

A rationalist explanation of Russian risk-taking

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Abstract

Three seemingly unrelated topics of Russian politics are investigated. It is shown that under expected utility maximization the assumptions of an unbiased oil forward market and a risk-acceptant attitude (strictly convex utility function) are sufficient to explain Russia's open position in oil and the bailout of Rosneft. The risk-acceptant attitude of the Russian leader also causes a shrunken bargaining range for the conflict in Ukraine, which can be enlarged by sanctions but not necessarily by the proliferation of weapons. This gives sanctions a clear edge over the proliferation of weapons.

The media are filled with reports about Russia's risk taking. Most prominent are reports about the conflict in Ukraine, less noted are reports on Russia's open (unhedged) market risk position in crude oil, and presumably least noted are reports about bailing out certain Russian firms. In this article we establish that all three risk-taking decisions can be explained by one rationalist model. First, we investigate Russia's decision not to hedge its well-known oil price exposure by making use of expected utility theory. Second, Russia's bailout of Rosneft is subsumed under this model. Third, a rationalist explanation is applied to the conflict in Ukraine.¹

Approaches to international relations

To understand the logic guiding the decisionmaking of Russian president Putin, it is essential to refer to the two main schools of thought in international relations, as this discipline contributes valuable insight into the behavior of states and other actors. We thus briefly discuss the traditions of realism and liberalism, compare them to each other, and then point out where our approach fits in.

The realist school was the predominant stream of international relations thought in the post-world war two era. Massively shaping foreign policy over the last few decades, its origins date back to Thucydides' *Melian Dialogue* which vividly demonstrates the basic assumptions of realism. The conclusion of the dialogue can be summarized as "the strong do what they can and the weak do what they must," reflecting the centrality of the theme of political power as the starting point of all realist theories. Realism emphasizes the constraints on politics imposed by human nature and the absence of international government. Realists, like liberals, assume that politics is governed by objective laws that have their origin in

human nature, with the significant difference that realists regard humans as egoic and inclined toward immorality. On the state-level, the main objectives are security and survival, both of which achieved through the deployment of military forces. Combined with the assumption that the international system is anarchic, this creates a security dilemma as each state is primarily motivated by rational national self-interest. As states are the most important actors in international politics, there cannot be a higher authority governing their interactions unless those states transfer their sovereignty in a contractual process to a supranational body.²

From this it follows that universal moral principles cannot be applied to the actions of states, and this stands in direct opposition to one of the main goals of liberal theories of international relations. Here the survival of each state depends on its material capabilities and alliances with other states. What realists have in common with liberals is the domestic analogy, just that realists draw this comparison in regards to politics, not law, from which derives a simple answer to the question of order—internationally as well as domestically: effective central authority. Furthermore, realists stress the importance of community to achieve order. This implies that an effective international order can only be achieved among states with similar ideals and values and thus emphasizes the cultural limitations of liberal internationalism.³

Liberals' core unit of analysis is the individual, not the state, and the view of this individual is much more optimistic than that of realists. Liberals begin with the assumption that humans innately tend to be good and can be motivated to act altruistically. From this philosophical starting point more diverse options arise for how a society of states can be structured. Liberalism considers a more diverse set of actors to be relevant to international relations and therefore involves

trade as a central element in its approach. One of the founding fathers of liberalism, Immanuel Kant, was among the first to create a holistic theory of peace revolving around the mutual benefits of commerce and, consequently, the implications of military activity for such trade. The basic idea therefore rejects war as a means of solving political conflicts and retreats to diplomacy in the name of reason, peace and progress. Perpetual democratic peace and free trade would make military solutions to conflict obsolete. From this follows the trust placed in international institutions and international law to govern interstate relations. Thus, liberals also draw on a domestic analogy, only that it treats states like individuals. Security is guaranteed collectively, the rule of law enforced internationally, and diplomacy carried out publicly.

Our approach can be subsumed under realism: We take the state as the core unit of analysis and point out the importance of only certain individuals, which we view as acting egoically. By identifying the interests of the Russian state with those of certain individuals, who act rationally, we are—again—in alignment with realism. Furthermore, most characteristics of Russia's recent foreign policy toward Ukraine reveal numerous realist elements. Especially the disregard for international institutions or the systematic abuse of its structural weaknesses, as well as Russia's calculating manner when breaking international law and probing the limitations of its actions motivate a realist approach to international politics. Since we apply an interdisciplinary approach and detail the risk preferences of the main actor, we add something new to the realist approach.

Russia's oil price risk management

The application of expected utility theory to hedging decisions has a long tradition, but its application to international relations is more recent, initiated by Bruce B. De Mesquita. We take two of his original assumptions and apply them to the case of Russian decisionmaking: (1) Decisions are viewed as if they are the product of a single, all important decisionmaker [i.e., the leader] and (2) decisionmakers are rational expected utility maximizers.⁴

Both assumptions can be defended as applicable to the case of Russia. First, according to Russia's chief propagandist "even a decision about the use of nuclear arms 'will be taken personally by Mr Putin'." Nevertheless, Putin has to cope with limitations on his power. It is well-known, for instance, that he cannot afford to lose support of the oligarchs; in fact, certain oligarchs were key in furthering his career. But as long as these few people are not overmuch adversely affected, there is a significant degree of freedom for Putin to decide as he wishes. This is captured by the first assumption.⁵

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Clearly the Russian state takes numerous major actions every year. It is outside the scope of this article to investigate all of them. But the three actions under consideration rank among the most important and can be linked to the Russian president. His involvement in Ukraine goes without saying. Regarding Rosneft and the oil markets, note that one of Putin's closet allies from St. Petersburg, Igor Setschin, is Executive Chairman of Rosneft, an integrated oil company that is majority-owned by the Russian government.⁶ We may thus safely assume that Putin is well-aware of Rosneft's positioning in the market and personally interested in the company's fate.

As to the second assumption, two economics Nobel prizes have been awarded regarding theories of decisionmaking under uncertainty, Expected Utility Maximization (EUM) and Prospect Theory (PT).⁷ For a number of reasons we prefer EUM. First, Kahneman himself notes that prospect theory does not apply to international relations.⁸ Second, the axioms underlying EUM are more convincing to us than those of PT. Take for example the handling of probabilities. Denote the chances to win a war by deploying army 1 by P_1 and for using army 2 by P_2 . Assume that $P_1 > P_2$. Under EUM, it is an elementary rule (axiom) that a decisionmaker would then prefer army 1 to army 2. Given a few other axioms, the authors of EUM have shown that there exists a utility function and that finding the optimal decision (e.g., regarding an army) is equivalent to EUM, i.e., picking the one which yields the highest expected utility. In the calculation of expected utility the probabilities would be taken as such, e.g., as calculated by intelligence functions. In contrast, PT applies a weighing function to the probabilities, capturing the notion that people tend to overreact to small probability events and underreact to large probabilities events. It serves to capture people's misunderstandings when coping with uncertainty. But we do not see why Putin should weigh probabilities instead of taking them as such.⁹ Now, while one could apply PT without weighing, the initial reference point in the weighing function is a crucial concept of PT which cannot be done without. The problem with the reference point is its arbitrariness. For

instance, it is not clear whether a hedged or unhedged position in oil should be chosen as reference point of the Russian leader. As the choice of the reference point regularly impacts the results of PT, its arbitrariness is seen as a detriment.

Third, EUM is today one of the most important theories in the social sciences. It serves as a tool to prescribe how decisions should be made, given elementary rules of rationality (such as the rank ordering of armies) and scientific journals are filled with EUM applications to derive optimal decisions (on production, hedging, etc.) and, at a minimum, deserve an application to our case. And fourth, for some the rationality of the Russian president might be presumed simply in light of his education as a KGB officer; more convincingly, though, it cannot be ruled out that the conflict in Ukraine is no accident but part of a grand strategy.¹⁰

Furthermore let us assume as in De Mesquita (1980) that the “leader’s welfare” is the argument of the utility function $u(\bullet)$ to be maximized. Since future oil prices are uncertain, the leader maximizes expected utility. The leader’s welfare is certainly a function of governmental tax income, which again is a function of the revenues from selling oil. We do not assume that the leader is a steward for the general welfare of his citizenry. Our approach is aligned with a recent, more detailed analysis of Russian foreign policy, which highlights Putin’s attempts to avoid Russia becoming a third-rank state. Governmental tax income is a means to buy more and better equipment for Russian troops, which thereby can be ignored less easily.¹¹

We denote the amount of the sovereign’s oil production by x in units of barrels (bbl) and the uncertain oil price by p in units of U.S. dollars (USD). The leader maximizes the following expected value over a certain time horizon:

$$(1) \quad E[u(x,p)],$$

where $E[\bullet]$ denotes the expectation operator using the subjective probability distribution as seen by the leader. For exposition, we assume a horizon of one year, which makes x the annual oil production. As a representative of the hedging instruments available we introduce a one-year futures contract, which can be bought or sold at today’s known futures price level of f in units of USD/bbl, for instance at the Intercontinental Exchange (ICE).

The leader does not have a “crystal ball” to foresee future oil prices. Many studies have investigated whether oil-futures prices can be treated as expected spot oil prices and have reached a positive conclusion.¹² Hence, we assume that the futures price f is an unbiased estimator of the future oil price p , i.e.:

$$(2) \quad f = E[p].$$

The last bit of notation is the decision variable h , which is the number of barrels sold forward at the current futures price f . For instance, if the leader chooses to hedge fully, we would have $x=h$. What is effectively chosen is the outcome of the following decision problem of the leader:

$$(3) \quad \max(h) E[u(xp + h(f - p))].$$

The only difference to equation (1) is the addition of the profit or loss term from hedging with futures. This simple model implies a proposition for the leader.¹³

Proposition 1:

- (i) The leader will hedge fully if he is risk-averse.
- (ii) If he is risk-acceptant, a full hedge is the worst decision. Hence, he will leave the oil exposure unhedged.
- (iii) If he is risk-neutral, it does not matter whether a hedge is in place.

Non-hedging of Russia’s oil exposure could thus be explained by either a risk-neutral or risk-acceptant attitude of the leader. Before this proposition can be applied, however, its unbiasedness assumption, as expressed in equation (2), needs to be defended. In theory this assumption could be checked by asking the Russian leader for his oil-price expectations and comparing them to the current oil-forward price curve. It is clear that this is out of question. As an approximation we look at the expectations expressed by the governor of the Bank of Russia. First, the expected levels were close to the then current futures quotes. Second, leading analysts are quoted by the governor. It is common practice that, where available as liquidly traded instruments, forward prices are taken as best estimates for future spot prices—even by experts.¹⁴

With this support for the unbiasedness assumption we can now conclude from the proposition that the Russian leader either has a risk-acceptant or a risk-neutral attitude. This intermediate result is next checked against other evidence.

Russia’s bailout of Rosneft

The media report that Russia’s central bank is accepting corporate bonds issued by Russia’s biggest oil company, Rosneft, as collateral from its debtors, i.e., commercial banks.¹⁵ The already big exposure of the Russian banking system to commodity-related companies is thereby increased. By assumption the central bank acts in alignment with the leader.

What does this bailout tell us about the risk attitude of the leader? Certainly, this decision cannot be reconciled with a

risk-averse attitude as this would call for diversification of credit risk, not for its concentration. Risk-acceptant or risk-neutral attitudes again appear as viable candidates to explain the observed behavior.

There are media reports on the specific conditions under which the central bank is taking the bonds as collateral. It is reported that they were taken at face value. The fact that the interest which investors are charging Rosneft on these bonds (i.e., the coupon) is below that of Russian sovereign debt rules out a risk-neutral attitude. In other words, the expected credit loss from holding these bonds is not compensated by the coupon as would be required by a risk-neutral decisionmaker.¹⁶

Hence, the bailout of Rosneft can neither be explained by a risk-averse nor by a risk-neutral attitude of the Russian leader. This leaves a risk-acceptant attitude of the Russian leader as the best common explanation of not hedging the oil exposure and bailing out Rosneft.

Conflict in Ukraine

Military conflict is inefficient because it destroys resources. Therefore, rational individuals seek to avoid military conflict. It should be noted that this is due only to reasons of efficiency and not of moral principles. Taking the approach by Fearon we show that risk-acceptance can explain why it is especially challenging to find a peaceful solution for the conflict in Ukraine.¹⁷

Let D be the monetary value of the region under dispute and C_i the costs of war for sovereigns A and B , $i=A,B$. The proportion of the region controlled by A is denoted by Y . Sovereign A prefers Y close to 1 (i.e., 100 percent). The chances to win a war (i.e., to get to $Y=1$) are signified by probability P . Hence, war is a Bernoulli random variable with outcomes $Y=1$ with P and $Y=0$ with $(1-P)$ from the perspective of A .

We take probability P as given and do not try to specify a conflict success function.¹⁸

In the case of risk-neutrality, sovereign A calculates its expected value of war as:

$$(4) \quad E[YD - C_A] = PD - C_A.$$

From B 's perspective the expected value is:

$$(5) \quad E[(1-Y)D - C_B] = (1-P)D - C_B.$$

This leads to

Proposition 2: So long as both C_i are positive, there is a negotiable proportion Z , which both sovereigns prefer to

Table 1: Bargaining ranges

	Bargaining range with risk-acceptant A			
	Bargaining range under risk-neutrality			
0	$PD - C_A$	$GD - C_A$	$PD + C_B$	1
B 's favorite outcome				A 's favorite outcome

Note: G is the amount of the certainty-equivalent share of region D .

war. The monetary amount ZD is in the interval (bargaining range) $(PD - C_A, PD + C_B)$.¹⁹

One surprising insight is that even if sovereign A is sure to win (i.e., $P=100$ percent), there is an interest to avoid the costs of war. This gives B the opportunity to get at least a (presumably rather small) fraction of the region's value, D , or a compensation payment.

So far the proposition sheds light only on the consequences of risk-neutral attitudes of both parties. However, in our case, the interim conclusion has been the leader's risk-acceptant attitude. This gives rise to a third proposition.²⁰

Proposition 3: The chances for a negotiated settlement shrink if party A becomes risk-acceptant. The interval (bargaining range) becomes smaller.

It makes sense to identify party A with Russia. This allows to cast current efforts of international politics into the model's framework. A comparison of the bargaining ranges under risk-neutrality and with a risk-acceptant party A is shown in Table 1.²¹

Sanctions on A can be interpreted as an attempt to increase A 's cost of war. In our model it is important that the monetary impact of the sanctions must be related to an intended future aggressive action (i.e., no action, no sanction). In this case the threat of sanctions increases cost C_A and widens the interval to the left in favor of B . Thus compensation for the initial bargaining range shrinkage due to party A being risk-acceptant can be achieved. One might object that sanctions also widen the bargaining range for the case of a risk-neutral aggressor. This is true but not the point we want to make. Instead, we highlight that if one has to cope with a risk-acceptant aggressor an extra portion of sanctions can be argued for.

Another model parameter is probability P . Advocates of military support for Ukraine might argue that this decreases P (Russia's probability of winning). But as stated by German chancellor Angela Merkel there is no amount of military support for Ukraine which would significantly change the odds of war for Russia. Hence, the probability distribution cannot be changed in this special case. But even if the probability distribution could be changed, the interval would not necessarily be enlarged. In addition, sanctions are more manageable than is the proliferation of weapons.

Conclusion

Three seemingly unrelated topics of Russian politics have been investigated. We show that, under expected utility maximization, the assumptions of an unbiased oil-forward market and a strictly convex utility function—representing a risk-acceptant attitude of the Russian leader—are sufficient to explain the open position in oil, the bailout of Rosneft, and the difficulties to settle the conflict in Ukraine peacefully. An additional insight is that the measures taken by Western states have to be more drastic than in the case of a less risk-acceptant leader.²²

A tentative forecast is that the Russian leader will prefer actions which make the world more unstable to those which do not.²³ This again is a consequence of the risk-acceptant attitude.

The application of an interdisciplinary approach, starting from sovereign commodity price risk management and ending in international politics, can be useful to specify and understand risk attitudes of decisionmakers in international politics.

Notes

1. The model follows the approach by Fearon (1995) and de Mesquita (1980).
2. Realism emphasizes: See, e.g., Donnelly (2000, p. 9). Realists assume: See Morgenthau (1948, p. 4). Rational national self-interest: Mearsheimer (1994/95, p. 9) and Gilpin (1996, p. 8). Transfer sovereignty: See Mearsheimer (1994/95, p. 9).
3. Main goals of liberal theories: Again we refer to Morgenthau (1948, p. 6). Survival of states depends on: See, e.g., Waltz (1979, p. 103). Effective central authority: More on this in Lebow (2014, p. 60-61). Liberal internationalism: Again we refer to Lebow (2014, p. 61).
4. Long tradition: An early publication is Ethier (1973). Initiated: De Mesquita (1980).
5. Quote: The Economist (2015).
6. At the time of writing, Rosneft claimed to be the largest publicly listed oil company in the world as measured by barrels of oil produced. If one uses other measures, for instance

revenues in 2014, Rosneft's worldwide ranking falls. But what counts here is that Rosneft is Russia's biggest oil company in terms of production.

7. Expected Utility Maximization: Neumann and Morgenstern (1944). Prospect Theory: Kahneman and Tversky (1979).

8. We are grateful to De Mesquita to point this out to us.

9. More specifically, von Neumann and Morgenstern proved that any weighing that is not proportional to the given probabilities leads to inconsistencies in decisionmaking. Also see the hint in Kahneman (2012, p. 312).

10. See the so-called Ukraine Plan as leaked by *Novaya Gazeta* (Grozev, 2015).

11. Leader's welfare function: To keep things simple, we do not make the tax function explicit. As long as it is increasing and close to linear, it does not change the nature of the maximization problem. Not a steward: This perspective should not come as a major surprise. See Dawisha (2014). Recent analysis: Monaghan (2008).

12. For instance Alquist and Arbatli (2010, p. 5) concluded that "treating oil-futures prices as the expected future spot price is a good first approximation."

13. For the proof, see the Appendix.

14. Governor: On 11 December 2014, Russia's central bank expected "average oil prices to be \$80 per barrel during the next three years. This average price results from consensus forecast of the leading analysts" (Nabiullina, 2014). Common practice: "It is commonplace in policy institutions, including many central banks and the International Monetary Fund (IMF), to use the price of NYMEX oil futures as a proxy for the market's expectation of the spot price of crude oil" (Alquist and Kilian, 2010, p. 541).

15. For instance, Kuznetsov (2014).

16. At face value: For instance, Gallucci (2014). Bond interest rates below Russian sovereign debt: Guriev (2014). Uncompensated expected loss: Implicit in this reasoning is the assumption that Rosneft has a higher probability of default than does Russia. One fact backing up this assumption is that Rosneft seeks help from Russia, and not the other way around.

17. Fearon (1995). There is no need to apply the more recent work of Powell (2006), who sees war as a commitment problem. In the case of Russia and Ukraine, many governments tried not only to broker peace but also announced stronger sanctions if negotiated deals are not honored. Thus they create commitment.

18. A conflict success function (e.g., Hirshleifer, 1995; Garfinkel and Skaperdas, 2007) specifies how military resources of one party translate into the probability of winning for that party. Details on this concept can be found in Anderton and Carter (2009, p. 246).

19. For the proof, see the Appendix.

20. And, again, the proof is in the Appendix.

21. G is the certainty-equivalent (CE) share of region D and defined in the Appendix. The certainty equivalent is the safe amount that is considered to be as attractive as the game itself. For a risk-acceptant player the CE is above the expected value of the game. For a risk-averse player it is below.

22. The need for a deeper understanding has been recently pointed out by Allison (2014, p. 1295): “The strategic and political consequences of a Russian readiness to rewrite borders in this way are most serious. This demands a concentrated effort to understand the extent to which Moscow seeks to challenge the current European international order and to better explain Russian actions towards Ukraine.”

23. This statement could be proven formally by showing that expected utility increases with the variance. As this consequence of risk-acceptance is rather obvious, we do not detail the proof.

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Appendix

Proof of proposition 1

Start with sub-proposition (i). Risk-aversion means that the utility function is strictly concave. A full hedge reduces $xp+x(f-p)$ to xf , which is nonrandom. Due to assumption (2) this is equal to $xE[p]$. With the help of Jensen’s inequality from probability theory one sees that getting the expected welfare for sure is the best outcome for a risk-averse leader because $E[u(xp)] < u(E[xp])$.

Sub-proposition (ii) implies a strictly convex utility function. The inequality reverses. Thus getting the expected welfare for sure is the worst thing for a risk-acceptant leader, which is why he will avoid hedging.

A risk-neutral decisionmaker maximizes $E[xp+h(f-p)]$. Insertion of (2) gives $E[xp+h(E[p]-p)]$. Since E is a linear operator, the term following the control variable h vanishes. What remains is $xE[p]$ for any choice of h . Hence, it does not matter.

q.e.d.

Proof of proposition 2

The proof is as in Fearon (1995) and given here for convenience of the reader. The left-hand side of the interval is trivial, because a Z bigger than A 's expected value is clearly preferred by A over the alternative of going for war. The right-hand side follows from the same logic as seen by B .

$$\begin{aligned} (1-Z)D &> (1-P)D - C_B \\ \Leftrightarrow -ZD &> -PD - C_B \\ \Leftrightarrow ZD &< PD + C_B \end{aligned}$$

q.e.d.

Proof of proposition 3

Consider the case of A being risk-acceptant. This implies the following inequality:

$$E[u(YD - C_A)] > u(PD - C_A).$$

Denote the amount of the certainty-equivalent share of region D by G and define it implicitly via:

$$E[u(YD - C_A)] = u(GD - C_A).$$

As a consequence of $u(\bullet)$ being increasing, the certainty-equivalent of going to war is larger than the expected value. This increases the left-hand side of the interval and shrinks the set of the negotiable proportion.

q.e.d.