term dynamics of these patterns as perceived by participants in the Russian financial system. I attempt to establish an informative picture of the role of tsarist financial policy in the historical chain of events that led eventually to the demise of the regime.

The tsarist regime in Russia faced persistent budget deficits throughout the latter half of the nineteenth century and the beginning of the twentieth century. Theories about budget constraints suggest that there are limits on the ability of governments to finance persistent deficits. The intertemporal government budget constraint suggests that a deficit in any period must equal real money growth plus the net increase in government borrowing (that is, growth in debt beyond that due to debt service on previous borrowings). This equation holds for all periods, so that government spending in any period must be financed through some combination of taxation, real money growth,

[1] See, for example, North and Weingast (1989), Bordo and White (1991), Sargent and Velde (1995), Dempster *et al.* (2000), and Wells and Wills (2000).

and new public borrowing. Accordingly, if there are limits to the growth of tax revenues, real money supply, and debt financing, the government's budget constraint will be binding.

Positing constraints on tax revenues is fairly uncontroversial, and most historians familiar with the late tsarist era agree that personal tax levels during the period had reached their limits, at least for the part of the population that predominately bore the burden of those taxes.[2] Kahan (1989) states that 'the Russian system of taxation not only derived the bulk of revenues from taxing the low-income groups, but it also severely limited the purchasing power of those social groups and affected their level of saving and consumption'. He goes on to state that the 'form of government, its militaristic orientation and authoritarian-bureaucratic mode of governing . . . explains the incessant pressure to increase the volume of taxation'.[3] However, Pipes (1990) notes that the 'famine of 1891–92 made clear the limits to such practices: the peasants' ability to pay, it was now acknowledged, had been exhausted'.[4] The prospect of direct progressive income taxation was still far off, as it would require the co-operation of an important interest group, the nobility, which had little incentive to consider it.

Real money growth is also subject to some easily identifiable limits. Money growth was a primary tool of the Russian government's budgetary policy for much of the nineteenth century, and a number of severe inflationary episodes were the inevitable result. These episodes imposed huge costs on the populace and, perhaps more importantly, severely limited the ability of the government to entice savers, both foreign and domestic, to invest in Russian bonds. Not surprisingly, the most severe inflationary episodes were accompanied by significant decreases in government bond prices and corresponding increases in the cost of capital paid by the government on additional borrowings. Sergei Witte, who became Minister of Finance in 1892, was convinced that the government's budgetary problems would only be resolved by economic growth financed through increased public borrowing. This, in turn, would require a fully convertible and stable currency, which was instituted by Witte in the form of the gold standard conversion of 1897.

Constraints on the ability of governments to raise funds through additional borrowing are more difficult to identify. Nonetheless, research by economists

[2] Reforms in government policy toward commerce and industry did, however, lead to positive effects on overall revenue levels. Furthermore, Simms (1977) and others have presented convincing evidence that it was the limits of willingness, not ability, to pay that had been reached in regard to the tax burden on the populace.

[3] Ibid., p. 64.

[4] Ibid., p. 77. Rogger (1983, pp. 101–02) corroborates this conclusion and attributes much of the blame to finance minister I. A. Vyshnegradskii. Wheatcroft (1991, p. 161) confirms that the rising trend in tax receipts was reversed in the famine years of 1891–92; however, see reference to Simms (1977) in fn. 2 above.

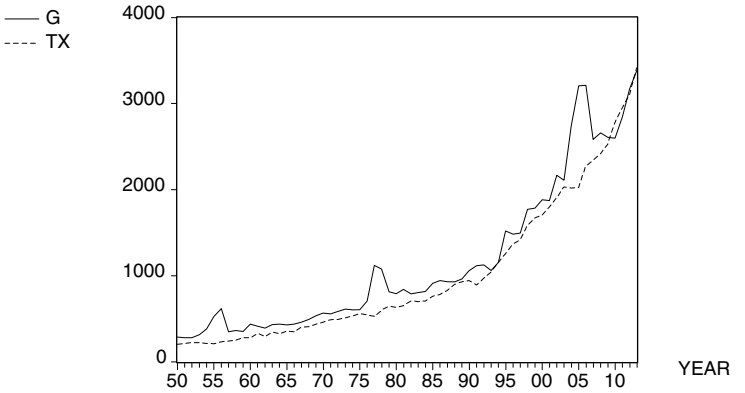

Figure 1. *Tsarist government tax revenues (TX) and expenditures (G), in millions of rubles, 1850–1913.*

Source: Mitchell (1980).

such as Sargent and Wallace (1981) indicates that constraints on government debt exist and are often reached in times of budgetary crisis. Sargent and Velde (1995) provide an example of an application of this line of research to a concrete historical phenomenon. They employ macroeconomic theories of budget constraints to illuminate various factors that determined the timing and direction of events in the French Revolution. Using an alternative approach, I attempt in this article to illuminate the extent to which the events of the late tsarist period were influenced by financial policy.

2. The fiscal condition of late tsarist Russia: 1850–1913

The fiscal history of late tsarist Russia can be meaningfully interpreted from the standpoint of constraints upon the ability of successive regimes to raise funds in order to finance expenditures for military operations, maintaining social order, and paying government bureaucrats. Evidence from time series of fiscal indicators supports the primary assertion made in this article, namely that fiscal policy in late tsarist Russia was dominated by efforts to pull the Imperial government out of a situation of unsustainability in its fiscal relations brought about by events of the mid-nineteenth century (including the Crimean War and the emancipation of Russia's serf population). Furthermore, this evidence suggests that these policies had some success in doing so, particularly in the period following the famine of 1891–92. It is contended that this balance was eventually destroyed by the strains of World War I, thus setting the stage for the collapse of a tsarist government that no longer had effective control of the resources that had ensured its existence.

Some relevant time series are presented below in Figures 1–6, based on data from Crisp (1976), Gregory (1982, 1994), Kahan (1989), and Mitchell

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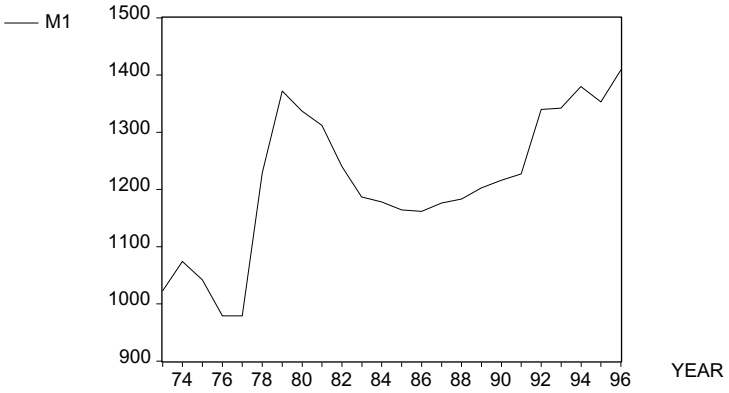

Figure 2. *Money supply (M1) consisting of currency, coin, and commercial transactions deposits, in million rubles, 1873–1896.*

Sources: Crisp (1976), Kahan (1989).

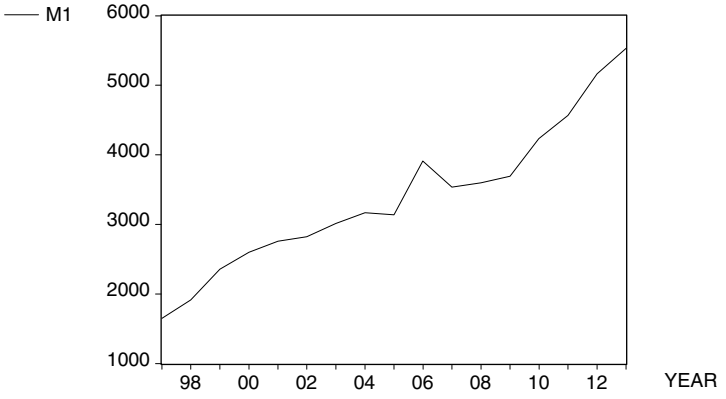

Figure 3. *Money supply (M1) consisting of currency, coin, and commercial transactions deposits, in million rubles, 1897–1913.*

Sources: Crisp (1976), Kahan (1989).

(1980). Figure 1 plots the time series of government tax revenues (TX) and government expenditures including interest payments for debt service (G) and demonstrates the persistence of deficits throughout the period 1850–1913. To discuss fiscal sustainability, I focus on the ratio of these two variables. A continually rising ratio of G/TX represents an unsustainable domestic budget policy (that is, 'explosive' deficits). The graph reveals that deficits were, indeed, persistent throughout this period; however, there is no visual evidence that they were explosive and, therefore, unsustainable in the long run.

These deficits were financed by a combination of expansionary monetary policies and debt. In order to demonstrate the relative importance of the

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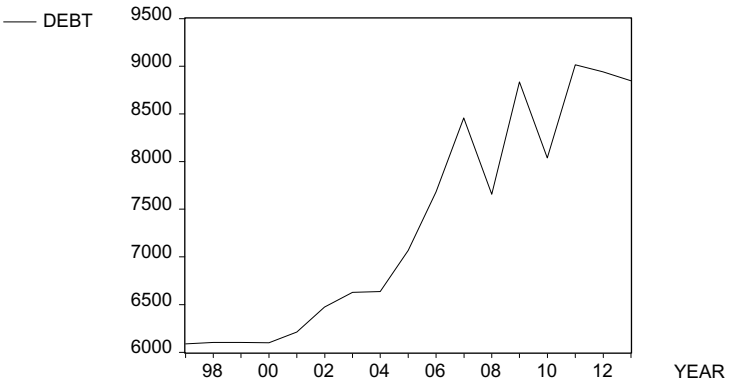

Figure 4. *Government debt (DEBT), in millions of rubles, 1897–1913.*

Sources: Crisp (1976), Kahan (1989).

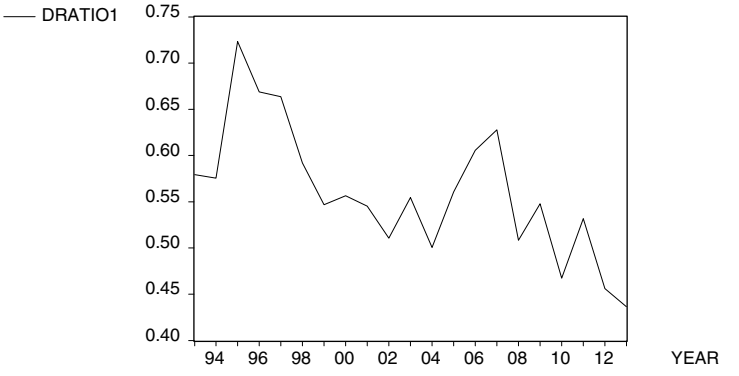

Figure 5. *Ratio of government debt to net national product (DRATIO1), 1893–1913.*

Sources: Crisp (1976), Kahan (1989), Gregory (1982, 1994).

two, Figures 2 and 3 show the development of money supply, and Figure 4 depicts government debt. The money supply data are logged annual totals of currency and coin in circulation plus commercial transactions deposits. The series is divided into two periods: one for 1873–96 and another for 1897–1913 (reliable data prior to 1873 are unavailable), due to the regime change to a gold standard in 1897. As shown by these series, money supply had a tendency to fluctuate in the first period, and was relatively smooth in the second, although the growth rate continued to be high. This is taken as an indication of decreased reliance on inflationary finance as a tool of deficit spending in the latter period, which coincides with the period of the gold standard. By contrast, debt (Figure 4) for the gold standard period shows a high degree of fluctuation, particularly in the latter years of the regime.

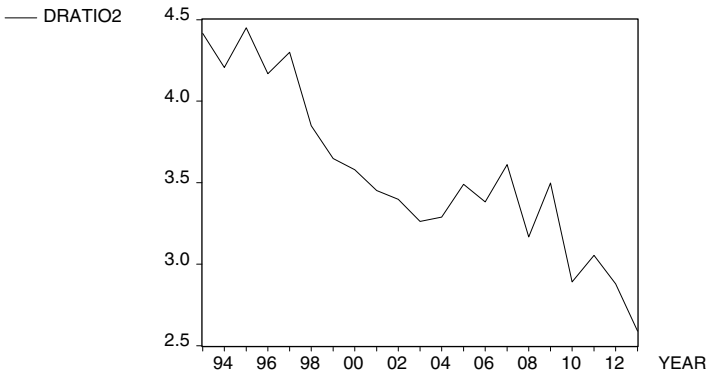

Figure 6. *Ratio of government debt to government tax revenue (DRATIO2), 1893–1913.*

Sources: Crisp (1976), Mitchell (1980), Kahan (1989).

Debt ratios provide additional evidence for examination. An 'explosive' debt ratio would indicate an unsustainable long-run policy. Figure 5 shows total debt divided by net national product for the period 1893–1913 (debt levels before 1893 were negligible). Figure 6 shows total debt divided by government revenue for the same period. Both series indicate a relative decrease in debt financing over time. Consequently, these ratios stress that cumulative deficit spending fell to what might be considered sustainable levels over the final decades of the tsarist regime, a period in which economic growth finally began to ease pressure on the government budget.

3. Formal tests of budget sustainability

The evidence presented in the previous section is consistent with the idea that Russia had obtained a sustainable peacetime balance in its fiscal and economic relations by 1913. Indeed, this conclusion is corroborated by Gregory (1994) in his study of the prewar Russian economy. The purpose of this section is to provide some formal tests of the hypothesis that Russia had, indeed, achieved a sustainable fiscal policy that was compromised finally by the tsar's insistence on entering the First World War. Indeed, Pipes (1990) notes that the 'immediate cause of the Revolution of 1917 would be the collapse of Russia's fragile political and economic structure under the strains of war'.[5]

[5] Pipes (1990, p. 195). Rogger (1983, p. 238) notes that several prominent scholars share the opinion that World War I 'overwhelmed these hopeful beginnings and led to collapse and revolution'. Others, however, disagree and suggest that the war merely postponed an already inevitable revolution. For a sampling of this debate, see for example Haimson (1965) and responses in the same issue of the *Slavic Review*.

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Following Ahmed and Rogers (1995), I consider the one-period government budget constraint of the form

$$G_t - T_t = (M_t - M_{t-1}) + B_t - (1 + r_{t-1})B_{t-1} \quad (1)$$

where M_t denotes real money stock at time *t*, B_t is the real value of one period bonds issued at time *t* bearing a real interest rate of r_t, and $G_t - T_t$ is the real government deficit (exclusive of debt service) for period *t*. Because this equation must hold for every period and the government cannot leave a debt with positive expected value (that is, it cannot finance deficits that are not expected to be paid off), the dynamic budget constraint may be characterised by equating expectations of the discounted present value of future government surpluses to the principal and interest on the initial debt, or (abstracting from real money growth):

$$E_t \sum (G_{t+j} - T_{t+j})/(1 + \rho)^{t+j} = -(1 + r_{t-1})B_{t-1} \quad (2)$$

for $j = 0, 1, \ldots, \infty$ and $0 < \rho < 1$, where E_t indicates expectations at time t and $(1 + \rho)^{t+j}$ is a discount factor where ρ is the mean (expected) interest rate. Rearranging, we get an equation of the form

$$E_t \sum (G_{t+j})/(1 + \rho)^{t+j} + r_{t-1}B_{t-1} - E_t \sum (T_{t+j})/(1 + \rho)^{t+j} + B_{t-1} = 0 \quad (3)$$

which provides a testable framework for analysing intertemporal budget constraints. The long-run relationship implied by this equation serves as our hypothesised cointegrating equation

$$T_t = \alpha + \beta(G_t + r_{t-1}B_{t-1}) + \varepsilon_t \quad (4)$$

where the hypothesised value of β is one. Note that the condition for intertemporal budget sustainability does not require that the national debt must eventually be paid off. It does require, however, that expenditures (inclusive of debt service) and revenues do not drift too far apart over time.[6]

The procedure for testing the sustainability hypothesis consists of three steps. First, the variables must be analysed for their order of integration, as a finding of the same order is necessary for a cointegrating relationship to exist. Second, the model is estimated under the null hypothesis of cointegration. I employ the method of Johansen (1988) in testing for cointegration between government revenues and expenditures in the late tsarist era. Finally, if a cointegrating relationship is found, the estimated coefficients within the cointegrating equation may be interpreted to describe the form of the relationship. Specifically, I test whether the cointegrating relationship between government revenues and expenditures is of the form $(1, -1)$.

[6] The question of whether the cointegrating relationship is both a necessary and sufficient condition, or merely a sufficient condition, for budget sustainability has been addressed in some detail in the literature. For present purposes, I follow Quintos (1995) and consider it to be both a necessary and sufficient condition for a 'strong' form of sustainability.

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Table 1. *Results of augmented Dickey-Fuller unit root tests on (logged) government expenditures (LG) and revenues (LTX), 1850–1913 (64 observations).*

	Lags (in differences)	ADF test statistic
LG with constant only	2	−0.401310
LG with constant & trend	2	−2.986189
LTX with constant only	6	−1.324728
LTX with constant & trend	4	−1.425904

Data, methods and results

Annual time series of (logged) government expenditures (inclusive of debt service) and revenues for the years 1859–1913 are obtained from Mitchell (1980) and designated as LG and LTX, respectively. Each series is tested for non-stationarity using Augmented Dickey-Fuller unit root tests, in order to determine the order of integration. The results of these tests are presented in Table 1. Appropriate lag lengths are chosen by minimising the Akaike Information Criterion (AIC).[7] The ADF tests fail to reject, at the 10 per cent (most restrictive) level, the null hypothesis of a single unit root in both series for models including only a constant as well as those including both a constant and a trend. ADF tests performed on the differenced series show no evidence of unit roots, indicating that the series are each I(1).

After confirming the order of integration, I test for cointegration between the expenditure and revenue series. Cointegration implies a long-run equilibrating relationship between two variables that are integrated of the same order; thus, it means that the variables will not drift apart over time, but will mutually adjust to deviations from the underlying equilibrium. The appropriate lag lengths are determined by minimising the AIC, in the context of the vector autoregression (VAR) framework in which the Johansen methodology is conducted. Johansen tests are performed using a number of different models that vary with regard to the deterministic elements (constants and trends) contained in the long-run equilibrium and in the VAR. The alternative models tested are: (1) no deterministic elements in VAR or cointegrating equation, (2) intercept in cointegrating equation only, (3) intercept in cointegrating equation and linear time trend in VAR, (4) intercept and trend in cointegrating equation and linear trend in VAR, and (5) intercept and trend in cointegrating equation and quadratic trend in VAR. The proper model is chosen by examining the significance of each additional restriction, beginning with the least restrictive model (5), on the basis of log

[7] $AIC = T \ln(RSS) + 2n$, where T is the (fixed) number of usable observations, RSS is the residual sum of squares, and n is the number of parameters.

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Table 2. *Results of Johansen cointegration test on model including intercept in cointegrating equation and linear trend in VAR, 1859–1913 (55 observations).*

Eigenvalue	Likelihood ratio	5% critical value	Number of cointegrating equations
0.329317	22.98645	15.41	None**
0.018307	1.016216	3.76	At most 1

** Indicates rejection of the hypothesis at the 5 per cent level.

likelihood.[8] Given the general rule of maximising the log likelihood subject to choosing the most parsimonious model (that is, one with the fewest parameters) when there is no statistically significant difference between two models, model (4) is chosen as the appropriate VAR representation. The results of the cointegration test are presented in Table 2. Importantly, they indicate that cointegration does exist between tax revenues and expenditures.[9]

Finally, I directly test the hypothesis that the cointegrating equation estimated in the Johansen test is statistically equivalent to the hypothesised equation $T_t = \alpha + (G_t + r_{t-1}B_{t-1}) + \varepsilon_t$. In other words, I test whether or not the coefficient β on government spending including debt service is equal to one. One method of doing so involves performing a likelihood ratio test comparing the explanatory power of a VECM that includes the hypothesised cointegrating equation with one that includes the cointegrating equation estimated in the Johansen test. A likelihood ratio is calculated for each representation and a test-statistic formed for the null hypothesis of equivalence between the two alternatives.[10] The test fails to reject the null

[8] A statistically significant change in log likelihood is indicated when the test statistic $2(LR_o - LR_1)$ exceeds a chi-square critical value with $m - r$ degrees of freedom, where LR_o and LR_1 are the likelihood ratios of the less restricted and more restricted model respectively, *m* is the number of variables in the VAR, and *r* is the rank. Therefore, in the present case, movement from model (5) to model (4) would indicate a significant change in log likelihood if $2(LR_o - LR_1) \geq \chi^2(2)$.

[9] The period chosen excludes available data from 1850–58 that are presented in Figure 1, but tests of parameter stability based on Bai (1997) suggest that imposing constancy on the parameters from this period is inappropriate. Furthermore, as pointed out by an anonymous reviewer, the fact that the 1850s were years of severe upheaval on the political and social fronts (brought on by the Crimean War, the death of one tsar and ascension of another, and the debates over serf emancipation and other reforms) should make it unsurprising that the initial years of the period under examination are 'outliers' (in a statistical sense) relative to the entire period.

[10] The test-statistic is $2(LR_o - LR_1)$, where LR_o and LR_1 are the unrestricted and restricted models, respectively. This statistic is compared to critical values from a chi-square distribution with $m - r = 1$ degree of freedom.

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hypothesis, and I therefore conclude that the actual cointegrating equation is indeed equal to the hypothesised (1, −1). This result is an important one because it is consistent with the theoretical implications of a sustainable fiscal policy.[11]

4. Fiscal crisis and the World War

The foregoing analysis builds a persuasive case that Russian domestic fiscal policy was sustainable in the period leading up to the First World War.[12] The next logical issue to address is whether wartime events caused this balance to break down and, if so, which ones. Unfortunately, reliable short-term inferences can be obtained only from time series that are of considerably greater frequency than those under analysis in the previous section. Reliable high frequency revenue and expenditure data for the period from the First World War until the repudiation of the debt by the Bolshevik government are unavailable. Therefore, I obtain an alternative data set for demonstrating the effects of wartime events on investor confidence.

Using data on monthly Russian bond yields covering the period from July 1906 to June 1920, I conduct a simple intervention analysis in order to determine the significance and magnitude of the effects of wartime events on investor confidence. The intuition behind the analysis is that the market yields and prices of government debt instruments should reflect investors' expectations of future repayment, and thus have a direct correlation with the expected probability of a regime's demise or, more correctly, with the probability that a regime's commitments will fail to be honoured. To the extent that a particular event affects this expected probability, one should be able to detect significant movements (that is, structural change) in a time series of yields or prices.

Methodology

Intervention analysis consists of three broad steps.[13] First, a descriptive model of the time series without the intervention is produced. For example, a

[11] A similar test can be designed using the methodology for estimating cointegrating relationships developed by Engle and Granger (1987). Augmenting the described procedure with an Engle/Granger approach produces the same result, that is, the cointegrating vector appears to be of the form (1, −1).

[12] An anonymous reviewer points out that sustainability in foreign debt markets was also important for late tsarist finance, and would have to be assessed by further reference to exchange rates or bond market data. However, the fact that over three-fourths of Russian investment was domestic by 1909–11 (Rogger 1983, p. 104) suggests that domestic sustainability was probably the more relevant issue leading up to the war.

[13] This discussion draws heavily from Enders (1995, pp. 270–6). The form of these models is merely illustrative; I derive the actual results below.

time series, y_t, might be best described by a simple first-order autoregressive process of the form

$$y_t = \alpha + \beta y_{t-1} + \varepsilon_t \tag{5}$$

where α is a constant, y_{t-1} is a lagged observation of the series y_t, β is the coefficient on this observation, and ε_t is a random error term with a zero mean and constant variance. The residual of the appropriate initial model should be free of statistically significant serial correlation and the model constructed to mimic, as nearly as possible, the actual data-generating process that produced the series. One then compares the autoregressive specification with an intervention model in order to determine whether the proposed interventions significantly increase explanatory power.

To determine the dates (that is, observations) at which interventions may have occurred, standard analysis often assumes that possible points of *structural change*, or regime shifts, are known *a priori* and thus may be imposed upon the model. A more appropriate method, however, allows the points of structural change to be gleaned from the data via some method of break point identification. I choose to employ recently developed tests for structural change based on the work of Bai (1997) and Bai, Lumsdaine, and Stock (1998).

Once the basic autoregressive process is uncovered, the time series is extended to include the intervention effects. Continuing the previous example, if a structural break is found to have occurred at time *k*, then the series may be modelled in the form

$$y_t = \alpha + \beta y_{t-1} + \gamma z_t + \varepsilon_t \tag{6}$$

where z_t is a dummy variable equal to zero for observations $1, \ldots, k-1$ and one thereafter, and γ is the coefficient on this dummy variable. The significance of γ may be tested using standard methods provided that the y_t series is stationary.[14] Furthermore, the short- and long-run effects of the intervention may be derived from the coefficient estimates. The short-run, or impact, effect is given simply by the estimated value of γ. The long-run effect is produced by subtracting the long-run mean of the initial model from that of the intervention model. In the case of the simple first-order autoregressive process, this effect will be

$$\text{LRE} = [\alpha + \gamma]/[1 - \beta] - \alpha/[1 - \beta] = \gamma/[1 - \beta]. \tag{7}$$

In the analysis that follows, I focus primarily on the short-run effects of wartime events on the market for Russian government obligations.

[14] Therefore, unit root tests should be performed on the series and appropriate steps should be taken to produce stationarity. It may be more convenient to perform these tests as part of the initial modelling phase of the intervention analysis.

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Table 3. *Results of augmented Dickey-Fuller unit root tests in (logged) tsarist government bond yields (164 observations).*

	Lags (in levels)	ADF test statistic
Tsarist bonds with constant only	10	−0.449887
Tsarist bonds with constant & trend	10	−2.102995

Data, results and interpretation

A monthly time series of secondary market bond yields for Russian government obligations, the 1906 issue of Tsarist bonds, is obtained from *Global Financial Data* (1998). The methodology described in the preceding section is employed to examine the characteristics of these series for the period from July 1906 to February 1920. The end-of-period date is chosen to allow for the detection of significant movements in bond yields up to January 1918, when the Bolshevik government formally defaulted on all Russian state obligations.[15]

Results of the initial modelling phase of the analysis are presented in Table 3. Appropriate autoregressive representations are chosen by minimising the AIC for each series regressed on lagged values of the series as well as both a constant and a time trend. This process reveals that the Tsarist bond series is best represented as an AR(10) process, probably due to seasonal effects in the monthly data. Unit root tests are also performed on the series, indicating nonstationarity in levels but not in first differences. Thus, the differenced series, with ten lags, is used to estimate the final model and perform hypothesis tests with regard to the significance of various interventions.

The next stage of the analysis involves identification of points of structural change in the series. I employ the Bai (1997) test for breaks in each autoregressive process, searching for a break in the constant alone, trend alone, and both constant and trend over the entire period from July 1906 to February 1920. This reveals, for all three cases, a break date in April/May 1917 for the Tsarist bonds. I speculate that this break is related to the fall of the liberal-led Provisional Government in late April and its replacement by a socialist-dominated one. It appears that the expectations of investors in Russian government obligations were affected much more strongly by the fall of this government than by the abdication of Tsar Nicholas II two months earlier. Upon reflection, this makes sense, as these investors, who are concerned not with who redeems the obligations but with whether they are redeemed, saw the shift of power from a group that emphasised fiscal

[15] Pipes (1990, p. 601).

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Table 4. *Estimated coefficients for intervention analysis of sample covering July 1906–February 1920 (164 observations).*

Variable	Coefficient
Constant	0.000657 (0.003844)
D_{I1}	−0.085307 (0.043454)
D_{T1}	0.031984** (0.009554)

** Indicates significance at the 5 per cent level.

responsibility to one which repeatedly railed against 'foreign capitalists' and their 'intervention' in Russian affairs as a monumental turn of events.[16]

Next, I truncate each series at the point of the identified break and apply the Bai (1997) test again in order to detect a significant break before April/May 1917. The test returns a break in July 1914, the precise month (according to the Julian calendar in use in Russia at that time) of Germany and Russia's declarations of war against one another. Therefore, initial evidence for a significant 'investor confidence' effect due to the onset of war is pronounced.

The magnitudes of these effects may be revealed by estimating the intervention models. I expect the coefficients on all intervention terms to have a positive sign, meaning that the onset of the World War in July 1914 and the fall of the first Provisional Government in April 1917 should have triggered higher yields demanded by investors. Because the structural break in 1917 is considerably more significant than that in 1914, I first estimate an equation covering the entire period from July 1906 to February 1920 with intervention variables corresponding only to the break in April 1917. I estimate a model in first differences, including an appropriate number of lagged dependent variables and, as intervention terms, the dummy variables D_{I1} and D_{T1} corresponding to a shift in the intercept and the trend, respectively.[17] The results of the estimated equation are presented in Table 4. The coefficient estimate pertaining to the trend is positive and significant at the 5 per cent level, indicating that higher and higher premiums were demanded by investors in response to the downfall of the first Provisional Government of 1917 until (and after) the Bolshevik default. This event appears to have led not merely to a one-time adjustment in risk premiums, but to an upward trend in the level of those premiums after the event.

[16] It is interesting to contrast this response on the part of financial investors with the muted reaction from most Western governments.

[17] Thus, in the context of an equation in first differences, D_{I1} and D_{T1} represent a single pulse and a change in intercept, respectively, in the month of April 1917. In other words, D_{I1} equals one for April 1917 and zero otherwise, and D_{T1} equals one for each observation from April 1917 to the end of the sample and zero otherwise.

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Table 5. *Estimated coefficients for intervention analysis of sample covering July 1906–April 1917 (130 observations).*

Variable	Coefficient
Constant	−0.004299 (0.002113)
D_{I2}	0.036508*** (0.018902)
D_{T2}	0.016909** (0.004703)

** Indicates significance at the 5 per cent level.
*** Indicates significance at the 10 per cent level.

I repeat this procedure on a subsample covering the period from July 1906 to March 1917 using dummy variables D_{I2} and D_{T2}, which correspond to a shift in the intercept and trend of the bond yield series, respectively, in July 1914. The results are presented in Table 5. One of the coefficients is significant at the 5 per cent level, and the other is only marginally insignificant at that level.[18] Each of these estimates also possesses the expected positive sign. Given that the previous break-point tests suggest an intervention in July 1914, I take these coefficient values to be fairly plausible estimates of the effects on investor confidence stemming from the onset of World War I.

The impact effects of these two events can be explained as follows: The coefficients on D_{I2} and D_{I1} represent shifts in the intercept of the series at the break dates July 1914 and April 1917, respectively, while the coefficients on D_{T2} and D_{T1} represent changes in the slope of a deterministic time trend at these respective dates. The results indicate, for example, that the logged yield of the series jumped by 3.65 per cent in July 1914, and continued to trend upward by almost 1.7 per cent annually thereafter, as a result of Russian entry into the First World War. As noted previously, the effects are much more pronounced for the April 1917 break date than for July 1914, suggesting that the fall of the liberal-led Provisional Government was a decisive moment for the fiscal stability of the Russian state. The measured effects of the onset of World War I are not, however, trivial; for they appear to have set in motion a pattern of increasing risk premiums, setting the stage for a breakdown in fiscal stability that hindered both Russia's war effort and the tsarist regime's ability to deal with the unrest it unleashed.

5. Conclusion

That the onset of the World War was the primary cause behind the downfall of Tsar Nicholas II and his government is now widely acknowledged. For example, Service (1998) notes that the war unleashed 'an economic and political disorder so huge that Nicholas had to abdicate in February

[18] The coefficient on D_{I2} would be deemed significant at an alpha level of 5.61 per cent.

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1917'.[19] This article has presented more systematic evidence, gathered from time series of government revenues, expenditures, and bond yields, that participants in financial markets considered both the onset of World War I in July 1914 and the fall of the first Provisional Government in April 1917 as crucial events which altered their perceptions of Russia's ability to eventually repay the national debt. Given the severity of these impacts on investor confidence, it is unsurprising when Pipes (1990) notes that the Petrograd Stock Exchange was 'entirely unimpressed' when the Bolsheviks seized power in October 1917.[20] Indeed, the general mood among both the educated and the man on the street seemed to be that 'it made no difference who was in charge since things could not possibly get any worse.'[21]

The evidence compiled here supports the findings of Gregory (1994) and others who suggest that Russia had indeed obtained a sustainable peacetime fiscal and economic balance that was thwarted by the untimely events of World War I. Historical episodes such as this one, as well as the early Bolshevik period that immediately followed, are ripe for investigation by economists who want to shed some light on an interesting but still under-explored period of economic and institutional change.

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[19] Service (1998, p. 26).

[20] Ibid., p. 505. The only indication of nervousness in the financial markets was a sharp fall in the value of the ruble, equal to almost half of its exchange value against the dollar.

[21] Ibid.

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