indicated in Chapter 2.7, we follow diversification as determined by the consumption volume instead of the mere ratio of route capacities, and actual use of the primary pipeline amounts to 5.66 million tons of oil per year on average over the most recent five years. This makes the true substitutability potential for the second route 67%, revealing that it is *significant*, but with the probability index limited.

Table 4.13: Baseline for the SR in 2012

$^{SR}t_0 = 67_{p=2}$	The substitutability potential is *significant.* The probability index *p* is assessed as *medium* because although the alternative supply route exists and its functionality is regularly tested, it is not actually used. Its only regular use comes in the reverse direction of flow, by a foreign entity.

Source: T. Vlček

CHAPTER 5
SUPPLY ALTERNATIVES

5.1 European Oil Pipeline Infrastructure

Before we analyse the dependent variables, we should first briefly introduce their context. Table 5.1 shows a simplified map of the European oil pipeline network. Reality is more complex than what is depicted on the map, since oil pipelines are usually composed of several concurrent sections with a number of branches and connections along the way.

Table 5.1: Simplified Map of the European Oil Pipeline Network

Source: *MERO ČR, a. s.*

For our purposes, these are the pipelines of interest: the IKL, TAL, Adria, AWP and the potential BSP, Odessa-Brody-Adamowo-Płock-Gdansk and Spergau-Litvínov. These are shown in Table 5.2, which provides a detailed look at the condition and capacity of the key routes. Some of these routes are further divided into individual sections, particularly if there are significant changes of capacity and diameter dependent on proximity to the endpoint. Typical is the Druzhba Pipeline. It serves a number of countries along the way to the CR and Germany, and its diameter and capacity logically undergoes a gradual decrease. The capacity information in the table is vital to the study, and we will make regular reference to it in analysing the individual dependent variables *A* through *E*.

Table 5.2: Basic Information on Selected European Oil Pipelines

Pipeline	Starting point	End point	Pipeline diameter (mm)	Pipeline length (km)	(Capacity (mil. tons per year)
ADRIA	Százhalombatta (HU)	Gola (HR)	910, 710	374	14
ADRIA SE	Sisak (HR)	Pančevo (SRB)	710, 660, 400	500	–
AWP	Wurmlach (AUT)	Schwechat (AUT)	457	419	8
BAP*	Brody (UA)	Adamowo (PL)	820	371	10–30
BSP*	Bratislava (SK)	Schwechat (AUT)	400–500	81–152	3.25–5
Druzhba S	Mozyr (BY)	Uzhgorod (UA)	2x 710	900	–
Druzhba S	Uzhgorod (UA)	Katov (SK)	500, 700	510	20
Druzhba S	Katov (SK)	Litvínov (CZ)	500, 700	358	9
Druzhba S	Šahy (SK)	Tököl (HU)	400	8.5	6
Druzhba S	Uzhgorod (UA)	Százhalombatta (HU)	–	–	–
Druzhba N	Almetyevsk (RU)	Leuna (D)	635, 820, 1020, 1220	–	121[r]
Druzhba N	Lunow (D)	Schwedt (D)	500, 800	27, 25	22.5
Druzhba N	Rostock (D)	Schwedt (D)	–	201	6.8
Druzhba N	Unecha (RU)	Ventspils (LV)	710, 2x 820	–	–
Druzhba N	Unecha (RU)	Mažeikiai (LT)	710, 2x 820	–	26.2[r]
Druzhba N	Płock (PL)	Schwedt (D)	–	–	27
Druzhba N	Adamowo (PL)	Płock (PL)	–	–	50
IKL	Vohburg and der Donau (D)	Nelahozeves (CZ)	700	347	10
JANAF	Gola (HR)	Omišalj (HR)	910, 710	289	20
OBP	Pivdennyi (UA)	Brody (UA)	1020	674	9–14.5
PGP	Płock (PL)	Gdansk (PL)	–	–	27
SLP*	Litvínov (CZ)	Leuna (D)	700	160	–
SSP	Schwedt (D)	Spergau (D)	500, 700	336, 338	13.5
TAL	Trieste (I)	Lenting (D)	660, 1020	465	43

Note: oil pipelines marked with an asterisks represent planned projects; the abbreviations, both official and working, represent the names of the oil pipelines: ADRIA SE, South-East branch of the Adria Pipeline; AWP, Adria-Wien Pipeline; BAP, Brody-Adamowo Pipeline; BSP, Bratislava-Schwechat Pipeline; Druzhba S, Druzhba – South branch; Druzhba N, Druzhba – North branch; IKL, Ingolstadt-Kralupy-Litvínov; OBP, Odessa-Brody-Pipeline; PGP, Płock-Gdansk Pipeline; SLP, Spergau-Litvínov Pipeline; SSP, the double Schwedt-Spergau Pipeline; TAL, Transalpine Pipeline.

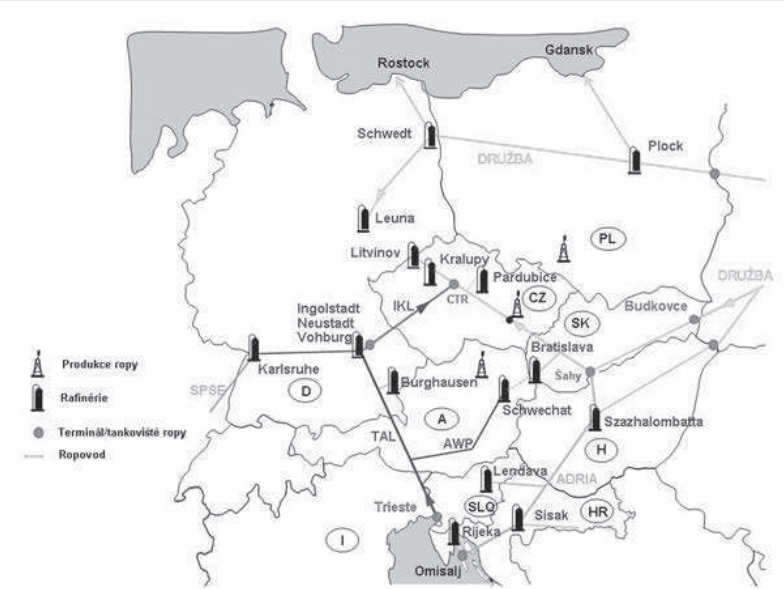
Note on local names: Leuna and Spergau, locations in Germany, are frequently interchanged because Spergau is a district of Leuna.

Note on the re-calculation: in the case of data marked with "r", the manual re-calculation of the capacity from number of barrels per day to millions of tons per year was based on the density and specific gravity of Brent oil (835 kg/m^3). Using this method, a barrel of oil weighs 132.754393162 kg.

Source: Information Technology Associates, 2008; Transpetrol, a. s.; Transpetrol, 2013, pp. 6, 12–18; MERO, a. s.; Mineralölverbundleitung GmbH Schwedt; Mineralölwirtschaftsverband e.V.; The Transalpine Pipeline; PERN S.A.

Data preparation and verification: T. Vlček. Re-calculation of the pipeline diameter into millimetres and of capacity into millions of tons done by T. Vlček.

Table 5.3: Central European Oil Sector



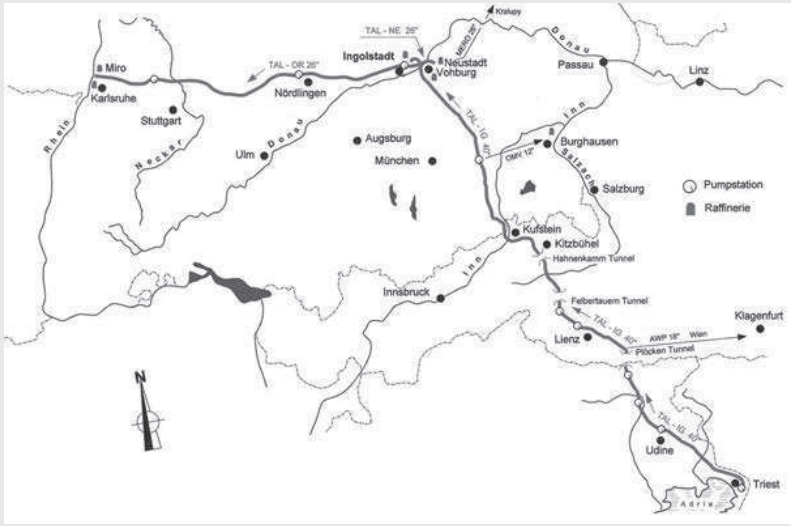
Source: Doprava a skladování ropy, (n.d.).

Table 5.3 presents a simplified view of the oil pipeline routes. But it also provides a detailed overview of the oil sector in Central Europe, including the designations of individual terminals and refineries.

5.2 The Ingolstadt-Kralupy-Litvínov Pipeline (IKL)

The first route we examine is the IKL Pipeline. The designation 'IKL' is in fact a misnomer—the pipeline does not transit any of the cities it is named after: Ingolstadt-Kralupy-Litvínov. Their names instead reflect a route that had originally been planned but was later abandoned. The pipeline actually

Table 5.4: TAL Pipeline



Source: The Transalpine Pipeline

has its starting point near Ingolstadt, Germany, in the town of Vohburg an der Donau, continuing through Germany and the Czech Republic before it terminates in the Nelahozeves Central Oil Tank Farm at the end of its 347 km long run. The pipeline's maximum annual capacity is 10 million tons.

The pipeline branches off the TAL (Transalpine Ölleitung) Pipeline that connects Italy, Germany, and Austria, starting at San Dorligo della Valle Marine oil terminal in southern Trieste and continuing across Italy, the Austrian Alps, and Bavaria to Lenting, Germany, approximately 5 km outside Ingolstadt. 465 km long, the pipeline has a capacity of 43 million tons of oil per year.

In Lenting**,** the pipeline splits into two subsequent routes: TAL-OR, and TAL-NE. TAL-OR is a 266 km long oil pipeline with a capacity of 14–17 million tons per year that leads to the Karlsruhe and Oberrhein refineries. TAL-NE is 28 km long,

with a capacity of 14 million tons of oil per year. It supplies oil to refineries in Ingolstadt and Neustadt (see *Transalpine Pipeline*). It is TAL-NE that the Czech IKL Pipeline continues.

The IKL Pipeline is the key back-up route for supplying the Czech Republic which uses it to ensure alternative supplies of oil if supply to the Druzhba Pipeline is interrupted. IKL utilisation is 30% on average leaving 70% to ensure increased supply if necessary. But although this might seem adequate, remember that the IKL Pipeline is a continuation of the TAL, and that pipeline is at almost 100% capacity. Room for unplanned increases in supply to the CR is limited.

One solution is to negotiate a share in the ownership of the TAL Pipeline giving the Czech Republic priority rights to free capacity. After trying to negotiate the purchase of 2% of the pipeline‘s shares. MERO did even better: in September 2012, the company and Shell Deutschland Oil GmbH signed a contract allowing it to purchase a 5% partnership in the companies that own and operate[31]. This makes a total ten companies in the ownership group: OMV AG (25%). Royal Dutch Shell plc (19%). Ruhr Oel GmbH (11%). C-Blue Limited (a subsidiary of Gunvor Group Ltd.; 10%). Eni S. p.A. (10%). BP p.l.c. (9%). Exxon Mobil Corporation (6%). MERO ČR. a. s. (5%). JET Tankstellen Deutschland GmbH (a subsidiary of Phillips 66. an US company; 3%) and Total S.A. (2%) (see Hovet. 2008; Stopp. Völtz. & Lother. 2005. p. 24; *The Transalpine Pipeline*; *“Oil Transit Company”*. 2010*;* Graham. 2008; Jones. 2010; “*Gunvor Bought a 10-Percent”*. 2013; *MERO ČR. a.* s.). Before it bought shares in TAL, MERO was

[31] They are three companies: Italian, Austrian and German (Società Italiana per l’Oleodotto Transalpino S. p.a. (S.I.O.T.); Transalpine Ölleitung in Österreich Ges.m.b.H.; Deutsche Transalpine Oelleitung G.m.b.H.) (see *The Transalpine Pipeline*). The owners of TAL are actually owners of these three companies (according to the volume of their shares).

regarded as a third party and preference was given to shareholders’ requests (see *MERO ČR, a. s.*). Currently, MERO has an official right to preferential use of the TAL oil pipeline corresponding to its ownership share. 5% of the total capacity of the TAL Pipeline amounts to 2.15 million tons of oil per year; the average annual volume of oil through the primary route in the most recent five years was 4.08 million tons. For an outage lasting one year, enough free capacity can be bought to supplant 52.7% of the missing supply, a significant amount.

Buying shares in the TAL Pipeline is logical because of how it functions. Its owners also own refineries which lie along the pipeline’s route. For this reason, transportation tariffs and operational regulations are in place satisfy anyone who wishes to transport oil through the pipeline. But shareholders are satisfied preferentially; only then is remaining free capacity offered under tariff conditions to third parties, using an eighteen month advance schedule of capacity allocation. This does not provide for security of supply, and therefore becoming a shareholder makes sense. Aside from supply security and fluency, there is another positive motivation: all pipeline users pay an identical transit tariff, but the pipeline’s shareholders also divide the profits from transporting oil among themselves proportionately. This reduces the net tariff paid for transport by the amount of profit received.

The Russians in charge of the Druzhba Pipeline normally demand that transportation capacity be allocated twelve months in advance with a fudge factor of ±10%. The pipeline is continually at maximum capacity and oil may be drawn almost instantaneously, but the business plan must be maintained and the volume negotiated for other consumers respected. The IKL Pipeline may normally be used only when capacity has been allocated eighteen months in advance. Like the TAL, the IKL Pipeline gives priority to shareholders.

The journey starts with oil being loaded onto tankers in the Persian Gulf, then unloaded in Trieste and transported to the Kralupy nad Vltavou refinery. Supply takes 6 to 8 weeks.

Capacity of the pipeline is 43,000,000 tons of oil per year. In 2012, 81% of that capacity was used—34.9 million tons.[32] (See *The Transalpine Pipeline*) Simply putting back into operation the pumping stations which have been decommissioned along the route would boost capacity fairly significant way to 50 million tons per year.[33] There are six such stations, three in Italy, two in Austria, and one in Germany, and they are there to ensure the flow of oil through the pipeline. But according to anonymous sources with firsthand knowledge, only two of these stations are currently operating. Recommissioning the others would require an outlay of approximately CZK 1 billion.

MERO ČR, a. s. is developing a project to do with the reverse flow mode on the IKL Pipeline, aimed at supplying Russian oil via the Druzhba and IKL Pipelines to German refineries. This would increase any interest the Russian Federation might have in exporting through the southern branch of the Druzhba, as well as generate profit from the transport. The project must, however, be reconciled with problematic swing operations that are a key obstacle to two-way operation. To be able to supply Germany with Russian oil, it would first be necessary to force approximately 110,000 tons of technical oil[34]

[32] In 2013, 41.3 million tons of oil were transported which accounts for 96% of the pipeline's maximum capacity (see *The Transalpine Pipeline*).

[33] The potential to increase the capacity of the downstream TAL Pipeline is also mentioned by ASEK 12/2014 in its strategy for the period until 2040 (see Ministerstvo průmyslu a obchodu, 2014, p. 52).

[34] Technical oil fills the pipeline because the pipeline must not remain empty. After their construction, oil pipelines may be launched into operation only after they are filled with technical oil. This is provided and paid for by the pipeline's operator. Tanks which store technical oil, among other types of oil, are a crucial part of the oil pipeline infrastructure. If the oil type changes, technical oil must be pushed out into the tanks and the oil pipeline must be filled with technical oil of the new type. Pushing oil out into the tanks is a big issue because of the capacity involved (in the case of the IKL Pipeline, approximately 110,000 tons, for Odessa-Brody roughly 670,000 tons). Many diversification projects have foundered on this point.

out of the pipeline. This is an amount equal to the capacity of the pipeline between the Vohburg and Kralupy nad Vltavou stations. But because the pipeline may not be empty, the technical oil would have to be pushed out using Druzhba oil, and this is not technologically feasible. Even if it were, pushing the oil to Vohburg will use up more than 50% of MERO's warehousing capacity, which is problematic by itself.

Complications related to the technology in place must also be taken into account. Processing a new type of oil engenders additional costs to pay for modifications to technology or to make up for a significantly reduced product yield. Currently, Czech refineries are specialized. The Litvinov refinery processes REB, a Russian blend imported via the Druzhba; the Kralupy nad Vltavou focuses on sweet local oil and oil transported via the IKL, and the Kolín and Pardubice refineries use input materials from the Litvínov refinery. This does not mean that oil of the same type as that normally imported from Russia may not be gotten from the West, however. The refineries may in principle process any type of oil, but the more this oil differs in character from that for which they were configured, the lower utilization is and the greater unit costs become. If the oil type were markedly different, operation of the refinery would be economically infeasible. A total change of technology is possible, but demanding in both time and money terms. If the need arose to substitute for supply limitations in the Druzhba, the refineries would not seek out

Russian oil in Western pipelines; rather they would demand oil that was as similar in character as possible—heavy and sulphurous. Iranian oil would seem a good substitute.

Reversing the flow of both pipelines has also been discussed in the Czech oil sector. In 2006, the government stopped preparations for moving oil taken from the Druzhba Pipeline across the Czech Republic to Germany using the IKL. The government was not opposed in principle to the transport plan, but did not wish it to come at the expense of source diversification or the transport of oil into the country from Europe, particularly since the IKL Pipeline is a significant element of the country's energy security in the oil sector (see Roškanin, 2006, p. 6).

Slovakia's opportunity for using the IKL Pipeline is as follows: In March 2008, it and the Czech Republic entered into negotiations for reversing the direction of flow of the Druzhba Pipeline. In this case, the flow reversal would be technically feasible. The cost for Slovakia would amount to tens of millions of crowns (see Roškanin, 2008d, p. 7). Reversing the flow would be based upon the possibility of importing crude via the TAL into the Slovakia, as well. This possibility is also mentioned in future projects being planned by Transpetrol, a. s. (see *Transpetrol, a.* s.), Energetická Politika Slovenska (see Ministerstvo hospodárstva SR, 2006, p. 15) and Slovak Stratégia Energetickej Bezpečnosti. The latter notes that MERO ČR, a. s. has already prepared a study for the necessary modifications to technology to reverse the flow, and that Transpetrol, a. s. is studying the extent to which the Slovak section of the pipeline must be modified (see Ministerstvo hospodárstva SR, 2008, p. 43). But according to informed sources, the project was halted after the first negotiations in 2008. It was viewed as unrealistic particularly because Slovakia has no dealings with the downstream TAL Pipeline, so the project is not significant in security terms.

It is clear the project is being promoted by the Czech side – MERO ČR, a. s. The company would benefit from new income options if the flow were reversed, because it would be able to offer transport routes to Slovak oil consumers and this would boost its bottom line. It must be noted that the income from oil transportation accounts for more than 75% of the company's income (see MERO, 2014, p. 5). It is thus completely understandable that the company would wish to increase it. Thinking of the IKL Pipeline, the project seems rational indeed; for consumers in the Czech Republic, the pipeline's five-year average use of capacity is 30.2% (3.02 million tons of oil per year). Given its total capacity of 10 million tons per year, free capacity amounts to almost 70%, i.e., 7 million tons. Therefore, the pipeline could handle the increased capacity even if all permitted free capacity from the TAL was purchased (2.15 million tons or 48.3% of the 4.83 million ton total).

The TAL is, however, the key stumbling block to the alternative Slovak route. Although 81% of the pipeline's capacity was used in 2012, in 2013, this figure climbed to 96% of maximum capacity (see *The Transalpine Pipeline*). The 2013 figure is closer to average; in 2012, supply was lower because of reduced demand due to the generally ailing condition of the oil sector. This means 2013 utilization must be taken into account: 41.3 million tons of oil were transported that year. The Czech Republic had sought easier access to the oil pipeline for a long period of time before finally succeeding in September 2012. Jan Žižka says: 'It would certainly be difficult [for the CR] to accept that, if there were a pressing need for black gold, it and the other TAL shareholders should leave capacity to supply Slovakia.' (see Žižka, 2013b). The entire project must thus be approached with great caution. Thus, the entire project must be approached with great caution. Under regular operations it would certainly be possible to supply a certain amount of crude oil to Slovakia via the TAL and IKL Pipelines,

and the reverse flow mode of the Druzhba, but with all the limitations on capacity, allocation, etc., indicated above. In emergencies, however, the likelihood of smooth supplies coming from the West is very low. Furthermore, such supplies would only be possible if short-term contracts for crude were concluded among the transporters, consumers, and suppliers, and this hardly seems realistic.

If we assess the output of Dependant Variable A (the IKL Pipeline) for the Czech Republic, we must consider its right of preference to TAL's free capacity corresponding to its ownership share, which was not available at the time of the baseline analysis. The baseline calculation must also be adjusted to reflect operation of the TAL. Average use of the IKL Pipeline over a five-year period amounted to 3.02 million tons of oil per year. Five percent of the TAL Pipeline's capacity amounts to 2.15 million tons of oil per year. If we add this value to the actual supply of Russian oil via the IKL Pipeline at 1.387 million tons, (see Chapter 3.1.11) we arrive at 3.537 million tons of oil per year. The extent to which Dependant Variable A can provide substitutability is 82%, considering that the total volume of oil supplied by Russia in 2012 was 4.302 million tons. Substitutability potential is there for key and points to a high degree of security of oil supplies for the Czech Republic.

For Slovakia, the situation is more complex. The reverse flow mode in the Czech section of the Druzhba Pipeline is not functional, and Slovakia possesses no contract for supply via the TAL Pipeline. The entire alternative is also restricted by capacity available on the Transalpine oil pipeline. All this necessarily points to a minimal substitutability index. IKL free capacity is sufficient, amounting to 4.83 million tons even with extraordinary supply to the CR. Average use of the Czech section of the Druzhba Pipeline is 45.3%, providing sufficient capacity at 4.08 million tons for the reverse flow mode. But problems lie downstream with the TAL Pipeline. It's free capacity is only approximately 4%, about 1.72 million tons of oil per year. Actual use of the primary route to Slovakia has amounted to 5.66 million tons of oil per year on average over the past five years. The substitutability potential for the secondary route must thus be calculated with limits that respect the TAL conditions; this adds up to 30%. Substitutability potential is thus considered only *important*, with significant probability limitations reflected in the index.

Table 5.5: Medium-Term Horizon for the CR and Dependant Variable A (IKL Pipeline)

${}^{CR}t_1 = 82_{Ap=1}$	The substitutability potential is *key*. We assess the probability index *p* as *high* because the alternative supply route is already regularly used and is secured by the ownership share in the downstream route.

Source: T. Vlček

Table 5.6: Medium-Term Horizon for the SR and Dependant Variable A (IKL Pipeline)

${}^{SR}t_1 = 30_{Ap=3}$	The substitutability potential is *important*. We assess the probability index *p* as *low* because the alternative supply route is not functional in the Czech Republic and the project has come up against significant capacity limits on the downstream TAL Pipeline.

Source: T. Vlček

5.3 The Adria Pipeline

Adria is the generally used but once again not entirely accurate name of the second alternative pipeline of interest to us. It should properly refer only to the section of pipe that runs between the town of Gola on the border between Croatia and Hungary, and the Hungarian refinery Duna located near Budapest in Százhalombatta.

Table 5.7: The Adria Pipeline

Source: Energy Community, 2009, p. 10. Modified by T. Vlček

Its route begins at the oil terminal of Omišalj, a port on the Croatian island Krk. This stretch of the pipeline that runs through Croatia is part of a system called JANAF (*Jadranski Naftovod*). More than ten entities are included in its ownership structure, among them the government of Croatia with a 78.509% share[35] (see *Jadranski naftovod JSC*). JANAF comprises five sections: the Omišalj – Sisak, Sisak – Virje, and Virje – Gola sections are upstream of the Hungarian Adria Pipeline. The remaining sections supply the Slovenian refinery in Lendava, the Croatian refinery in Slavonski/Bosanski Brod, and the Serbian refineries in Novi Sad and Pančevo. Plans called for JANAF's capacity in Croatia to be 34 million tons of oil per year but in the end, the capacity was only

[35] By means of Agency for State Property Management , Croatian Agency for Supervision of Pension Funds and Insurance, State Agency for Insuring Deposits and Bank Rehabilitation and Restructuring and Sale Centre.

20 million tons; Adria's capacity (Gola – Százhalombatta in Hungary) is 14 million tons of oil per year (see *Jadranski naftovod JSC*). As of February 2015, however, transport capacity was only 6.9 million tons of oil per year, owing to the performance of the pump at the Százhalombatta pumping station (see *Transpetrol, a. s.*). Capacity may be increased simply by reactivating the Csurgó pumping station. This station was built under a 1974 agreement between the CSSR and Hungary as part of the Csurgó – Tupá route downstream of JANAF and Adria (see Ministerstvo hospodárstva SR, 2008, p. 42). It is not currently in operation for financial reasons: the amount of oil transported did not require its use and so the Hungarians dismantled it several years ago.

At Százhalombatta, Hungary, a smaller southern branch splits off the Adria toward the Algyő refinery in southeastern Hungary[36]. Outside Budapest, the Adria splits into two routes: a northern route to Slovakia and an eastern route downstream to the southern branch of the Druzhba. In Hungary, the Druzhba Pipeline was already in operation by 1963. Transport capacity between the Hungarian and Slovak systems is 3.8 million tons of oil per year at the border, but there has been no commercial use for a long while, although recommissioning for oil exports to Slovakia could be done in a matter of weeks (see Ministerstvo hospodárstva SR, 2008, p. 42). Repairing defects along the route and reactivating the station noted above could easily increase capacity to 4.5 million tons per year (see *Transpetrol, a. s.*).

The Adria Pipeline project was already in place by 1964, but not before years of discussion had taken place among

[36] Unfortunately, this southern branch is not indicated in the map in Table 5.7. In terms of its capacity of 2 million tons per year, however, this pipeline is small and has a single goal: to supply oil to the Algyő refinery (see MOL, 2013, p. 17).

the project's backers—Czechoslovakia, Hungary, and Yugoslavia—about its construction. Originally, 34 million tons of oil per year was the proposed capacity of the project, of which 21 million would go to Yugoslav refineries, 5 million to Czech refineries, and another 5 million to Hungarian refineries (see Trend, 1973, p. 2). In the end, capacity amounted to 20 million tons of oil per year, a figure that had originally been designated only for the project's first phase (see Antic, 1975, p. 2).

The original motivation for constructing a Yugoslav oil pipeline was the enormous increase in industrial consumption of liquid hydrocarbons in the country. Between 1960–70, that increase was 847%–from 344,000 tons to almost 3 million tons per year (see Nafta, 1972, cited in Antic, 1973, p. 2). It was a logical move: the country imported most of its oil and no oil pipeline system was in place. For Hungary, financial reasons were paramount. A Comecon member, Hungary paid Russia more for its oil than western countries paid for oil from the Middle East, chiefly because it was fully dependent on a sole supplier and had no diversification projects on the burner (see RFE, 1972, cited in Antic, 1973, p. 4). The country was interested in opening a new route to obtain oil from other suppliers at a cheaper price, and also wished for diversification to improve its negotiating position with Russia. The Balkan states found new suppliers among the Arabic countries and, according to informed sources, got some of that oil in exchange for arms.

By 1973 it was already clear that the pipeline's capacity would not be adequate to the needs of Czechoslovak, Hungarian, and potentially Polish consumers, as well (see Trend, 1973, s. 3). But free capacity for Czechoslovakia became less and less likely when Yugoslavia stated it was now projecting consumption increases above the planned 24 million tons (see – Antic, 1975, p. 4). Yugoslavia was fully aware of the situation. Right at the outset of construction of the JANAF system, it began to negotiate with Greece for a potential interconnection in the Thessaloniki (GR) – Skopje (MK) – Pančevo (SRB) direction (see Antic, 1975, p. 4). At Pančevo, the new oil pipeline would connect to the southern branch of the Adria and the entire system could be supplied using two maritime ports: Omišalj in Croatia and Thessaloniki in Greece. This project, however, never came to pass. By the 1990s, it had become clear that use of the Adria as a second alternative was not suited to the CR's needs because of the lack of capacity. There was also a present danger that the CR would be edged out by increasing volumes of consumption on the part of the Slovak Republic and Hungary (see *Transpetrol, a. s.*). Accordingly, the country followed its own path in diversifying, turning instead to the IKL Pipeline. Potential free capacity on the Hungarian-Slovak section sufficed to cover potential emergencies in Slovakia.

Construction of the JANAF began in 1974, and the system was completed in 1979. The project for the Hungarian section of the pipeline was prepared by OLAJTERV, a Hungarian firm, between 1975–77. Work began in 1984, but full operation did not come until 1989. The system survived intact the war in Yugoslavia, relaunching into full operation in 1995 (see IEA, 1999, p. 81). That said, the pipeline does not fulfil its originally intended purpose. Originally constructed to bring in oil from the Middle East, it currently serves to transport oil from Russia to the refinery in Sisak (see IEA, 2011, p. 51) and Százhalombatta, using the reverse direction of flow. Serbian refineries are supplied in the same manner. The Russian Federation lost its monopoly only in 2011 (see Dąborowski, 2011), but one may safely assume that Russian oil continues to represent a majority of Serbia's imports.

Table 5.8: Refineries on the JANAF and ADRIA Routes

Refinery	Country	Owner	Capacity
Rijeka	Croatia	MOL Group	4.5
Sisak	Croatia	MOL Group	2.2
Novi Sad	Serbia	Naftna Industrija Srbije*	2.0
Pančevo	Serbia	Naftna Industrija Srbije*	4.8
Bosanski Brod	Serbia	NefteGazInkor** (80%)	1.2
Lendava***	Slovenia	NAFTA Lendava	–
Százhalombatta (Duna)	Hungary	MOL Group	8.1
Algyő	Hungary	MOL Group	2.0
*Tiszaújváros (Tisza)***	Hungary	MOL Group	–
*Zalaegerszeg****	Hungary	MOL Group	–
Bratislava (Slovnaft)	Slovakia	MOL Group	6.1

Note: capacity indicated in millions of tons per year.
* The company ownership structure is 56.15% JSC Gazprom Neft, 29.87% Republic of Serbia, and 13.98% minority shareholders. The Novi Sad refinery's input consists of intermediate goods from the Pančevo refinery.
** The remaining 20% is made up by minority shareholders. NefteGazInkor is a subsidiary of Zarubezhneft, a Russian company.
*** Oil processing was terminated in the refinery. The owner focuses on processing natural gas and other activities. The refinery plant is for sale.
****Operation of the *Tiszaújváros refinery was terminated in 2011; the same is true of the Zalaegerszeg refinery.*

Source: MOL Group; Rafinerija nafte Brod; Naftna Industrija Srbije; JSC Gazprom Neft; Grujicic, 2009. Prepared by T. Vlček

In addition, since 2001 negotiations have been underway on using the Adria and JANAF pipelines to export Russian oil through the Omišalj terminal. In December 2002, Croatia and Russia concluded an agreement supporting a project to integrate the Adria and Druzhba Pipelines, i.e., to reverse the flow in the Sisak – Omišalj section of the JANAF system. This means the original intention of transporting oil inland has been precisely reversed: to serve as an interstage between Russian export pipelines and tanker transport from Omišalj (see Socor, 2010).

Informed sources say the idea of transporting Russian oil to the Balkans was motivated by the war in Yugoslavia. Damage the country suffered was reflected in the oil infrastructure. Because of this, the Russian Federation offered to supply oil to the Rijeka refinery. It offered a three-stage project whose capacity would initially be 5 million tons, increasing to 10 and 15 million tons per year. But only the first variant was realistic because of the free capacity available in the upstream sections in Hungary and Slovakia. A novel technological problem also arose in Croatia: when the JANAF system was being built, there was no plan to reverse the direction of flow. The project took advantage of local geographical conditions. From the port of Omišalj the oil pipeline goes through the northern section of the Velika Kapela mountain range in Croatia, which reaches up to 1400 meters above sea level. Coming out of the port, the pipeline walls had to be built thicker to withstand the high pressure created by pumping stations pushing the oil along a route of such high elevation. But the section from the top of the mountains to Sisak required thinner walls. Gravity itself did much of the work in this direction. Once the direction of flow was reversed however the thin walls would not withstand the high pressure needed to push the oil up the mountain range and the pipeline would burst. Croatia agreed to modernize the pipeline only on condition that the Russian Federation provide a bank guarantee. Croatia, that is, needed an obligation for a specific volume of oil based upon which it could take out a loan to modernize JANAF. But Russia offered only an informal promise; the project never came to fruition.

The stakeholders may not have arrived at an agreement, but they did manage to reveal their diverse interests along

the way. Long-term, the Russian Federation has tried to diversify its export routes and limit exports via the Druzhba. But its aim in the Balkans is also clearly to become the major player in the oil sector, and in this it has been fairly successful. Croatia is aware of the diversification potential of the oil pipeline as well as the strategic risks ensuing from the Russian Federation's use of the route, risks that arise because reversing the direction of flow largely blocks Central Europe out and damages Croatia's effort to become an EU energy transit country (see Socor, 2013). In the end, Croatia definitively turned its back on the negotiations and continues to hold a negative view of the project's potential over the long term. The consortium operating the JANAF system, by contrast, generally takes a positive approach to the agreement. Since it is a private company (even if the government of Croatia is the majority shareholder), it is primarily concerned about maximizing profits, and reversing the direction of flow would bring in new transport revenue. As regards export volume, Russia has been considering a tri-level project; only the first level is realistic—to export 5 million tons of oil per year (see Socor, 2010).

MOL Rt, which owns refineries in Hungary, Slovakia and Croatia, is among the firms that take Russia's statements on limiting exports over the Druzhba seriously. In September 2011, the company announced it has been working closely with Slovakia's Slovnaft to prepare a modernization project for the Adria Pipeline (i.e., the Gola – Százhalombatta route) (see "*MOL, Slovnaft to Invest*", 2011). This project most certainly will involve reactivating the pump station, repairing the route, engaging in overall modernization and increasing pipeline capacity on the Százhalombatta – Šahy route. In May 2012, Slovnaft, Transpetrol and MOL Group concluded a memorandum of collaboration aimed at modernizing and increasing the capacity of this section (see "*Slovnaft, Transpetrol and MOL*", 2012). Although the project is to serve as an alternative, not a replacement to the primary route, the aim is to double capacity. Tanspetrol perceives the project to be an opportunity to generate new revenues transporting Russian oil to the Balkan refineries (see "*Slovak, Hungarian firms*", 2012). It must be noted that although the project appears to involve Slovak-Hungarian collaboration, it is actually simply part of MOL's implementation of its business plan. Under growing pressure from statements made by Gazprom Neft and other Russian companies, MOL is trying to make sure the oil supply to its refineries on the Druzhba Pipeline, its current source, remain secure. The reconstruction has been conceived to allow the company to use tankers to transport the entire consumption of Slovnaft (and, potentially Százhalombatta) to Omišalj and from there via JANAF and the Adria all the way to Slovakia (see Beer, 2013, p. 42). In February 2015, reconstruction of the Barátság I section between Šahy u Tupé and Tökölem, near Százhalombatta, was completed. The original transportation capacity was not doubled but did increase to 6 million tons of oil per year. In addition, two pumping stations located in Hungary were modernized, increasing transport capacity on the Gola-Százhalombatta section from 6.9 to the maximum 14 million tons of oil per year.

The Slovak situation could be summarized as follows: On the one hand, interest in and even pressure for expanding connections with the Adria Pipeline has been growing because of the benefits it would bring for supply diversification. But this means further reductions in oil supplied over the primary route, and this is a financial risk for Transpetrol, the Slovak oil transporter, which would lose transport income. If further limits should be set in place with the aim of terminating supplies via the Druzhba, Slovakia would be among the countries that would suffer significant ecological and financial impact due to the need to maintain or decontaminate an

entirely unused pipeline. Interest in modernizing the Adria, then, stems not only from the country's need for diversification, but also the need to make Transpetrol viable. It would likely increase its profits thanks to the greater capacity of connection to Hungary, and it is also likely to take part in supplying Balkan refineries with oil.

The Czech Republic is not involved in the project and the project is not mentioned in any official document prepared by the Ministry of Industry and Trade. According to Slovnaft, it could transport up to two million tons of oil per year to the CR owing to the company's connection to the Druzhba (see Žižka, 2013b).

Let us now assess the output of Dependent Variable B (the Adria Pipeline) for Slovakia. As far as the capacity available on individual sections, Table 5.9 provides a concise overview. To arrive at a correct result, however, we must also take consumption on the route into account. Table 5.8 serves this purpose; the baseline consists of the refining capacity of individual facilities. Before the oil gets to Hungary, Croatian refineries must be satisfied (7.7 million tons) and those in Serbia (6 million tons). But the Serbian refineries get most of their oil from Russia, transported through Hungary. Let us make a qualified estimate that Russia's share of Serbian oil consumption is 90%. Free Croatian capacity thus amounts to 12.3 million tons; the capacity on the Gola – Százhalombatta section is 14 million, of which 6 million is used in the reverse direction of flow. It thereby follows that even after satisfying the needs of the Serbian refineries, the Gola – Százhalombatta section will provide free capacity of 8 million tons of oil per year. Hungarian consumption is 10.1 million tons of oil per year, with the oil fully imported from Russia. It follows that having modernized the Százhalombatta – Šahy section, up to 6 million tons of oil per year may be transported to the Slovnaft refinery in Bratislava.

Table 5.9: Capacity of Individual Sections in Relation to the Adria Pipeline

Omišalj-Gola	Gola-Százhalombatta	Százhalombatta-Šahy	Šahy-Bratislava	Katov-Litvínov
20	14	6	20	9

Note: data in million tons per year
Source: T. Vlček

We thus arrive at a substitutability potential versus the primary route for Dependent Variable B of 106%, considering that Russia has supplied an average of 5.66 million tons per year over the most recent five years. This qualifies as *essential* substitutability potential. As regards the probability index, it is practically certain that the Adria Pipeline's modernization will be complete by the deadline, bringing all the positives envisioned. The capacity available for supplying Slovakia will suffice even with the prevalence of Russian exports to Hungary and Serbia. Any interruption or termination of supply on the Druzhba Pipeline, though, would affect not only Slovakia, but likely Hungary, as well. Hungarian consumption amounts to 10.1 million tons of oil per year. If it were to look for a 100% alternative to the Russian supply, it would have to make use of the JANAF system. Having satisfied Hungarian consumption, there would be free capacity of merely 2.2 million tons. This would mean significantly lower substitution potential for Slovakia (39%), with nothing left for the Czech Republic. For this reason, the probability index must be assessed as medium.

The Czech Republic may be assessed based upon what we know about Slovakia. Having fully satisfied Slovakia, the left-over capacity on the Százhalombatta – Šahy section amounts to 0.34 million tons of oil per year. As indicated in Table 5.9, the route to the CR is problem-free for the amount indicated. The substitutability potential for the primary route of

Dependent Variable B, given a total volume of Russian oil of 4.302 million tons in 2012, is 8%. The probability index is low because of the above noted facts and the reality that the CR is the final country on the route.

Table 5.10: The Medium-Term Horizon for the CR and the Dependant Variable B (the ADRIA Pipeline)

${}^{CR}t_1 = 8_{Bp=3}$	The substitutability potential is *key.* The probability index *p* is assessed as *low* because of the facts described in the case of Slovakia and the fact that the CR is the last country on the route.

Source: T. Vlček

Table 5.11: The Medium-Term Horizon for the SR and the Dependant Variable B (the ADRIA Pipeline)

${}^{SR}t_1 = 106_{Bp=2}$	The substitutability potential is *essential.* We assess the probability index *p* as *medium* because the positive effect of the project is closely tied to Russian supplies to Hungary. With limited supply via the Druzhba to Slovakia, supplies to Hungary would very likely be limited as well, and Hungary's demand would be satisfied by the JANAF system and the ADRIA Pipeline preferentially before Slovakia's.

Source: T. Vlček

5.4 The Potential Bratislava-Schwechat Pipeline (BSP) and Adria-Wien Pipeline (AWP)

For many years (since 2003), the discussion of diversification in the Slovak Republic has included construction of the BSP (Bratislava – Schwechat Pipeline), 62 km in length (50 km in Austria and 12 in Slovakia), with a total capacity of 3.25 million to 5 million tons of oil per year.[37] The project began as part

[37] 3.25 million tons without the construction of a new pump station on the route; 5 million if the new pump station was part of the project.

of plans drafted by OAO Yukos (ОАО Нефтяная Компания ЮКОС), a Russian company which ended up going into bankruptcy (see "*OMV and Yukos sign"*, 2003; "*Yukos Unit to Build"*, 2003). Until 2009, it had a 49% ownership share in Transpetrol, a. s. and was interested in ownership of OMV. The project was logical, therefore, and would have created ownership between the Schwechat refinery and the transport route across Slovakia. Even after Yukos went bankrupt, the project remained alive, endorsed by Transpetrol, a. s., the Slovak oil transporter. It would also potentially have an effect on the Czech Republic, since it could diversify the oil pipeline routes available.

The BSP was conceived to connect the *Slovnaft, a. s.* refinery in Bratislava and the Austrian OMV *Raffinerie Schwechat* outside Vienna. The project particularly aims at interconnecting the existing route taken by Russian oil pipelines with Austria, thereby allowing Russian oil to be supplied directly to Austria for the first time. For Austria, the project has significant diversification value, because oil for the country is currently provided solely via the TAL and AWP. Support for the development of Transpetrol, a. s., though, is a key project objective (see *BSP Bratislava Schwechat Pipeline GmbH*). The Slovak transporter has prioritized the project because operation of the BSP section will allow it to generate new regular revenues (and it will therefore contribute to the state coffers), particularly tied to transporting oil from Russia to Austria. According to some sources and available information, a secondary objective is reversing flow and reinforcing Slovakia's oil security by connecting to AWP.

Austria presents practically no obstacles to the project. A key issue on the Slovak side lies in seeking out a route; the one originally proposed across Žitný Ostrov in Bratislava is highly problematic for environmental reasons (see "*Jahnátek: Spojit",* 2009; "*Na vytýčení novej trasy",* 2008*;*

"*Ropovod Bratislava – Schwechat*", 2009;"*OMV prosazuje,*" 2009). The Žitný Ostrov protected water area is one of ten such areas in Slovakia. It is the largest river island in Europe, located in southwest Slovakia between the Danube and Little Danube Rivers. The potential route of the BSP across the Žitný Ostrov protected water area arouses emotion not only because local fauna and flora might be endangered, but also because it is the largest drinking water reservoir in Europe.

A campaign led by Slovak citizens and environment organizations against the oil pipeline has been successful so far. For this reason, neither of the ten new potential routes goes through Žitný Ostrov. But this will increase the total length of the pipeline from 62 km[38] to 81 or even 152 km, based upon the route variant selected. The cost will range from €70 million to €112 million and the structure is to be finished six years after construction work begins (see *BSP Bratislava Schwechat Pipeline GmbH*).

In spite of the problems and protests, Slovakia continues to consider this a priority measure for ensuring oil security (see Ministerstvo hospodárstva SR, 2008, p. 47). The BSP Pipeline project is being prepared by Austria's IMV AG and Transpetrol, a. s., The Slovak state-owned company. On 19 October 2009, Reinhold Mitterlehner, the Austrian Federal Minister of the Economy and Lubomír Jahnátek, his Slovak counterpart, signed a Memorandum of Understanding with the Aim of Deepening Collaboration between Austria and Slovakia in the Area of the Oil and Natural Gas Trade. Under this document, construction of the oil pipeline should begin in 2012. To implement it, a joint enterprise was created – Bratislava-Schwechat

[38] The most ideal route consists of a connection to the Slovnaft, a. s. refinery across Petržalka, a Bratislava district, to Kittsee, a border transfer point. In the Slovakia, this route is only 12.814 km (see *Transpetrol, a. s.*).

Pipeline GmbH – whose ownership structure is as follows: Transpetrol, a. s. (74%) and OMV Refining & Marketing GmbH (26%) (see "*Memorandum o porozumení*", 2009).

Table 5.12: Length Comparisson of Potential Routes for the Planned BSP Pipeline

Route No	Start Point	End Point	Total Length	Length in Slovakia	Length in Austria
1	Druzhba pipeline at Jablonice	Schwechat	108.8	64.0	44.8
2	Druzhba pipeline at Veľký Biel	Schwechat	81.2	27.5	53.7
3	Druzhba pipeline at Veľký Biel	Schwechat	82.1	33.5	48.6
4	Druzhba pipeline at Jablonice	Schwechat	111.1	62.5	48.6
5	Druzhba pipeline at Jablonice	Schwechat	127.6	74.0	53.6
6	Druzhba pipeline at Jablonice	Schwechat	152.1	64.0	88.1
7	Druzhba pipeline at Jablonice	Schwechat	126.2	63.6	62.6
8	Druzhba pipeline at Veľký Biel	Schwechat	107.7	33.5	74.2
9	Druzhba pipeline at Jablonice	Schwechat	136.7	62.5	74.2
10	Druzhba pipeline at Veľký Biel	Schwechat	84.8	32.5	52.3

Note: length in km

Source: Ministerstvo hospodárstva SR, 2012, p. 35–41.

In 2009, the option to construct the pipeline across the Žitný Ostrov protected water area was definitively closed. A year later, the Slovak government under Iveta Radičová pledged

in its programme declaration that no oil pipeline would lead across the Žitný Ostrov protected water area (see *BSP Bratislava Schwechat Pipeline GmbH*). The project has been under discussion for more than ten years, but minus this option, it is uncertain whether it will ever be implemented. After recent events in Ukraine, strident voices from the opposition Sloboda a Solidarita party have risen in favour of terminating the BSP project as a whole and shifting attention to the ADRIA Pipeline (see "*Pripojenie na ropovod Adria")*. Currently, the Slovak government, which supports the project along with the Ministry of Economy of the SR, is working on arriving at an agreement with all stakeholders, particularly with the city of Bratislava. Bratislava had refused the project in 2013.

In June 2013, however, the Slovak Parliament approved an amendment to the act on significant investments that means no binding opinion from municipalities is necessary any longer for significant investments. And it is the government that decides whether an investment is significant. In this case, a construction project whose investment costs will be at least €100 million, and which will bring at least 300 new jobs, will be considered significant (see "*Na banské stavby", 2013)*.

In general, any alternative route becomes an issue for implementing the project. The shortest route, which leads across Bratislava and Žitný Ostrov, is the most profitable but also harbours the greatest environmental threat. This has resulted in its definitive rejection. The second most profitable route leads through Bratislava across the so-called city corridor. But it confronts an identical issue. Although preferred by the investors, its environmental sensitivity is high: it leads right through a highly populous section of Bratislava, essentially right through the city centre.[39] Other routes are

[39] Of the ten potential routes, the so-called City Corridor route is given the most consideration. It leads through the centre of Bratislava and connects to Austria at the Kittsee border crossing and the so-called Carpathian Corridor, where the connection would be made between the cities of Marchegg and Záhorská Ves.

therefore more socially acceptable and safer environmentally, but they are barely profitable, since refineries pay transporters for oil based upon the number of kilometres transported. The longer the pipeline, the greater the likelihood that the investment in construction will not be returned, since consumers will look for shorter, therefore cheaper, transport routes.

The primary interest behind the BSP is to supply Austria with Russian oil, thereby potentially increasing Russia's interest in transporting oil via the southern branch of the Druzhba, because destinations would include not just the Czech and Slovak Republics, but European commercial concerns, as well. Austrian interest in the BSP is also perceptible from the intensity of preparation on the Austrian side. Austria has already purchased 98% of the plots of land necessary for the route through Kittsee and issued a great majority of the construction permits (see *Transpetrol, a.s.*). The motivation is quite clear. Connection to the Druzhba Pipeline via the BSP project will ensure shorter access for the Austrian refinery to Russian oil, making it faster and, most importantly, cheaper—the Austrian refinery mostly processes Russian oil (to a lesser degree oil extracted inside Austria, as well as oil from Kazakhstan, Nigeria, Saudi Arabia or other countries).

Some capacity in TAL might also free up if Austria were regularly supplied by the new pipeline. An attempt to awaken more interest on the part of Russian exporters in the southern branch of the Druzhba Pipeline also plays a role, particularly, perhaps, after Alexej Kornienkov, Director of Strategic Planning at Gazprom Neft Trading said in autumn 2013, 'If I had

a refinery on the Druzhba Pipeline, I'd sell it' (see Beer, 2013, p. 42).

The operation of Transpetrol, a. s. is based upon refineries in Bratislava and Litvínov. The volume of oil supplied via the Druzhba Pipeline in the CR has been decreasing as a result of growing utilisation of the IKL. Revenues generated exclusively from the transfer of oil to Bratislava are not sufficient for the company. For this reason, Transpetrol, together with Slovnaft, a. s., the company shareholder, began to modernize the Gola – Százhalombatta and Százhalombatta – Šahy sections of pipeline (see above). It is also interested in the BSP: its share of costs amounts to 74%, while Austria's is 26%.[40] This despite the fact that the interests of Transpetrol, a. s. directly contradicts those of Slovnaft, a. s.[41]

Although the BSP is, above all, a commercial project of the Slovak state via Transpetrol, a. s., it is also significant for security reasons: the capacity planned for the pipeline could cover more than 80% of the oil supplied through Druzhba. This would be possible, though, only if there were free capacity on the TAL-AWP section. At this point, we come up against a significant capacity limit. The consumption of oil in the Austrian refinery of Schwechat would actually have to be reduced by the volume of oil supplied to the SR, which is, of course, commercially infeasible.

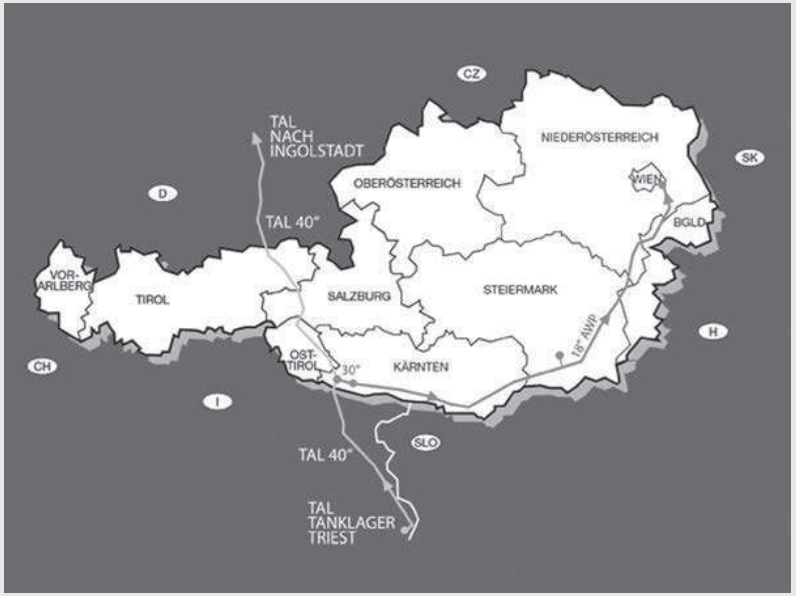
The Adria-Wien Pipeline is operated by Adria-Wien Pipeline GmbH, a joint enterprise of OMV R&M GmbH (76%), BP Europa SE Zweigniederlassung BP Austria (20%) and Eni GmbH (4%) (see *Adria-Wien Pipeline GmbH*). The pipeline, completed in 1970, starts in the Austrian region of Carinthia

[40] It is notable that Slovakia has already invested approximately €8.9 million owing to the purchase of land in Austria – because of the agreement on project cost indicated above (see Krajanová, 2011).

[41] Schwechat, the largest regional competitor to the Bratislava refinery, can get at the cheaper Russian oil easier and at lesser cost.

in the transfer station of Würmlach, whence it connects to the TAL Pipeline. The AWP route then follows the Austria-Slovenia and Austria-Hungary borders and goes through the lands of Carinthia, Styria, Burgenland and Lower Austria. The 419 km long pipeline terminates at the Schwechat refinery outside Vienna. It has a capacity of 8 million tons of oil per year.

Table 5.13: The AWP Pipeline



Source: Adria-Wien Pipeline GmbH

The Schwechat refinery, with a maximum refining capacity of 9.6 million of oil per year, is part of the OMV group, which operates three refineries in the region: in addition to Schwechat, there is Burghausen in southern Germany, with a capacity of 3.6 million tons, and Petrobrazi in Romania, with a capacity of 4.2 million tons (see OMV, 2014, p. 49).

Schwechat operates at approximately 85% of maximum capacity. In 2012, it processed 8.19 million tons of product (Tuppinger, 2014), and these values have been maintained over a long period. All of the AWP's capacity thus targets the Schwechat refinery; there is no free capacity. This fact confirms the notion that the BSP project is a purely commercial project undertaken by Transpetrol, a.s., since the security level related to diversification has negligible meaning given the degree to which the AWP route downstream is utilized.

There are two potential situations which could occur in interconnecting to the BSP. The first, very likely, is that the supply of Russian oil to Schwechat via BSP instead of AWP would free capacity in the AWP section equal to the volume of Russian oil from the new route. This would certainly have a positive effect on diversifying Slovakia's supply, but exclusively during non-emergency periods.

During emergencies (by which here we mean supply limitations or shutdowns on the Druzhba) things would be otherwise: Austria would satisfy its needs through the AWP, and because of the volume of oil consumed, no free capacity would be leftover for Slovakia. Thus the security dimension of the BSP project is highly limited.

If BSP is constructed, it must be perceived as a tool for increasing state revenues, not for increasing the security of supply to Slovakia. From a geopolitical standpoint, the pipeline represents an attempt to increase Russian interest in Central European consumers by boosting their numbers. Only by a single consumer—but one that is significant. In this context it should be noted that the importance of increasing Russian interest in Central European consumers is also felt by the Czech MERO ČR, a.s. It has already offered a Czech variant, an oil pipeline connection between the Druzhba at Klobouky u Brna to the Schwechat refinery outside Vienna. This proposal is closely tied to developments in Slovakia and was declared a possible variant should the connection between Schwechat and Bratislava not be constructed (see Ministerstvo hospodárstva SR, 2008, p. 43).

Let us now assess the output of Dependent Variable C (the BSP and AWP pipelines) for Slovakia. The BSP's capacity is planned at 3.25 million to 5 million tons of oil per year. The latter capacity figure is predicated upon the construction of an additional pumping station. But we will ignore this possibility and, considering the construction schedule and our 2020 time horizon, concentrate on the first value. Capacity in the AWP is 8 million tons of oil per year, but this is fully utilized for supplying oil to Schwechat refinery. The substitutability potential versus the primary route for Dependent Variable C is 57%, considering that Russia has supplied an average of 5.66 million tons per year over the most recent five years. This qualifies as *essential* substitutability potential. Unfortunately, downstream sections must be included in the calculation, i.e., the AWP Pipeline, whose capacity is fully utilized. In this case it is therefore redundant to seek potential free volume in the TAL Pipeline, which is positioned at the start of the route that leads to the Austrian refinery. The substitutability potential versus the primary route of Dependant Variable C is thus in actuality 0: *insignificant*. Because of the issues that have impacted the decision to construct the pipeline to this point, it would appear that it will be built by 2020, but not in operation. Thus we assess the probability index as low.

Because the Czech Republic is entirely downstream of Slovakia on the route, the substitutability potential versus the primary route is zero and the probability index is low.

Table 5.14: The Medium-Term Horizon for the CR and the Dependant Variable C (the BSP and AWP Pipelines)	
$^{CR}t_1 = 0_{p=3}$	The substitutability potential is *insignificant.* The probability index *p* is assessed as *low* because of the facts described in the case of Slovakia and the fact that the CR is the last country on the route.
Source: T. Vlček	

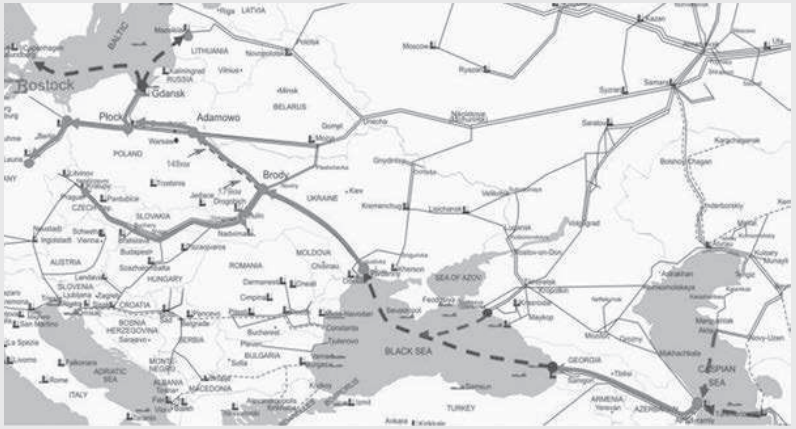
Table 5.15: The Medium-Term Horizon for the SR and the Dependant Variable C (the BSP and AWP Pipelines)	
$^{SR}t_1 = 0_{Cp=3}$	The substitutability potential is *insignificant.* The probability index *p* is assessed as low because of the small probability of its construction by 2020.
Source: T. Vlček	

5.5 The Potential Odessa-Brody-Adamowo-Płock-Gdansk Pipeline

The Odessa-Brody Pipeline originated as a project to build the most direct, shortest route to transport Caspian oil to Europe, receiving support from the EU and the US. The idea to build initially arose in Ukraine in the early 1990s, with two major objectives. First, by diversifying oil supply routes and sources, Ukraine's energy security would be increased. Second, such a pipeline would reinforce the country's position as a transit country for energy raw materials (see *Sarmatia Sp. Z o.o.*). Construction was to take place in two phases, the first of which would see pipeline capacity reach 14.5 million tons of oil per year, expanded to 45 million in the second phase. The work was to be done by a Ukrainian company, Ukrnaftohazbud ZAT (Укрнафтогазбуд ЗАТ). Construction began in 1996 and came to a close in 2001. The next year, in August 2002, after the completion of the Pivdennyi terminal, the

674 km pipeline was launched into operation under the control of PAT Ukrtransnafta (ПАТ Укртранснафта), a Ukrainian oil pipeline operator. Only the first phase of construction was completed, however, with fewer pumping stations than had been planned along the route. Maximum transport capacity has thus been limited to 9 million tons of oil per year.

Table 5.16: Potential Route from the Caspian Sea to Central Europe



Source: Sarmatia Sp. Z o.o.

The Odessa-Brody Pipeline begins in southern Ukraine, on the shore of the Black Sea in Odessa. Oil is transported by sea tankers to two terminals: the Port of Odessa (Одеса) and Pivdennyi (Південний). From there, it is picked up by the pipeline. The pipeline's current 9 million tons could easily be expanded to reach the original Phase I target of 14.5 million tons by building the additional pumping stations along the route[42] or by injecting special chemicals that reduce oil

[42] The investment is estimated at €4.1 million (see ILF Consulting Engineers, Purvin & Gertz, 2010a, p. 29).

friction in the pipeline.[43] The pipeline ends in the town of Brody in Ukraine, near the country's border with Poland. Brody lies on the southern branch of the Druzhba Pipeline (the Mozyr – Uzhhorod section).

The section connecting Adamowo and Płock, two Polish towns, is part of the north branch of the Druzhba, the Almetyevsk – Mozyr – Leuna route. Here transport capacity reaches 50 million tons of oil per year. On the Płock – Gdańsk section, the so-called Pomeranian Pipeline, 27 million tons of oil per year may be moved; if the reverse flow mode is used, the figure is 30 million tons (see *PERN S.A.*).

It must be said, however, that the original intentions in building the Odessa-Brody Pipeline have not come to fruition. Shortly after its launch, the project was impacted by three events. The first was that Ukraine had no money to fill the pipeline with Caspian oil (see Kupchinsky, 2007). As a result, the pipeline stayed empty. Second, European countries were unwilling to construct a connection between the Odessa-Brody project and European refineries (see "*Clouded Future for*", 2007). And third, high transport fees along the new route meant that nothing changed in terms of oil supply for Ukrainian consumers.[44] They continued to get their oil in-

[43] Oil pipelines are usually laid below the frost line. In spite of that, winter soil temperature may oscillate around 4°C. At such low temperatures, oil starts to thicken, increasing friction, slowing transport, and cutting the pipeline's capacity. The problem is addressed by injecting special chemicals that prevent oil from thickening and freezing. These chemicals do not impact the processing of oil and need not be filtered out.

[44] In spite of the fact that the type of oil to be transported was selected by Ukraine. The Odessa-Brody pipeline project was conceived to transport Azeri Light, CPC Blend and REBCO, i.e., light oil. The viscosity and density of the type of oil determines the capacity and flow-through of the pipeline system. The higher the oil viscosity and density, the more malleable and ductile the oil. This will therefore lead to reduced capacity if higher pressure is not used to minimize the impact (see ILF Consulting Engineers, Purvin & Gertz, 2010d, p. 17).

stead via the primary route, i.e., the Druzhba. Until February 2004, then, the pipeline remained unutilized.

To return to the significant point that Ukraine had no money, it must be said that the entire situation was unusual. An agreement was reportedly under negotiation between Ukraine, producers in Kazakhstan, and refineries located along the route. In April 2003, representatives of KazMunaiGas, the Kazakh state oil company, announced the pipeline would be filled in the second half of 2003, with a consortium of Kazakh producers providing 6 million tons of oil annually. The only remaining issue was the tariff Ukraine would charge for transport (see Kupchinsky, 2007). But then, Leonid Kuchma, the country's president, declared the pipeline economically infeasible in the northbound direction. He proposed instead to push oil southward through the pipeline, specifically Russian oil to Odessa, which, he said, would generate revenues for Ukraine (see Orbán, 2008, s. 132).

What induced the head of Ukraine to take such a sharp turn, in defiance of the government, no less? The answer most likely lies with TNK-BP Ukraine[45], a Russian-British company. In 2003, it launched a massive lobbying campaign in Kiev to reverse the direction of flow. In February 2003, the government approved the Odessa-Brody Pipeline exclusively for transporting Caspian oil to Europe. The decision was supposed to be final and irrevocable. But five months later, the government did an about-face, declaring that the pipeline would not be restricted to carrying oil in the northbound direction (see Orbán, 2008, p. 132). TNK-BP's lobbying efforts had won the day.

[45] Since 2012, with the purchase of the British share by Transneft, the company has been exclusively Russian-owned (see Žižka, 2013a).

In February 2004, the pipeline indeed began to be used to transport Russian oil from the Druzhba across Brody, and thence via the Sarmatian Pipeline to Odessa. From the Odessa and Pivdennyi terminals, transport continued by tanker. During the first five months of operation in the reverse direction of flow, however, a paltry 1.3 million tons of oil went south (see "*Clouded Future for"*, 2007). This made the pipeline simply unprofitable for PAT Ukrtransnafta, the oil pipeline operator. Even at a significantly reduced tariff, the company generated no profit until 2007; the volumes transported were too negligible.

Shortly after completion of the pipeline, when the divergence between Ukraine's vision and reality sunk in, the owner of the pipeline put out a tender for creation of business plan for its further use. That tender was won by a group of companies: Nexant Ltd, Ernst & Young, and PriceWaterhouseCoopers (see *INOGATE*). In March 2003, the new business plan confirmed that the project, now labelled the Euro-Asian Oil Transportation Corridor, or EOATC,[46] was feasible (see *Sarmatia Sp. Z o.o.*). From that time forward, more or less active negotiations and preparations have been going on to extend the pipeline to Adamowo, Poland, where it would be joined to the north branch of the Druzhba.

Preparations got underway in May 2003 for a consortium to run the pipeline. In July 2004, Międzynarodowe Przedsiębiorstwo Rurociągowe "Sarmatia" Sp. Z o.o. was established, a company that brings together PAT Ukrtransnafta, the Ukrainian and Polish operator of the oil pipeline network (originally 50% and, as of 2007 2.24%) and PERN "Przyjaźń" S.A. (originally 50%, as of 2007 27.24%). Three other companies joined in October 2007: SOCAR State Oil Company of

[46] 'Euro-Asian Oil Transportation Corridor' is essentially a fancy 'European' name for the Odessa-Brody-Płock Pipeline project.

the Republic of Azerbaijan (27.24%), GOGC Georgian Oil & Gas Corporation (17.27%) and the Lithuanian AB "Klaipedos Nafta" (1%)[47] (see *Sarmatia Sp. Z o.o.*). Since that time, the entire Odessa-Brody-Adamowo-Płock route has been called the Sarmatia Pipeline.

The motivation for creating the company and promoting extension of the pipeline is unclear. At the very least, doing so gives pause for thought. It is possible that the impulse to extend the pipeline originated with the European Commission, which became aware of its significance as oil prices rose and the Russian Federation took an aggressive attitude in the summer of 2005 (see Kupchinsky, 2007). The EC declared constructing a project for the transportation of oil on the Black Sea – Ukraine – Poland route was 'an infrastructural project critical for European and Ukrainian policy aimed at securing the oil supply' (see EU Eastern Partnership Delegation to Ukraine, cited in Glebov, 2010, p. 135) and provided €2 million to prepare a feasibility study (see Orbán, 2008, p. 133).

Ambiguity returned to the situation in Ukraine once again in May 2008, when President Yushchenko signed a decree calling for the Odessa Brody Pipeline to be used in the originally envisioned direction (see Kostiugova, 2008, p. 9). Paraphrasing Glebov, it may be said that the EU not only supports the Sarmatia Pipeline but also that its political will is growing to block Russian geo-strategic interests in the region (see Glebov, 2010, p. 136). Despite this, until 2010, Russia exported oil in the Brody-Odessa direction at an average annual volume of 9 million tons (see ILF Consulting Engineers, Purvin & Gertz, 2010d, p. 16). For a short period of time, the Ukrainian effort to revert the flow of oil back to the original direction led to an

[47] Polish and Lithuanian interest may relate to the 2006 purchase by Polish company PKN Orlen of Mažeikiai, a Lithuanian refinery, thereby expanding not only its portfolio and but also demand for oil.

offer to transport oil on the Odessa-Brody-Druzhba-SR/CR route, i.e., to cancel the plan to extend the pipeline to Poland. President Yushchenko said the offer was made at the summit between the EU and Ukraine in October 2006 (see Socor, undated; Orbán, 2008, p. 133). Any such offer, though, was academic: the issue of filling the pipeline with Kazakh oil was not addressed. Although the Czech and Slovak side was not against the proposition, Ukraine could not provide sufficient technical oil and fill reservoirs with the Russian oil blend used to fill the Odessa-Brody Pipeline. In late 2006 Kazakhstan announced it had pledged to export all its oil in directions other than Odessa and Pivdennyi[48]. With no supplier, the pipeline could not survive (see Orbán, 2008, p. 133). Thus Ukraine had no other option than to continue to use the pipeline for Russian exports in the southbound direction.

In November 2010, Russia's Transneft announced it had terminated oil exports over the Odessa-Brody Pipeline and through the Gdańsk terminal due to the opening of the ESPO and BPS-II pipelines (see Konończuk, 2010). Under a contract signed in early in the year, the Odessa-Brody Pipeline had already utilized the northbound direction to transport 1 million tons of oil to the Belarus refinery at Mozyr in 2011. Up to that time, the refinery had exclusively processed Russian oil. Since the contract was not prolonged in early 2012, this was probably a pilot operation. The oil was from Venezuela, purchased by Belarus, but exchanged for oil from Azerbaijan in a swap.

In early October 2013, Poland changed the status of the project and it was classified as a backup resource because of administrative delays threatening its construction. The EU funds allocated to PERN, the Polish operator, for this project

[48] Over the long-term, Kazakhstan conditioned its own participation, i.e., oil supply, on Russia's participation in the project (see Orbán, 2008, pp. 133–137).

were to be paid only if construction was completed by the end of 2015. For administrative reasons, the deadline was unrealistic; this prompted Poland to relabel the project a backup resource, thereby forfeiting the European subsidy of €120 million (see "*Poland postpones"*, 2013; "*Poland refuses"*, 2013). The position PERN finds itself in is thus somewhat strange. On the one hand, the company supports implementation of the project but it is not clear in what way (see "*Poland refuses",* 2013).

The European Union, however, continues to provide support. In October 2013, the EU published a list of energy infrastructure projects to benefit from financial support during 2014–2020, which will see the allocation of €5.85 billion. On the list is the construction of the Brody-Adamowo section as a project of MPS Sarmatia, like extending the Pomerian Pipeline, with no further specification (see European Commission, 2013). Gradually, over three phases, the Sarmatia Pipeline will increase its capacity to provide 10, 20 and, finally, 30 million tons of oil per year. In September 2013, the project obtained the consent of the Director for Environmental Protection in Lublin that will allow the investor to apply for a construction permit. The permit is a mandatory attachment to any application for funding the project as part of the Operational Programme 'Environment' under European Structural and Investment Funds (see *Sarmatia Sp. Z o.o.*)

And since Poland and the Ukraine resumed project negotiations in spring 2014 (see "*Ukraine and Poland resume*", 2014), it is clear the project is kept alive especially because of the potential financial resources. Whenever the potential investors and oil consumers make negative statements, the project is put on hold, and vice versa. This, however, logically indicates that the project is not actually considered strategic for any of the stakeholders, and that the deadlines for initiation or terminating construction must be taken with a large

dose of caution. This is also supported by Igor Kyryushin[49], the former chairman of UkrTransNafta, who, in 2007, expressed strong doubts off the record about extension of the pipeline ever becoming a realistic commercial project. He says the sole reason behind the extension lies in the political, i.e., strategic interests of the EU concerning potential alternative routes to the north branch of the Druzhba Pipeline, where the German refineries of Schwedt and Wilhelmshafen are located (see "*Ukraine: Ukrtransnafta Head*", 2007). The European Bank for Reconstruction and Development (EBRD) provides further economic reasoning: freeing naval operations on the shores of Denmark and Sweden (see "*Oil Transit in Ukraine*", 2006).

To make the project for oil supply via Odessa-Brody to Central Europe feasible, it must be economically competitive with the other available options. Table 5.17 shows an example of oil supply to Bratislava that makes clear the project would be competitive but only if the primary route, the Druzhba, did not exist. This is also in line with EBRD's logic.

Table 5.17: Comparison of Total Transportation Costs for Russian REBCO Oil Blend to Bratislava Refinery

Route	Units	2005	2006	2007	2008	2009
Budkovce-Bratislava	€ / ton	17.2	14.5	10.5	16.1	10.9
TAL/AWP/BSP	€ / ton	16.3	15.6	14.7	17.9	12.7
Odessa-Brody-Druzhba	€ / ton	19.8	20.1	19.0	21.0	18.6
Adria-Druzhba	€ / ton	21.7	21.1	20.2	23.2	18.3

Note: calculated by comparing the price of REBCO, the Russian oil blend at Novorossiysk, a Russian export port, and Bratislava.

Source: ILF Consulting Engineers, Purvin & Gertz, 2010c, pp. 57–58.

[49] In spite of his statement above, Igor Kyryushin himself was a great supporter and proponent of the project.

The table shows the Druzhba Pipeline is the cheapest route, followed by the planned Bratislava-Schwechat Pipeline; the prices for using the ADRIA and Odesa-Brody are comparable. However, the calculation is based only upon the route indicated and does not consider costs for transport to the entry point. In such a case, Druzhba would remain the choice owing to its price advantage, followed by Odessa-Brody and Adria-Druzhba, while the TAL/AWP/BSP would be most expensive. The reason is clear: the sea tanker route across the Black Sea to Odessa is significantly shorter that the route across the Bosporus and Dardanelles and the Mediterranean Sea to the two remaining oil pipelines. Although the price for maritime transport depends upon a number of factors, including operational costs, regular maintenance of ships, travel expenses, capital costs and cargo handling costs (see Stopford, 1997, p. 156), it always grows proportionately with the length of route (for detail see Vlček, 2010). But the price balance between the various transportation options is fragile, especially in view of growing distance. It remains to be seen whether, for example, transporting oil to Kralupy nad Vltavou is cheaper via the TAL/IKL, particularly considering how many transportation companies must handle the oil if the eastern route is used: maritime transport must be used across the Caspian Sea from Kazakhstan to Azerbaijan; BP – Baku-Supsa must transport the oil from Azerbaijan to Georgia; maritime transport once again across the Black Sea; UkrTransNafta, the Ukrainian operator then takes the baton; and finally, Transpetrol, the Slovak operator and MERO ČR.

The Odessa-Brody Pipeline was used for a single transport of oil to Mozyr, Belarus in 2011; since 2012 it has remained out of operation (see "*Ukraine lengthens", 2012)*. Negotiations have been undertaken with Azerbaijan since 2009 to become a potential supplier of oil to replace Kazakhstan. In

2012, Natig Aliyev, the Minister of Industry and Energy of Azerbaijan, stated he was 'interested in the project, meaning an alternative route for oil to Europe' (see "*Azerbaijan Addressed"*, 2012). He had previously made clear that the country was 'willing to provide all its own oil pipeline infrastructure for its neighbours from the east of Caspian Sea, should they be interested' (see *Azerbaijan Has Enough Resources", 2007)*. The future of the Odessa-Brody Pipeline and thereby the extension to Adamowo is closely related to whether clients exist, that is, whether there is demand on the route and a reliable supplier to supply oil from the Caspian region. Demand is hard to predict. It is related to the quality of supplies received to date, the price for the raw material and transport, refining technology and available refining capacity, and to the overall situation in the oil sector, etc. Current information claims that Azerbaijan is to supply oil to Odessa and Pivdennyi starting as early as 2016 (see "*Azerbaijani oil may", 2013)*. Neither demand nor supply, therefore, has been insured, and the future of the pipeline is highly uncertain. Furthermore, Azerbaijan found very good markets after the so-called Arab Spring, since Europeans began to consume oil from Azerbaijan instead of Libya, and the country's interest in the Odessa-Brody project has dampened.

Moving on now to calculating free capacity in the pipeline for both independent variables, the initial consumption that takes place prior to the oil reaching Slovakia and the Czech Republic must be assessed. There are seven refineries in the Ukraine. The government admits that a further 120 illegal refineries exist in the country that produce very low quality fuel (see IEA, 2012b, p. 142). Currently, of the seven refineries, only Kremenchuk is in operation, with the technical capacity to process 8 million tons of oil per year.

Table 5.18: Ukrainian Refineries

Refinery	Country	Owner	Capacity
Odessa	Ukraine	VTB Bank OAO	2.8 / 3.9
Lysychansk	Ukraine	TNK-BP	7.2 / 16.0
Cherson	Ukraine	Continuum Group	? / 7.1
Kremenchuk	Ukraine	Privat Group (57%), Naftogaz (43%)	8.0 / 18.6
Drohobych	Ukraine	Privat Group (75%), Naftogaz (25%)	2.0 / 3.3
Nadvirna	Ukraine	Privat Group (74%), Naftogaz (26%)	2.2 / 4.0
Shebelinka	Ukraine	UkrGazVydobuvannia	1.0 / 1.2

Note: capacity indicated in millions of tons per year; the data to the left concerns technical capacity, i.e., the current maximum operation possible; that to the right, the installed capacity.

Source: LUKOIL oil company; IEA, 2012b, p. 142; "Oil Processing Industry of Ukraine", undated. Prepared by T. Vlček

The Odessa refinery has an interesting story. It was shot in 2010 due to low operational efficiency once the supply of Russian oil in the Brody Odessa direction had ceased. In a dispute between Russian and Ukrainian investors over the Kremenchuk refinery that resulted in the interruption of direct Russian supply, it became necessary to re-route the flow of oil from another pipeline: Odessa was also able to receive Russian oil transported via the Kremenchuk refinery. Flow along the route, however, had to be reversed so that light oil from Azerbaijan could be supplied to the Kremenchuk refinery. Despite this emergency solution, Kremenchuk production dropped and production at Odessa stopped altogether. It is because both these refineries may operate concurrently only if Kremenchuk consumes Russian oil (see IEA, 2012b, p. 143).[50]

[50] The reason consists in swing operations and the complex nature of pumping and exchanging the technical oil in the pipeline.

In February 2013, LUKOIL, a Russian company and then owner of the refinery, sold 99.6% of its shares to VETEK Group, a Ukrainian company. But the refinery was never launched into operation. Because the VETEK Group was unable to make payments on the loan it took out to buy the refinery, the refinery was taken over by VTB Bank OAO, a state-owned institution. The shift in ownership continued to be a subject of dispute, sometimes in the courts. In April 2014, Ukrainian courts confiscated the refinery. Because of its debt, LUKOIL ceased supplying oil to the refinery in February 2014 (see Deede, 2014; Polityuk & Neely, 2014; "*Ukraine Court Seizes*", 2014). According to informed sources, the Russian Federation went to international court over the Ukrainian procedure and won. Ukraine must return the refinery to VTB Bank OAO and pay damages to the Russian Federation.

Table 5.19: The Ukranian Oil Pipeline System

Source: BAT UkrTransNafta

We begin once again by assessing the output of Dependant Variable D (the potential Odessa-Brody-Adamowo-Płock-Gdańsk Pipeline) for Slovakia. To set things out clearly, the capacity available on individual sections is indicated in Table 5.20. Once again, we must also consider consumption along the route. Table 5.18 shows this. The baseline consists of the technical refining capacity of individual facilities. The subject of the study presented is the interruption of oil supply on the primary route for both independent variables, i.e., on the south branch of the Druzhba Pipeline. This route includes the Nadvira and Drohobych refineries. The Odessa-Brody route also includes the Odessa refinery which, however, receives oil directly from the maritime port. Because of the current situation in Ukraine, all refineries except for the one in Kremenchuk are closed. In the future, particularly looking at the period until 2020, it cannot be expected that the Nadvirna and Drohobych refineries will be relaunched. They are aging facilities with outdated technology. Operating costs are high and the yield from processed raw materials is low. Production in these facilities is not profitable, particularly with the strong competition in Central and East-Central Europe. Without significant investment in modernization, these refineries will not be re-launched. They would not be competitive.

Table 5.20: Capacity of Individual Sections in Relation to the Odessa-Brody Pipeline

Odessa-Brody	Brody-Uzhhorod-Katov	Katov-Litvínov	Adamowo-Płock	Płock-Gdańsk	Płock-Schwedt
9 (14.5)	20	9	10 (30)	27	27

Note: data in million tons per year
Source: T. Vlček

Of the Odessa-Brody pipeline's capacity, 9 million tons of oil may be exported annually. In terms of capacity, there are no limitations on the downstream pipelines, so the entire 9 million tons may also be transported to Slovakia. Thus we arrive at a substitutability potential versus the primary route for Dependant Variable B, taking into account the total Russian oil supplied (once again, a mean of 5.66 million tons per year for the five most recent years) of 159%. This constitutes *essential* substitutability potential. The probability index is high because of the facts described above. We take a negative view on construction of the Brody-Adamowo section, but a route to Slovakia is in place and is in fact already in operation in the northbound direction.

Assessment of the Czech Republic is carried out based upon what we have seen about Slovakia. The substitutability potential versus the primary route for Dependant Variable D (this time with a total volume of Russian oil of 4.302 million tons in 2012) is calculated from the capacity remaining to satisfy Slovak consumption of 3.34 million tons. This comes out to 78% and is therefore of *key* importance. The probability index is also once again assessed as high. If we ignore the security dimension, that is, the need to substitute interrupted supplies via the primary route, the Odessa-Brody Pipeline would be usable—in regular mode—to provide a regular supply of Caspian oil to the CR, as well, provided the tariff is competitive.

If the Brody-Adamowo section is built, it will certainly come later than 2020. But there is a threat at the same time: if construction takes place, the substitutability potential would decrease for both countries, since Poland, a new consumer and exporter, would appear on the route. Poland would possess a large volume pipeline leading to Germany with a capacity of 27 million tons and a second pipeline with a 27 million ton capacity leading to the port of Gdańsk. But there would also be greater route diversification, opening the possibility to receive oil from the port of Gdańsk. Just looking at the map, we may, however, presume that the transit price will not be competitive versus the supply coming through IKL for the CR and through the Odessa-Brody for the SR. Imports from Gdańsk would be of greater interest if a connection existed between Spergau and Litvínov, as we show in the chapter to follow.

Table 5.21: Medium-Term Horizon for the CR and Dependent Variable D (the potential Odessa-Brody-Adamowo-Płock-Gdańsk Pipeline)

${}^{CR}t_1 = 78_{Dp=1}$	The substitutability potential is *key.* The probability index *p* is assessed as *high* because of the facts described for Slovakia and the fact that the CR is the final country on the route.

Source: T. Vlček

Table 5.22: Medium-Term Horizon for the SR and Dependant Variable D (the potential Odessa-Brody-Adamowo-Płock-Gdańsk Pipeline)

${}^{SR}t_1 = 159_{Dp=1}$	The substitutability potential is *essential.* The probability index *p* is assessed as *high*.

Source: T. Vlček

5.6 The Potential Spergau-Litvínov Pipeline

In 2010, a plan to diversify oil supplies arose. It involved building a third oil pipeline in the CR. A proposal was made for Slovakia and Austria to enter into negotiations with the CR to construct a connection from Klobouky u Brna to Schwechat, and somewhat later, the project was seen as a backup in the event the Bratislava-Schwechat Pipeline was not built (Žižka, 2010). A second project called for connecting the refinery in Litvínov to the TOTAL Raffinerie Mitteldeutschland GmbH in Spergau near Leipzig, Germany. Although the project was

introduced by the Ministry of Industry and Trade of the CR, it actually came from MERO ČR, a. s., which is also its promoter. Despite the fact that the project is spoken about as having to do with energy security and fluency of supply, the original notion was not to increase the country's energy security. According to unofficial information, at the time the project was presented, MERO ČR had the option of either paying a dividend to its shareholders or opening a new investment project, thereby keeping the money inside the company.

The aim of the project is to boost the oil security of the Czech Republic in terms of supply routes by connecting the pipeline both to the north branch of the Druzhba Pipeline and to the German oil pipeline network and the ports of Rostock and Gdańsk. The Litvínov-Spergau Pipeline could make the Czech Republic a transit country in the future.

Information exists that indicates the Litvínov-Spergau project was intended to resolve the IKL's lack of capacity; two other variants included connecting to Austria or purchasing shares in the TAL Pipeline (see Leshchenko, undated).

In March 2011, a meeting of representatives ofMERO ČR and TOTAL took place in Prague (see Matocha, 2011). According to unofficial information, however, nothing came out of the meeting, probably due to reasoning put forward by Petr Nečas. In October 2011, Nečas once again came out in support of the project during his visit to Dresden, when he said "the basic consideration for implementing the project is free capacity in the TAL Pipeline. This is estimated at 4 million tons per year, exactly what the Spergau refinery consumes" (see Johnstone, 2011). Although the Prime Minister did not provide precise figures depicting the refinery's needs (see below) he designated the key issue: free capacity on the TAL. As indicated in Chapter 5.2, having satisfied the needs of the CR, that free capacity amounts to approximately 4%, i.e., only 1.72 million tons of oil per year.

In the years since the project was first proclaimed, the likelihood that it will actually be implemented has grown. There was explicit support for it in the latest version of the Czech National Energy Concept ASEK12/2014, where language on infrastructure and international collaboration says the goal is "to support other projects that increase the diversification of oil and oil product supply options to the CR, e.g., (…) the construction of the oil pipeline connection between the Litvínov – Leuna (Spergau) refineries (…)" (see Ministerstvo průmyslu a obchodu, 2014, p. 52).

Table 5.23: The Planned Litvínov – Leuna Pipeline

Source: Matocha, 2011

In October 2013, the project was included on the list of the so-called projects of common interest of the European Union, similar to the Brody-Adamowo Pipeline. This means shorter approval procedures of only 3.5 years and an option to ask for a grant if the project is significant economically and socially but would not be commercially viable (see "*Ropovod z Litvínova do Spergau*", 2013).

The documents speak of a 160 km pipeline with a diameter of 700 mm and indicate that the key prerequisite to implementing the pipeline is increasing capacity on the IKL route between Trieste and Ingolstadt (see Leuschner, 2013; European Commission, 2013). Once the project had been included among EU projects, other interested parties appeared. Poland's PKN Orlen, as the owner of Czech refineries, thinks the project interesting in terms of diversifying the pipelines used by its operations, but it is the Polish pipeline operator PERN which has shown the greatest enthusiasm. The project would loop between the north and south branches of the Druzhba Pipeline and be connected to the ports of Gdańsk and Trieste, and, potentially, to the Odessa-Brody Pipeline, as well (see Duszczyk, 2013). It is interesting that after it had become clear that German refineries may be supplied not only by the capacity of TAL and IKL but also Poland's Gdańsk, TOTAL took an interest in the project (see Duszczyk, 2013). The current capacity of Naftoport, the Gdańsk oil terminal, is 40 million tons of oil per year. In 2013, 8.06 million tons of oil were processed, along with 2.54 million tons of liquid fuel. Furthermore, since March 2014, storage capacity in the port has been increasing (see *Port of Gdańsk*; *PERN S.A.*; *Naftoport Ltd.*). TOTAL is primarily interested in oil from Gdańsk, but the connection to Litvínov would increase the security of supply at the same time it brings new income for oil transport in the CR. And the transport of oil in the CR from Rostock or Gdańsk is the paramount Czech interest in the project.

The interest shown by Poland and reignited in Germany is attributable to the fact that European Union interest projects include, besides the connection between Litvínov-Spergau, increasing the capacity of the Pomeranian Pipeline and TAL.

The capacity of the Pomeranian Pipeline from Gdańsk to Płock is 30 million tons of oil per year. The Płock – Lunow (Polish-German border) section reaches 27 million tons of oil per year. A pipeline leads from Lunow to the Schwedt refinery (22.5 million tons of oil per year) and, finally, Schwedt is connected by a pipeline whose capacity is 13.5 million tons of oil per year, heading to the Spergau refinery. In northern Germany, another oil pipeline is located between Rostock and the Schwedt refinery 9with a capacity of only 6.8 million tons of oil per year.

Table 5.24: Capacity of Individual Sections in Relation to the Litvínov-Spergau Pipeline

Gdańsk-Płock	Płock-Lunow	Lunow-Schwedt	Rostock-Schwedt	Rostock-Schwedt
30	27	22.5	13.5	6.8

Note: data in million tons per year
Source: T. Vlček

The existing capacity on the sections leading from Gdańsk to refineries in Germany suffices to supply Polish and, partially, German refineries. If the Litvínov-Spergau route is built and new demand comes from the CR and SR, capacity will no longer suffice and the pipeline between Gdańsk and Płock will have to be doubled. This step would be compatible with the development of the Odessa-Brody-Płock plan (see "*Action Plan for North-South",* undated, p. 29).

The PCK Raffinerie GmbH refinery in Schwedt has a capacity of 12 million tons and annually processes 10.8 million tons of oil (see *Mineralölwirtschaftsverband e.V.*). Most of this oil is transported from Russia[51] via the north branch of the Druzhba Pipeline and, if necessary, from

[51] Because this is a connection of the farthest points of the Druzhba Pipeline, it is interesting to note that the oil travels to Schwedt three weeks (see *PCK Raffinerie GmbH*).

Rostock[52]. The refinery is owned by Ruhr Oel GmbH (37.5%; the company is owned by BP and Rosneft), Shell Deutschland Oil GmbH (37.5%) and AET-Raffineriebeteiligungsgesellschaft mbH (25%, the company is owned by Eni and TOTAL) (see *PCK Raffinerie GmbH*). TOTAL Raffinerie Mitteldeutschland GmbH Spergau is fully owned by France's TOTAL S.A. and annually processes around 10 million tons of oil (capacity after modernizing the refinery is 12 million tons of oil per year), exclusively transferred via the Druzhba Pipeline (see *TOTAL Deutschland GmbH*). Thus, German consumption of Russian oil is approximately 20 million tons of oil per year.

As Table 5.24 clearly shows, the capacity of the route from Russia fully satisfies the German refineries. If the Litvínov-Spergau Pipeline is built without increasing the capacity on the upstream sections, a maximum of 3.7 million tons of oil per year could be transferred across the border on the Gdańsk – Płock – Lunow – Schwedt – Spergau route if all consumers along the route are satisfied. This means 2 million tons of oil per year will be transported to Schwedt from Rostock and Spergau's capacity will be 10 million tons of oil per year. Although there is free capacity of 4.8 million tons of oil per year on the Rostock – Schwedt section, owing to the limited capacity of the pipeline connecting Schwedt and Spergau, only 1 million tons could be transported to the CR. Thus, without any increased capacity on the upstream sections, only 4.7 million tons could be transferred annually across the Czech-German border. The fact that the Spergau facility has been modernized and increased its operating capacity to two 12 million tons, however, represents a risk. If operation was substantially increased, only 2.7 million tons per year would

[52] In 2010, only 1.9 million tons of oil were transported in the CR (see IEA, 2012a, p. 11).

be left for export to the CR. Similarly, if the PCK Raffinerie GmbH refinery in Schwedt operated at maximum capacity, a further 1.2 million tons would have be deducted. Although the planned capacity of the Spergau and Litvínov connection is not yet been specified, given the information obtained from sources closely acquainted with the issue and because of the planned diameter of the pipeline, capacity of at least 10 million tons of oil per year may be anticipated.

The greatest limitation suffered by this alternative is missing capacity on the Schwedt – Spergau and Rostock – Schwedt sections. This means investments in increasing capacity are necessary to ensure the profitability of the entire project. Unofficial information also points to the fact that the German section badly needs revitalization. The project is also limited by the port of Rostock, because it is too shallow to receive tankers that exceed 50,000 DWT. If capacity is increased on these sections, both the CR and the SR could be supplied with adequate amounts of oil. This demonstrates that merely constructing a pipeline to connect Litvínov with Spergau makes no sense in profitability terms. It will likely be implemented only after it has been confirmed that the stakeholders will invest in increasing the upstream section capacity.

Thus, the entire project closely depends upon an agreement among all three countries taking part in the project. Increasing capacity between Gdańsk and Płock in Poland is contingent upon the presence of consumers (CR and SR) other than Germany along the route. For Germany, sufficient capacity between Gdańsk and Płock is important. It would substitute for supplies coming through the Druzhba when necessary. The CR needs both countries to arrive at an agreement and make adequate diplomatic efforts, and satisfactorily explain the significance of the project to Germany. An expression of interest by Slovakia would also help greatly. This is the only way to connect Litvínov and Spergau and concurrently

increase the capacity on German oil pipelines. Thanks to the relatively short length of the sections, and the intense competition, tariffs may be expected to be competitive.

Russian companies that oppose the diversification projects have also entered the game. Lukoil, Russia and recently OAO Gazprom Neft have shown interest in the German refinery at Spergau, among others. They would like to sell products manufactured there on the Polish market (see Sušanka, 2010; Žižka, 2010; "*Czech Republic: Oil pipeline",* 2010*;* Čarek, 2009). Rosneft has an ownership share in the *PCK Raffinerie GmbH* refinery. The greater the ownership involvement of Russian companies in the refineries indicted, the greater the likelihood they will be supplied with a fluent flow of oil via the Druzhba, and the diversification projects will be placed on the back burner.

And thus we come to the substitutability potential of Dependent Variable E versus the primary route. This time we address the Czech Republic first. Because of the current situation in the oil industry around the world, we will presume that consumption in Spergau will maintain a volume of 10 million tons of oil per year. Given the total supplies of 4.302 million tons in 2012, the substitutability potential amounts to 109%, designated as *essential*. The probability index is again assessed in view of the facts above. It is unreal to expect that all elements of the Gdańsk – Litvínov route will be built by 2020. But it may still be realistic to build a pipeline that connects Litvínov and Spergau because the logic and positive outgrowth of the project are superb. Thus we set the probability index at medium.

For its part, the Slovak Republic finds itself in the reverse situation. Unlike with prior projects, this time it is Slovakia that is position at the end of the route. To supply Slovakia with oil does not represent a technical issue, since putting the reverse flow mode into operation on the Czech section of the

Druzhba could be done in a few months at trivial cost. Nevertheless, although the capacity of the Litvínov – Bratislava route is entirely adequate, after completely satisfying the Czech refineries, only 0.398 million tons of oil per year remains for Slovakia. The substitutability potential of Dependent Variable E, with the total volume of Russian oil supply at 5.66 million tons thus amounts to a negligible 7%, pointing to insignificant substitutability potential. Because of this, the probability index is set at medium, as was the case with the Czech Republic. It must be noted, though, that if the capacity along German pipelines is increased and the Litvínov – Spergau Pipeline is constructed, offering capacity of at least 10 million tons of oil per year, the project could fully satisfy Slovak consumption. Because Slovnaft, a. s., the Slovak refinery, can only process Russian oil, Slovakia would be forced to receive oil either through the North branch of the Druzhba, or via the BTS systems and tankers going to Gdańsk if it was using the Czech-German connection. From Gdańsk, the oil would be transported either across Germany or via the potentially constructed Adamowo-Brody Pipeline.

Table 5.25: The Medium-Term Horizon for the CR and the Dependant Variable E (the potential Spergau-Litvínov Pipeline)

${}^{CR}t_1 = 109_{Ep=2}$	The substitutability potential is *essential.* The probability index *p* is assessed as *medium* owing to support from the EU and the logic of the project.

Source: T. Vlček

Table 5.26: The Medium-Term Horizon for the SR and the Dependant Variable E (the potential Spergau-Litvínov Pipeline)

${}^{SR}t_1 = 7_{Ep=2}$	The substitutability potential is *insignificant.* The probability index *p* is assessed as *medium* owing to support from the EU and the logic of the project.

Source: T. Vlček

5.7 Lobau-Bratislava Waterway

The final dependent variable to be explored is the waterway along the Danube between the ports of Lobau and Bratislava. This variant is mentioned in the Slovak energy security strategy. The waterway was tested in the 1970s, when oil was transported from Trieste through the TAL and AWP to the Lobau terminal, and from there along the Danube to Bratislava. (Ministerstvo hospodárstva SR, 2008, p. 44)

The oil terminal of Lobau is located on the Danube near Schwechat, Austria and takes in an area of 196 hectares. It is connected to the Schwechat refinery via a product pipeline. Each year, 1200 river tankers are berthed there and more than 1.2 million tons of oil product are handled (see *Wiener Hafen, GmbH & Co KG*; *Via Donau – Danube Ports Online*; *Standort Wien*). The Lobau terminal was completed in 1941. It was built as a Central European port for both oil and coal. From there, the raw materials would be transported via the Danube-Morava-Oder-Elbe canals. But only a shoulder of approximately 7 km at Lobau was constructed. The port is operated by OMV R&M GmbH, and therefore has ownership ties with OMV *Raffinerie Schwechat* outside Vienna.

Pálenisko, in the port of Bratislava, is used for reloading liquid, and can receive river tankers whose loading capacity ranges between 600 and 1200 tons.[53] Currently, oil products from Slovnaft a. s. are reloaded here using a product pipeline that leads from the refinery directly to vessels with no interim storage (see *Slovenská plavba a prístavy a. s.*). The port is owned and operated by Slovenská plavba a prístavy a. s. (87% owned by Dunajservis Slovensko, s. r. o., 7.01 by Budamar Transport Limited and other shareholders) and its subsidiary DALBY a. s.

[53] The average capacity of river tankers recalculated for the entire length of Danube is 2000 tons (see Via Donau – Donauschifffahrt).

The Danube is the longest river in Europe, crossing ten countries and connecting the North Sea via the Rhine to the Black Sea. But in spite of this, operations on the river are at quite a low level—merely 10% of maximum capacity (see Radojcic, 2012, p. 1). Seven sections of the river regularly depths under the 2.5 m necessary to be designated an international waterway. Because of the clogged riverbed, river cargo boats are often loaded only halfway, to allow them to proceed safely, boosting costs and making for late deliveries (see Trejbal, 2012). But the Danube also reaches high water levels; it has done so frequently in recent years, and this is a consistent problem (see Hrančík, 2012, p. 40).

Table 5.27: Middle Branch of the River Danube

Source: Academic Dictionaries and Encyclopaedias

In the oil sector, the river ports indicated above are used to export refinery products. In 2010, the Austrian section of the River Danube transported 2.15 million tons of oil product, i.e., 19.5% of the total volume of goods transported (see *Via*

Donau – Donauschifffahrt). Given the average capacity of vessels—2000 tons— this figure corresponds to 1100 vessels. It the total operation of the River Danube reaches but 10% of its capacity, the transportation of oil products or crude oil may significantly increase, as well. This, however, is an entirely theoretical variant. The route is not used for oil and the Bratislava port technology would have to be modified to receive crude oil. (Currently, the reloading facility allows diesel and petrol to be tapped. Other issues include the costs for constructing the additional infrastructure, eliminating risks related to the potential contamination of groundwater and the environment, since the entire route goes through Donau-Auen National Park. Other issues include ecological aspects of oil transshipment points, agreement by Austria, etc. The shallow river bed between Vienna and the Austria-Slovakia border is another issue. It limits vessel dive and thereby operation. A solution has been sought since 2004. (For details, see Danube Inland Harbour Development, 2012, pp. 12–13).

This project, like the BSP is a downstream continuation of AWP. As noted above, latter pipeline's entire capacity targets the Schwechat refinery and there is zero free capacity. The only variant that might be considered is that indicated in Chapter 5.4: should Russian oil be supplied to Schwechat via BSP and not AWP, this would free up capacity in the AWP section equal to the volume of the Russian oil flowing through the new route. The list that follows is therefore unfortunately only tentative, and contains a fair amount of guesswork. If we make a qualified guess that, given that the performance of the Bratislava port pumps is 500 m³/hour, the port could re-pump 0.5 million tons per hour[54]. In other words, a river tanker carrying 1200 tons anchored in Bratislava could be

[54] Although oil is lighter than water, we swapped their physical characteristics in the tentative calculation indicated.

unloaded in 2.4 hours. If we add in the time necessary to exchange vessels and provide for other operating and preparatory time, the port would theoretically be able to re-pump up to 8 tankers per day, i.e., 2900 tankers per year, adding up to 3.5 million tons of oil per year. Thus, if we leave out emergency situations and lack of capacity involving the AWP, the substitutability potential for Dependant Variable F versus the primary route, given 5.66 million tons per year of Russian oil, would be 62%.

Because of how the study has been set up, however, the capacity of AWP must also be taken into account. For Slovakia, the substitutability potential versus the primary route for Dependant Variable F is 0%, and the same is true for the Czech Republic, which lies downstream of Slovakia. The oil would therefore have to be reloaded into the Druzhba Pipeline. The AWP thus represents *insignificant* substitutability potential for both countries. Furthermore, because of the capacity problems indicated and the current condition of the infrastructure, implementation of the entire project is highly unlikely.

Table 5.28: Medium Horizon for the CR and Dependant Variable F (the Lobau-Bratislava Waterway)

${}^{CR}t_1 = 0_{Fp=3}$	The substitutability potential is *insignificant.* The probability index *p* is assessed as *low*.

Source: T. Vlček

Table 5.29: Medium Horizon for the SR and Dependant Variable F (the Lobau-Bratislava Waterway)

${}^{SR}t_1 = 0_{Fp=3}$	The substitutability potential is *insignificant.* The probability index *p* is assessed as *low*.

Source: T. Vlček