Energy security and energy dependence on Russia in Europe. Path dependence, political and additional factors

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Author's Declaration

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Abstract

In the last year, the issue of Europe's energy dependency on Russia has been in the spotlight. Among catastrophist scenarios that were dreaded as Europe moved away from Russian gas and calls to further move away from fossil fuels, the extreme weakness and vulnerability of many European countries concerning energy security were dramatically exposed.

However, some countries have been more severely damaged than others by a rapid effort to overcome energy dependence from Russia following the beginning of the Russian aggression on Ukraine. Some countries have been more reluctant and more struggling than others in abandoning Russian gas.

This thesis has the objective to inquire what may be the factors that induced and led countries to a higher dependence on Russian gas. Using data from 31 countries (the EU 27, the United Kingdom, Iceland, Norway, and Liechtenstein) from a period between 1995 and 2021, we will try to identify the main indicators that are linked to higher imports from Russia. To do so, we will use as a dependent variable the data regarding imports of Russian gas taken from the Eurostat and, as independent variables, we will be using multiple factors, including geographical ones, governance indicators and other factors regarding energy policies.

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List of Abbreviations

- -"consimpruss"= share of natural gas imports from Russia on energy consumption
- -"geo" = geographical variable
- -"oilproduction" = domestic oil production
- -"defence" = defence spending
- -"corruption"= political corruption (V-Dem)
- -"accessbus"= access to state business by political group (V-Dem)
- -"democracy" = Liberal Democracy Index (V-Dem)
- -"gasproduction" = domestic gas production
- -"fearussia" = fear of Russia
- -"nuclear" = use of nuclear energy (yes/no)
- -"f.right/populist parties" = vote share of far-right and populist parties
- -"Left/right/centre" = Political orientation of the Executive (left, right, centre)
- -"impconsum" = share of natural gas imports from Russia on energy consumption
- -"EP" = European Parliament

Introduction

The unforeseen deflagration of the war in Ukraine in 2021 has shaken an energetic status quo in Europe that was based on considering Russia as a trustworthy partner and has shown several weak spots in the existing circumstances.

The war started almost one year after the former Chancellor of Germany, Angela Merkel, had defended the Nord Stream 2 project and argued that Russia could not use energy as a weapon. The words of the Chancellor could simply be disproven by looking at the massive energy dependence some European countries have on Russia. Following 2022, European countries have rushed and struggled to be finally able to shrink their dependence on Russian energy. A severe divide emerged between countries that saw their energy security threatened by the collapse of relations between Russia and Europe and countries that have not been affected. The reason for this divide in energy security may be following a path dependence scheme. Indeed, geography and history play a crucial role in this kind of relationship, and in the options countries have regarding their energy supply. Still, political, and strategic factors may seem to have pushed some countries more than others to seek alternatives to Russian imports.

This paper aims to inquire what the different factors that affect choices in the matter of energy dependency from Russia are and how consistent is the effect of these factors. As it was stated before, path dependence probably plays a fundamental role in the status quo regarding energetic supply in Europe, however, we believe there may be other factors to count in as well. We will divide all the factors that can be considered to influence dependency on Russian gas into three groups: one regarding "structural" (or semi-structural) characteristics of a country (and these factors may reflect in part path dependence and historic legacy), a second one regarding international political alignment, foreign relations and consideration for "security", and a third one regarding internal political factors (including levels of corruption, democracy etc). Indeed, a clear-cut line among these factors cannot be defined with extreme precision. Some of the "structural" factors may be influenced by policymaking and by the policy process and so might be the "international alignment" ones. However, the division we made, although not essential to the analysis, seems to be quite useful to have a clearer picture of what might be the causes of dependence on Russia and to understand why some countries appear to be stuck in a firmer grip compared to others.

In the following paragraph, we are going to be analysing the current literature regarding energy security in Europe and the energy dependency of European countries on Russia as well as the energetic relations of Russia. Through the analysis of the literature, we will begin also to list all the factors we have chosen for our quantitative analysis and justify the reasons that led to the choice of these factors. After that, we will more in-depth clarify all the variables chosen, the data to be employed and the kind of analysis that will be carried out.

Literature Review

The issue of the energetic dependency of Europe on Russia has emerged in recent literature. Very often this problem has been framed as a question of co-dependency rather than a unilateral problem.

In Paillard (2010) (although it must be noted it is not a very recent paper) one can see how the author clearly delineates the ratio of the European dependence on Russia and argues (rightly) that this dependence will likely last for more than 10 years (as Russia's production of gas will grow and Europe will still be struggling to find alternatives). The author highlights how the most vulnerable countries will be likely those that are abstaining (or planning to do so) from nuclear energy (he mentions Germany and Italy). The author claims that this dependency is a mutual phenomenon: as Russia has virtually no alternatives to Europe as a buyer. In this regard, Paillard argues that this may make more aggressive the Russian negotiating position. The importance of Russian gas for the European market makes European countries, reasons the author, more reluctant to take a stance on international crises caused by Russia. On the other hand, Russia through these international crises aggressively tries to improve its negotiating position with regards to energy. Moreover, Russia uses its energy standing to compensate for other economic and diplomatic problems. The author contends that through its energetic leverage, Russia is seeking to create divisions among European countries as well as within NATO and between Europe and the USA. Furthermore, as Paillard argues, Russia tries to compensate for its rudimental economy through imports from countries that depend on Russian gas.

If we move on to the analysis of more recent literature, we can find another set of problems illustrated concerning Europe's dependence on Russian gas. For example, Luciani (2015), among other things, stresses the issue as one of monopoly: in fact, Russian gas (and Gazprom in particular) is explained to have a monopolistic position in the European energy market. The author argues that Europe is heading towards a more competitive market that will see more actors and possibly lower prices.

Ozawa (2022) similarly describes the energetic relationship between Russia and Europe as interdependent and contends that Russia has now weaponized natural gas as opposed to what Europeans might have expected. Moreover, some other crucial points are emphasized by Ozawa's paper: firstly, that now Europe has an increased incentive and opportunity to foster its energy security and diversify imports. Secondly, the author highlights how Europe might be more resilient than expected to a halt to Russian gas imports. Nonetheless- thirdly- the author describes the main obstacles that exist to energy independence which are partly represented by the "structural" marriage between Russia and Europe (namely, pipelines) and the costs (economic, political, environmental) to switch to other energy sources.

Ozawa and Iftimie (2020) furtherly delineate the energetic dilemma between Russia and Europe. They identify three main points of the dilemma: security of supply, affordability and environment. In this regard, by, then, looking at the trade deficit between European countries and Russia, they argue that the nature of the relationship between Russia and Europe is not one of interdependence. They claim that the relationship is unbalanced and has somehow the characteristics of a barter. This relation, according to the authors, develops through different systems: direct industrial links, association and industrial networks and links between industries and government leaders. It is, in fact, important to notice that in Ozawa and Iftimie (2020) the importance of state-owned companies and links between companies in the energetic actors and the State/Government actors is described both regarding actors in the European and the Russian market.

Concerning the history and the origins of the energetic relationship between Russia and Europe, Zaslaviskiy (2017) explains how the crucial role of Gazprom started to emerge in the 2000s with Putin's presidency. As with other pieces of literature, the paper highlights how the Nordstream 2 project was also supposed to allow Russia to bypass part of the not-very-friendly Eastern European countries (where most of the pipelines that connect Russia to Europe were situated).

Kundnani (2015) focuses on Germany to delineate the country's new "Ostpolitik", arguing that the Federal Republic has been reluctant to antagonize also because of its energy dependency on it. With regards to solutions and possible ways to overcome the energy dependence on Russia, Lee-Makiyama (2021) marks a very positive depiction of the European Green Deal and explains how it could be helpful to phase out Russian gas and even challenge the current position of Russia in the international sphere.

Balmaceda (2014) analyses, on the other hand, how in Belarus corruption, rent-seeking and energy dependency from Russia (and from Gazprom) are strictly related. This issue was analysed also in Balmaceda (2008) and Balmaceda (2013): oligarchies and corruption in Ukraine, Belarus and other post-Soviet countries are widely discussed. The author argues how the elites of these countries profited and supported dependence on Russian energy, very often resulting in a completely lacking domestic energetic policy.

The existing literature also focuses in a detailed way on the Energy Charter and the way it influenced the integration of the energy market of the former Soviet Union with the broader European and International energy market.

Nonetheless, while the existent literature very often presents with precision the particular situation and reasons of singular countries about dependency on Russia, and while it pictures very well the history of relations between European countries and Russia, there is no more detailed empirical analysis of what the broader reasons behind energetic dependence, or the factors that are most related to it might be. Most existing literature on this matter is based on qualitative methods or descriptive analysis.

For this reason, this paper wants to build an empirical model through regression analysis that will try to weigh factors that may have an impact on energy dependency from Russia in European countries (or that have been detected to do so by previous literature).

Research design and Methodology

To do so we will be defining some dependent and independent variables.

The dependent variable to carry out this analysis will be the share of Russian gas imports on consumption. We have collected the data for this variable from Eurostat (regarding imports of gas from Russia by European country) and from the British Petroleum data series (regarding energy consumption by country). As the Eurostat data was expressed in cubic meters, and the British Petroleum data was expressed in joules, we converted the Eurostat data into joules.

Indeed, the choice we made for the independent variable has some limitations: energy dependence on Russia is represented by Russian gas imports (weighted on energy consumption). This may be an accurate measurement (as gas has been representing the most important and "hottest" piece of Russian export to Europe and blackmail instrument), however, the data does not include a division between pipeline gas and other kind of imports. This might be an imprecision in representing our independent variable as we should consider that pipeline gas is surely the one that defines dependence on Russia best: in fact, phasing out pipeline gas is harder as pipelines express a stricter and narrower relation of interdependence. The physical links are harder for both sides to cut and replace. On the other hand, gas imports through other means, although signalling an economic relation, are easier to replace. Therefore, they might represent a less precise indicator of dependence on Russia. However, the data available provided only the total amount of imports without differentiating.

With regards to independent variables, the first one identified is the geographical variable. For the purpose of analysis, we will be dividing countries into five categories and attributing a value to each of them. 0 value will be assigned to countries that were formerly part of the Soviet Union, 1 will be assigned to countries that were either a Communist state or that were bordering the Soviet Union, 2 will be assigned to the Austro-German market, 3 to countries bordering with Austria or Germany and 4 to countries that do not belong to any of these categories.

The ratio of this decision is based on different reasons and on motives explained by previous literature. Scanlan (1992) illustrates how Baltic countries were highly dependent on Russia for energy supply also due to the fact of their historical annexation to the Soviet Union and links that had been built over time with regards to pipelines (both oil and gas ones) and rails. Estonia represented somehow an exception because of its recently discovered shale oil reserves.

Also Clemens (1999) highlights how the Baltic countries were deemed to have been heavily reliant on Russia for energy supply since the 40s. Pervukhin and Schultz (1975) explain how the fact that the Soviet Union used to have massive natural resources although concentrated in some very specific areas of its land, induced the creation of both gas and oil pipelines as well as the improvement of railways to move the energy resources. These facilities were built both to allow the transportation of energy resources within the Soviet Union (towards the European regions) and to allow exportation abroad. The authors mention Poland, Czechoslovakia and Hungary as some examples of countries that (as they were governed by a Communist regime that had a fondness for the Soviet Union) began to heavily rely on Russian energy supplies. The authors mention Austria, the German Federal Republic, Italy, and Finland as some countries that (not being Communist) started importing their natural resources from the Soviet Union very early on.

Dienes (1975) explains similarly how in the Soviet Union there was the need to transfer energy resources from the most natural resources blessed Asian regions of the Union to the most populated and economically active European areas of the Union. For this reason, the necessary facilities were built, and they were also expanded to other countries that were allies of the Soviet Union (Hungary, Czechoslovakia, Poland, and Bulgaria) and even to some Western countries that were either neutral or pursuing some kind of "Ostpolitik") such as Austria and the Federal Republic of Germany.

Goldman (1982) explains the graduality of the process. At the first moment, the Soviet Union started to build pipelines for internal purposes, later it started to export gas and oil to its closest allies in Europe (Hungary, Poland, Czechoslovakia). Afterwards, the first Western market to open to Soviet energy imports was Austria, followed by Federal Germany and Italy. This process was met by the construction of new pipelines. The author also highlights how the Soviet Union already used energy supply as some kind of political instrument and cites the example of Yugoslavia that, as Tito was reclaiming more independence, in 1948 was denied energy supplies.

Odell (1987) depicts the (then) new augmented flow of exports of gas and oil from the Soviet Union to Western Europe as Gorbachev's strategy to expand and restructure the Soviet economy.

Maull and Vale (1983) argue that the increasing energy dependency of some European countries on the Soviet Union can be dangerous. They explain how Austria was the first Western country to start receiving gas from the Soviet Union and was then followed by West Germany (that started to receive gas through Austria as well as from the pipelines that used to serve Czechoslovakia and East Germany), Italy and France. The authors particularly focus on West Germany underlining how the country is one of those which is becoming more and more linked and reliant on the Soviet Union.

Girardi (2020) explains how the energy relations between Russia and Austria are one of the most important components of the relationship between the two countries: Austria is one of the most energetically dependent Western countries on Russia and at the same time Austria represents a very important joint for the Russian exports in Europe. The importance of Austria and Germany as some junctions for the Russian gas exports towards Western Europe is confirmed also by Stefanova (2012). Boesch (2014) regards the role that Germany now plays in the energetic relationship between Europe and Russia as a result of the country's former Ostpolitik.

In light of everything that was contended here, the geographical variable seems very important to add and the division we made seems pretty accurate as it reflects also the "physical nature" of the relation (in fact, it is also determined by geographical existence and extension of pipelines).

Soviet and post-Communist countries had surely a privileged set of links to Russia and Russian gas. On the other hand, Austria and Germany were the first doors for Russian gas to Western Europe. Oppositely, countries in Western Europe that were not bordering Austria and Germany (like Spain, Portugal, Ireland etc) had fewer links and more difficulty being connected to the Soviet (and then Russian) pipeline and export network and were, in this matter, more isolated.

The second independent variable we will be taking into consideration is domestic oil production: very intuitively, in fact, a country that is more autonomous in domestic energy supply and that may have some natural resources of its own will need to import less energy than countries that have no autonomy.

The third independent variable that we will consider is the carbon price. We are taking the data from the World Carbon Pricing Database which is included in Dolphin (2020). A measure of the average carbon price for country, based on carbon taxes (and similar measures) and the weight of different sectors on the economy. We are taking this variable as a proxy indicator for willingness of countries to "go green". Ozawa and Iftimie (2020) argue that the effect of "green" policies in Europe on dependence on Russia is ambiguous. Selei (2017) contends that it is feasible to reduce Russian gas imports to Europe by substituting the energy supply through renewable sources and improving the European energy transition. If the second interpretation is correct, we would find a negative relationship between this independent variable and the dependent variable (as a higher carbon price would be linked to fewer imports from Russia).

The following variable is domestic gas production: here the reason for its computation is similar to the domestic oil production one. The effect we expect to find is a negative one: more domestic gas production should lower the need for external imports.

Another independent variable we will be using is a dummy variable to indicate whether the country does or does not rely on nuclear energy production. This might influence dependence on Russia as

countries that have begun using nuclear energy have grown to be less reliant on external imports and less reliant on fossil fuels. This possible substitution effect has been argued in Michaelides (2020). These first variables represent the "structural" and "energetic" kind of variables and would give the dependence on Russia an explanation that prevalently mirrors path dependence in matters of long-term energy policy decisions, and historic and geographic reasons.

The second set of variables is constituted by two independent variables. It tries to codify the effect that international alignment, security concerns and international relations with Russia have on the energetic dependence on Russia.

The first variable is defence spending as GDP share. We reckon that this indicator represents a good proxy of the "security concerns" of a country. To corroborate this fact, we might argue that in the European Union, countries that generally have lower perceived international threats like Italy or Germany have much lower defence spending. On the other hand, countries like Poland and the Baltics have much higher military spending. France as well, which has strategic international and security interests that it often pursues abroad, has a higher military expenditure compared to other countries.

The relationship between energy security and national security has been explored by the existing literature already. Yergin (2006) in explaining what the main principles of energy security are, brings up some examples of how energy security has played an important role in war and military situations. On the other hand, Cornell (2009) models an elucidation on how energy security is related to national security. The author divides his explanation into three levels: energy is fundamental to national security because it assures military functionality, it supports critical domestic services, and it grants economic vitality. The issue of energy security as a policy of national security has not only been an issue in Europe, in fact, Spero (1973) explains how at the time of her paper, the Department of Defence was actively pursuing a policy of energetic self-sufficiency for the U.S. .

If we look at more recent literature, Cheon and Urpelainen (2015) develop a game theoretic model to predict and explain countries' decisions to "invest" in energy security. This model had, then, been tested by the authors through regression analyses. They found as well that countries with higher military expenditure would try to "preserve" more their energy security (in this case, these countries reacted to the increasing share of the Middle East in world oil production by diminishing their dependence on oil imports). This last paper indicates a strict relationship between national security interests and willingness to avoid energy dependence on "unfriendly" suppliers. Indeed, we think we may find the same kind of behaviour in Europe (towards Russia). Therefore, we may expect to find a negative relation between defence spending and the dependent variable.

The second variable we are going to use to capture international alignment is "fear of Russia": this variable is taken from a threat assessment of European countries with regards to Russia made in Meijer and Brooks (2021). The paper, in fact, analyses how much different European countries consider Russia a threat, a minor threat or not at all a threat. We would assume that countries that are less scared of Russia should be more willing to import gas from the country in question as they would be less concerned with being dependent on Russia.

The third and last set of variables includes all the variables that may be reckoned as the "political" ones: it, in fact, includes different domestic factors that may influence dependence on Russian gas.

The first of the variables is political corruption taken from the V-Dem dataset. Some literature, in fact, (Balmaceda 2008, Balmaceda 2013, Balmaceda 2014) argues that, in some Eastern European countries, oligarchies tended to favour energetic dependence on Russia. For the same reason, we are using as well "Access to state businesses by political group" from the V-Dem dataset as another variable of this set. This variable, however, not completely and not fully reliably, may in part capture both "oligarchy" and the role of rent-seeking in State-owned energy companies. Moreover, we are going to use as control variables the liberal democracy index and the political orientation of the Executive to avoid excessive distortions.

The last variable from this set we will be using is the share of populist and far-right parties. Many (Weiss 2020) (Futàk-Campbell 2020) (Polyakova 2014) have found that far-right parties in Europe in the last years have been having and pursuing links with Russia. Additionally, populist parties that favour "alternatives" to the "Western" status quo might seek more actively economic and political relations with Russia. This may be the case because anti-status quo parties often criticize NATO and the EU and try to promote economic and political relations with "alternative" powers (such as Russia and China). We have used the classification of populist and far-right parties according to Populist 2.0 database and then, we have collected the vote share of these parties overtime. Hence, the variable indicates the collective vote share of populist and far-right parties in each country over time.

In this way, we have identified 3 main groups of factors that would explain why some countries are more dependent than others on Russia and we will test them to see whether our hypotheses and suggestions are true.

There is one more methodological thing to highlight at this point. The Eurostat data (as last accessed in May 2023) regarding Russian imports registers some oddities with regard to Austria and Croatia. In fact, with regards to Austria since 2009 the total of the imports of natural gas is registered as "not specified" (with no clarification of the origin of these imports). However, there are many official

sources that still report that Austria keeps importing massively natural gas from Russia and through Gazprom (for instance this report of OMV 50 years of reliable supplies of Russian gas to Austria (omv.com) of 2018 that celebrates 50 years of Russian gas supplies to Austria indicates that still in 2017 Austria was a major buyer of Russian gas; this source Russia's Gazprom Export begins gas supply to OMV in Germany under long-term deal | S&P Global Commodity Insights (spglobal.com) indicates that OMV used to have a contract with Gazprom for yearly supply of gas to Austria until 2040; this article on Euractiv Austria slides back into dependence on Russian gas – EURACTIV.com reports that in the month of December 2022 Russian imports made up 71 % of the total imports of natural gas).

The problem with Croatia is different: until 2010 Croatia is reported to have consistent imports of natural gas from Russia. Still, in the Eurostat data, the imports from Russia suddenly become zero since 2011 and, at the same time, Croatia has an abrupt increase in imports of natural gas from Hungary, Italy, Austria, Germany, and Slovenia.

Nonetheless, other sources and the Croatian Government itself report and claim that the country (after 2011) is still importing natural gas from Russia (<u>Russia's Gazprom loses gas monopoly – DW –</u> 01/08/2021 Deutsche Welle reports that Croatia still in 2019 was one of the major recipients of Russian gas in the Balkans; in 2017 <u>Russia's Gazprom says signs 10-year gas supply deal with</u> Croatia's PPD | Reuters Reuters reported that Croatia had signed a deal for yearly gas supplies from Russia until 2027; in 2021 Reuters reported that gas flows from Russia to Croatia through the TurkStream pipeline had started <u>Russia's Gazprom starts gas supplies to Hungary, Croatia via TurkStream | Reuters</u>).

This bizarreness in the data might potentially prejudice the results of our analysis. For this reason, we are going to use two different datasets: one that includes the original data from Eurostat and one that substitutes the data for Croatia (since 2011) and Austria (since 2009) with some estimates based on the other sources. We are going to replicate regressions and scatter plots with both datasets to have more accurate and less biased results.

Discussion

Firstly, we are going to carry out the analysis with the "original" Eurostat data (which registers since around 2010 0 imports of natural gas from Russia both for Austria and Croatia). We are going to make 4 different regressions: one that includes all the variables together, while the others will have around 5-6 independent variables each (to have more degrees of freedom and possibly be able to have a more indicative coefficient for the variables). Still, all the regressions will include the geographical variable (as omitting that variable would probably result in a bias since it appears to be one of the most important ones). Therefore, we will be using only random-effect type of regressions.

As we proceed with the analysis, the results of our regressions are:

	(1) consimpruss	(2) consimpruss	(3)	(4) consimpruss
			consimpruss	
geo	-3.414**	-4.582***	-4.409***	-4.889***
	(-2.92)	(-5.02)	(-4.29)	(-5.50)
oilproduction	0.00117	0.0000546		
	(1.49)	(0.08)		
carbonprice	-0.0945***			-0.0241
	(-3.36)			(-1.02)
defence	0.124	-0.232		
	(0.41)	(-0.97)		
corruption	13.48***	11.96***		
	(3.81)	(4.41)		
accessbus	0.821		-0.0721	
	(1.25)		(-0.15)	
democracy	1.055			-6.567**
	(0.24)			(-2.75)
gasproduction	-0.0698***		-0.0448**	
	(-4.03)		(-2.83)	
fearussia	0.974		0.471	
	(1.16)		(0.60)	

Figure 1

nuclear	-0.797	-1.462		
	(-0.66)	(-1.25)		
f.right/populist parties	0.0781***		0.0678***	
	(5.18)		(4.90)	
Left/right/cent re	0.136			0.254
	(0.82)			(1.62)
_cons	9.386 (1.78)	18.21 ^{***} (6.89)	17.34 ^{***} (4.91)	24.27 ^{***} (8.12)
Ν	727	781	727	781
r2_w	0.0888	0.0262	0.0446	0.0178
r2_b	0.592	0.573	0.572	0.568
r2_o	0.530	0.508	0.507	0.503

There are a few things we should note: firstly, we have a very significant result for several factors: the geographical one (which always maintains a z value always lower than 0.01 and most of the times lower than 0.001), the carbon price one (which has a z value lower than 0.001 in the regression including all the variables), the corruption indicator (with, in both regressions, a z value lower than 0.001), the domestic gas production (with a z value lower than 0.001 in the complete regression and lower than 0.01 in the other one) and the variable indicating the share of populist/far-right parties (with a z value lower than 0.001 in both cases). The results reflect mostly what we expected. With regards to the geographical variable (geo), which divided countries into 4 different categories, we can see how the relationship is strongly negative: a higher score on the geographical variable translates into fewer imports of Russian gas. This corresponds to our hypothesis: in fact, the highest scores (3 and 4) are assigned to countries that are further from Russia and that were less linked to the Soviet (and then Russian) pipeline system.

The carbon price variable as well indicates a negative relation with Russian gas: a higher carbon price is linked to fewer natural gas imports from Russia. This could be explained as a higher carbon price may make natural gas a less convenient natural resource or as a high carbon price can be seen as an indicator of the willingness of a country to "go green" and, therefore, this translates into fewer imports (and use) of fossil fuels. However, in the second regression (which includes fewer independent variables) the relation is less significant.

Then, we can analyse the effect of the corruption indicator: in this case, we can see a very strong positive relationship. As a higher score on the indicator corresponds to higher corruption: this means that more energy dependence from Russia is linked to higher levels of corruption. This may confirm the analysis Balmaceda had carried out for post-soviet countries and even, partly, extend the relation to other European countries.

Domestic gas production indicates a very intuitive relation: negative. A higher domestic gas production leads to less need to import natural gas from Russia.

Lastly, the variable regarding the share of populist and far-right parties has an extremely statistically significant positive relation: as the share of populist and far-right parties increases, that corresponds to higher imports of natural gas from Russia. It is important to note that in the "smaller" regression the democracy index variable becomes statistically significant (with a z value lower than 0.01) and indicates a negative relation (meaning the more democratic the countries, the less gas imports from Russia).

All the other variables are not significant enough to be taken into consideration for the evaluation of their effect.

Lastly, we can look at the R-squared values of the regressions. As we can see, the principal regression has an overall R-squared of 0.53. That is a rather good R-squared and would indicate that the complete model (with all the independent variables we have taken into consideration) would explain 53% of the variation in the dependent variable (Russian natural gas imports). The R-squared between (r2_b) is even higher (0.592) which means that our model explains around 59% of the variation differences between countries with regard to our dependent variable. Yet, the R-squared within (r2_w) is much lower (around 0.09): this would mean that our model explains just around 10% of the variation in the dependent variable within a country over time. Nonetheless, this is quite unsurprising: in fact, variables such as the geographical one have no variation at all for one country over time, yet they are extremely important to explain dependence on Russia.

In the regressions that include fewer independent variables, indeed, all the R-squared are lower, however, in all cases the overall R-squared is always around or over 0.5 which is generally considered a good result in social sciences.

We proceed and visualize partly the data as it might be by some means useful. However, one must bear in mind that the scatter plots like the ones we are going to show will illustrate solely the relation between two variables (therefore they may be distorted as the effect of the other factors is not taken into consideration).



Figure 2

Here we can see the illustration of the relationship between Carbon Price and Imports of Russian Gas (the share on energy consumption). On the y-axis, there is Russian Imports, while on the x-axis we placed the carbon price. To do the scatter plot we are considering the average value (for all the observations between 1995 and 2021) of both x and y for each country. We can see graphically the negative relation that was indicated by the regression; nevertheless, we must observe that the great majority of European countries tends to have no carbon price at all. Considering that the variation among countries is, therefore, low, this could bias the effect of this factor.





In this scatter plot, we can see the relationship between Domestic Gas Production (x-axis) and Imports from Russia (y-axis) (still using the average value for the years taken into consideration). In this case, we can see the negative relation that had been found by the regression too.



Figure 4

Now, we can see the scatter plot for the Far-right/Populist parties share (still using average values). In this case, we can picture the positive relationship that was signalled by the regression. Still, we can identify a number of outliers. Latvia, Lithuania, and, even, Slovakia seem to deviate quite importantly from the regression line. The same happens for Norway, Iceland etc.. This seems to reflect the geographical differences among the countries: Latvia, Lithuania and Slovakia seem to import more Russian gas than they "should" because their imports are also influenced by the geographical values (by their closeness to Russia and the past relationship the countries had with the Soviet Union). The opposite is true for countries like Norway and Iceland (they import less gas from Russia than they are supposed to if we take into account just the "populist variable").

We can now visualize the scatter plot relating the democracy index and Russian imports: since the democracy variable was not significant in the first regression while significant in the second one, it may help us to visualize it.



Figure 5

In this case, we can see how there seems to be an important negative relation (how the second regression indicated), still, the great majority of European countries has a very high democracy index. The ones that have a lower score are very few, generally concentrated in Eastern Europe. It may be important to note that in the regression in which the democracy index has a significant effect, the far-right/populist party variable is omitted (and the two variables may be correlated).

Finally, we can try to visualize the defence variable and try to understand why it has an insignificant effect on the dependent variable.





As we can see, the regression line indicates almost no effect, and the values are not particularly fitted. Therefore, maybe dividing "Eastern" (where $geo \le 1$) and "Western" (where $geo \ge 1$) European countries may help us to understand the relation.



Figure 7

For Western countries, we can see how the effect is almost irrelevant and the values (again) are not fitted.



Figure 8

On the other hand, for "Eastern" countries (that here are including Finland as the country shared a border with the Soviet Union) we can see a negative relation (more defence spending, fewer imports

from Russia) and values seem more fitted. Yet, this is not enough to individuate a statistically significant relationship.

The results of these regressions are, indeed, interesting. Nonetheless, one must notice that the data officially reported by Eurostat for Austria and Croatia seems to be very far from reality: all the other sources indicate natural gas imports from Russia that are far from 0 million cubic meters for the years we have specified before.

For this reason, as we had stated before, we are going to replicate the regressions with some estimates for Croatia and Austria we made based on the data available and the other sources.

	(1)	(2)	(3)	(4)
	impconsum	impconsum	impconsum	impconsum
geo	-3.887***	-5.061***	-4.642***	-5.196***
	(-3.40)	(-5.71)	(-4.63)	(-6.04)
ailproduction	0.00150*	0.000224		
onproduction	(2.10)	(0.34)		
	(2.10)	(0.34)		
carbonprice	-0.104***			-0.0247
	(-4.10)			(-1.13)
defence	-0.830**	-0 992***		
uerenee	(-3.05)	(-4.53)		
	(5.65)	(1.55)		
corruption	7.870^{*}	6.878^{**}		
	(2.45)	(2.76)		
a a a a a a b u a	0.220		0.502	
accessous	0.230		0.302	
	(0.39)		(1.13)	
democracy	1.238			-1.222
	(0.31)			(-0.55)
f	0.0000***		0.0077***	
narties	0.0880		0.0877	
parties	(6.46)		(7.03)	
	· · /		· /	
gasproduction	-0.0727***		-0.0437**	
	(-4.63)		(-3.05)	

In this case, the regressions are:

Figure 9

fearussia	0.693		0.422	
	(0.87)		(0.57)	
nuclear	-1.163	-1.785		
	(-1.05)	(-1.64)		
Left/right/cent	0.0266			0.213
	(0.18)			(1.47)
_cons	15.40^{**}	21.84^{***}	16.65***	21.40^{***}
	(3.13)	(8.56)	(4.91)	(7.51)
Ν	727	781	727	781
r2_w	0.120	0.0304	0.0789	0.00515
r2_b	0.630	0.614	0.602	0.599
r2_o	0.576	0.556	0.546	0.539

We can see how the results are rather similar to the previous ones.

Nonetheless, there are some notable changes.

As a first thing, we can notice, again, how a relevant number of independent variables has a statistically significant effect. In this case, the geographical variable has a z value that in all cases is lower than 0.001 and has a negative effect.

Domestic Oil Production has a significant effect in the first regression (the one that includes all variables) (with a z value lower than 0.05) while in the other one, the effect is not statistically significant. The effect is very small, and it is positive.

Similarly to the previous results, carbon price has a very statistically significant (z value lower than 0.001) negative effect in the first, complete, regression, while in the other one, the effect becomes not statistically significant. On the other hand, the main novelty in these results is that the effect of defence spending becomes statistically significant (z value lower than 0.01 in one case and lower than 0.001 in the other) in both regressions. The effect it has on the dependent variable is negative meaning that more defence spending translates into fewer natural gas imports from Russia.

In this case, the effect of the democracy index on the dependent variable remains statistically insignificant for both measurements.

The effect of corruption, on the other hand, is statistically significant (with a z-value lower than 0.05 in the complete regression, and lower than 0.01 in the other one) and holds a positive effect.

The effect of far-right/populist parties' vote shares remains positive and highly significant (with a z-value lower than 0.001 in both cases).

In the same way, the effect of domestic gas production remains negative and statistically significant in both regressions (with z values lower than 0.01 and 0.001). The effects of the other variables are not statistically significant enough to be taken into account.

In the end, we can look at the R-squared values.

We can see how these values have improved compared to the previous results. The overall R-squared for the first regression (which includes all the independent variables) is 0.576 which indicates that the model we have designed explains up to almost 58% of the variation in the dependent variable. The R-squared between is even higher: it is 0.63 which means that our model explains 63% of the variation in natural gas imports from Russia between countries.

Indeed, the R-squared within is, for the same reasons we had illustrated before, lower. Yet, again, in this case, it is still higher compared to the previous results.

We have, in fact, an R-squared of 0.12 (in the complete regression) which means that all the independent variables explain 12% of the variation in the dependent variable over time within a country. If we look at the R-squared of the other regressions (that include only 5-6 independent variables each) we can still see how the overall R-squared is always bigger than 0.52, and the R-squared between is always around 0.6. These results are better than the previous ones and the "R-squared"s are generally very good for social sciences standards.

We can, again, visualize the data in order to have a better grasp of it. We may start with the relationship between the dependent variable and defence spending (since with the new dataset it appears to be statistically consistent). We will, again, deal separately with countries such that geo\$>\$1 and countries such that geo\$=1.



Figure 10

In this case, we can see how, compared to the previous scatter plot regarding defence spending for "Western" countries, the relation seems inverted: there seems to be a quite small negative effect. However, the values, again, are not very fitted.



Figure 11

On the other hand, for "Eastern" countries, we can once again see a stronger negative relation and the values are more fitted.

In conclusion, from this second analysis, we can take some points. The relation between the geographical variable and the dependent variable is still negative and extremely statistically significant. This confirms the fact that geography and historical legacy in Europe play a fundamental role in energy security as some countries because of this path dependence struggle significantly more than others in cutting their energy dependence on Russia.

With regards to carbon price, we can see how- again- in the first and complete regression we have a statistically significant negative effect, while in the second regression, the effect is not statistically significant. We may conclude that, in the end, the effect of this variable on energy dependence is partly ambiguous. The reason behind this ambiguity seems to be the fact that the great majority of European countries does not have a carbon price. The few countries that do have a carbon price seem to import fewer natural gas from Russia. Still, the amount of natural gas imported from Russia has a significant variation among countries that do not have a carbon price or that have introduced one very recently.

The oil production, in this case, is only statistically significant in the first regression and a very small positive effect is indicated. However, the z value in the first regression is only lower than 0.05 and in the second regression, the result is not statistically significant at all. Therefore, we may regard this effect as ambiguous as well.

Indeed, similarly the problem with this variable may be that only a very small number of European countries has domestic oil production.

On the other hand, the effect of defence spending becomes negative and very statistically significant. Our result, in this regard, seems to replicate the effect Cheon and Urpelainen (2015) found.

Cheon and Urpelainen were analysing how countries responded to the increasing market role in oil exports of the Middle East and found that countries that had a higher military expenditure were more likely to pursue policies to become increasingly autonomous from oil imports. They concluded that security considerations may be essential to energy policy. In this context, we might argue that these results show how their theory may hold true also with regard to Russia-Europe relations. We can claim that a strict relation between national security interest and energy can be confirmed by our analysis.

Corruption holds a positive and statistically significant effect. That means that higher corruption is correlated with more imports of natural gas from Russia. In this regard, it is more difficult to delineate the connecting link that may exist between the dependent and independent variable.

Indeed, our result seems to confirm the arguments that had been supported by Balmaceda. However, even "Western" European countries like Italy and Greece seem to fit the relationship we have found. This may make it harder to completely attribute the result we see with regard to corruption to the reasons that have been explained by Balmaceda. However, the rent-seeking type of behaviour Balmaceda finds in post-soviet countries with regard to the energy market may be linked to state-owned energy companies. This hypothesis could be furtherly investigated by future research.

Similarly, populist/far-right parties' vote shares hold a very statistically significant and positive effect. The relation with the dependent variable, in this case, may be explained through the reasons we mentioned before. Far-right parties in Europe tend to have reportedly more relations with Russia and are reportedly fonder of Russia compared to other parties. Likewise, populist parties may seek closer relations with Russia to pursue a foreign policy that is "alternative" to the status quo. Indeed, even in this relation, we can find some major outliers: the most important ones can be Germany and Italy where even the (generally considered) "traditional" parties have been pursuing for a long time closer economic and political relations with Russia.

Conclusion

Our analysis largely confirms our initial hypotheses and expectations.

In conclusion, this paper confirms through empirical data the importance of geographical, historical and other structural factors (including domestic production of energy) to determine energy dependence on Russia. Yet, it also finds an empirical confirmation of some non-structural factors whose influence had been conjectured by some but never demonstrated through Quantitative methods.

Our results relate well to the existing literature: as we had explained before, the relation between the dependent variable and defence spending would indicate an effect that relates well to the findings in Cheon and Urpelainen (2015).

Moreover, a strict relation between defence spending and natural gas imports from Russia would partly also confirm what Paillard (2010) had argued about Russia wanting to use energy as an instrument to deteriorate relations among NATO members and among European countries. In fact, a higher defence spending in many cases could indicate a higher NATO commitment as well and, as we have seen, countries with higher military expenditure import less natural gas from Russia. This could confirm that Russia uses energy to weaken some European countries' commitment to their international alliances.

As we had described already, our results about corruption relate well to previous literature, particularly to what Balmaceda had argued. As we had contended, the problem may be related as well to state-owned energy companies. Yet, Kazantsev (2012) explains the political networks that exist between Europe and Russia with regard to energy. It has been suggested (even in a parliamentary question at the EP) that, as the number of European politicians that started working for Russian energy companies was considerable, political corruption in Europe may be linked to these companies too.

Indeed, this study has many limitations. We are now, lastly, going to mention the main ones in order to give some final suggestions for the possible improvement of this work.

The first limitation is the one we mentioned at the beginning regarding the Eurostat data. If it had been possible to access data that was reported with more precision even the complete imports for Austria and Croatia, our analysis could be more accurate and reliable. Another way to improve our analysis could be to insert more than one proxy for energy dependence on Russia (the dependent variable) and test all of them through more regressions to get a more complete picture. In this regard, there may be also the possibility to try to also include oil imports from Russia in addition to gas imports.

Furthermore, finding and including in the independent variables some survey indicators of public opinion attitudes concerning foreign policy and opinions of foreign leaders would probably lead to a more complete analysis.

Lastly, it would perhaps be useful to, by some means, try to weigh and include an indicator of the role of state-owned energy companies as well as of the links and ties of European politicians with Russian energy companies.

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