IN DEFENSE OF THE REALM: RUSSIAN ARMS TRADE AND PRODUCTION IN THE SEVENTEENTH AND EARLY EIGHTEENTH CENTURY

J. T. Kotilaine

This article examines one of the key challenges of Russian economic and military policy in the early modern period, that of developing a secure supply of weapons for the country's army. Throughout its long land border in Europe, Muscovy was flanked by aggressive neighbors intent on expanding into its economically and strategically important borderlands. As a country with basically no natural borders, Russia needed to devise new ways of mobilizing its limited economic resources to contain these increasingly aggressive incursions. The magnitude of the task ahead, and Russia's relative backwardness compared to her Western rivals, became obvious during the Time of Troubles when the country's leading cities—Moscow and Novgorod—fell temporarily into foreign hands.

The early modern era marks an important transition in Russian defense policy. Instead of the highly mobile mounted enemy of the steppes, Russia increasingly had to contend with the latest European weapons technology. In response, Muscovy needed to create a more or less standing army that could be mobilized with relative ease. Yet the challenge of equipping this force was a great deal more daunting in Russia than in either Sweden or Poland-Lithuania. At the beginning of the seventeenth century, Russia had practically no domestic metal industry. All domestic iron came from swamp ore and was neither voluminous nor high-grade enough to produce reliable weaponry. Muscovy was thus forced, in the first instance, to import an adequate volume of either weapons or inputs for their production. The long-term objective was to promote the development of domestic metal production, and—ultimately—to create a Russian arms industry. This paper seeks to demonstrate that late Muscovy made significant headway toward meeting both of these goals, though Russian metals and arms production never reached a sufficient scale to make the country independent of foreign imports during the period reviewed here.

Russian weapons trade has not been the subject of a systematic treatment to this day, in spite of the fact that there exists a great deal of both published and unpublished material on it. The most important recent secondary contributions are by T. Esper, N. N. Repin, A. V. Demkin, V. N. Zakharov, and J. W. Veluwenkamp.[1] There exists a more substantial literature on various aspects of early industrialization in Russia.[2]

Metal and Arms Imports

Military considerations played a central role in Russian trade policy. Efforts to secure firearms supplies were of necessity a permanent element of Muscovite commercial diplomacy and merchants who ventured out of the country, especially into Swedish possessions, could always rely on a guaranteed demand for goods deemed to be of military importance. Russian imports for military purposes fell into three broad categories:

1. Metals. Large quantities of copper and iron were required in arms production: "A large cannon . . . required between three and four tons of bronze. The carriage and accessory devices needed

---

[1] Thomas Esper, "Military self-sufficiency and weapons technology in Muscovite Russia," *Slavic Review* 28 (1969), 185–208; Nikolai Nikolaevich Repin, "Vneshniaia torgovlia cherez Arkhangel'sk i vnutrennyi rynok Rossii vo vtoroi polovine XVII-pervoi chetverti XVIII vv." (Candidate of Sciences diss., Moskovskii gosudarstvennyi universitet, 1970); Nikolai Nikolaevich Repin, "Vneshniaia torgovlia Rossii cherez Arkhangel'sk i Peterburg v 1700-nachale 60-kh godov XVIII v." (Doctor of Sciences diss., Akademiia nauk SSSR, 1985); Andrei Vladimirovich Demkin, *Zapadnoevropeiskoe kupechestvo v Rossii v XVII v.* (Moscow: Rossiiskaia Akademiia Nauk, Institut Rossiiskoi Istorii, 1994); Viktor Nikolaevich Zakharov, *Zapadnoevropeiskie kuptsy v Rossii: epokha Petra I* (Moscow: ROSSPEN, 1996); Jan Willem Veluwenkamp, "De Nederlandse wapenhandel op Rusland in de zeventiende eeuw," *Armamentaria* 31 (1996), 71–76. Jan Willem Veluwenkamp, *Archangel: Nederlandse ondernemers in Rusland 1550–1785* (Amsterdam: Uitgeverij Balans, 2000).

[2] Petr Ivanovich Liashchenko, *Istoriia narodnogo khoziaistva SSSR*, vol. 1, 4th ed. (Moscow: Gosudarstvennoe Izdatel'stvo Politicheskoi Literatury, 1956); Pavel Grigor'evich Liubomirov, *Ocherki po istorii russkoi promyshlennosti* (Moscow: Gospolitizdat, 1947); Fedor Iakovlevich Polianskii, *Pervonachal'noe nakoplenie kapitala v Rossii* (Moscow: Izdatel'stvo sotsial'no-ekonomicheskoi literatury, 1958); Stanislav Gustavovich Strumilin, *Ocherki ekonomicheskoi istorii Rossii* (Moscow: Izdatel'stvo sotsial'no-ekonomicheskoi literatury, 1960); Elizaveta Ivanovna Zaozerskaia, *U istokov krupnogo proizvodstva v russkoi promyshlennosti XVI–XVII vekov: K voprosu o genezise kapitalizma v Rossii* (Moscow: Izdatel'stvo "Nauka," 1970); Joseph Theodore Fuhrmann, *The Origins of Capitalism in Russia: Industry and Progress in the Sixteenth and Seventeenth Centuries* (Chicago: Quadrangle Books, 1972).

between 4,500 and 5,000 pounds of iron. And a medium-sized cannon ball weighed from 25 to 30 pounds, a large one weighing up to 120 pounds."[3] Production of cast-iron cannon became a high priority for the Russian government in the seventeenth century, since they were far superior to forged-iron cannon in terms of durability and labor-costs and far cheaper than bronze cannon.[4]

2. Chemical products, most notably gunpowder, but also sulphur and saltpeter which were key inputs in powder production.

3. Finished weapons, mainly muskets, carbines, harquebuses, and pistols.

Three main categories of people supplied military equipment. Firstly, the government customarily relied on the so-called "Muscovite foreigners" (*moskovskie inozemtsy*) who were often specifically dispatched abroad for this purpose, especially during major armament campaigns.[5] Secondly, Russian diplomats were frequently given instructions to acquire weapons and they often used military supplies as a bargaining chip in negotiations on other issues. Finally, there were foreign merchants operating in Russia, the most important category. Several of them were commissioned by the Tsarist government to purchase military equipment in the West, something that carried important rewards. Merchants could expect special passes to operate in the Russian interior, instead of being confined to designated border towns, especially Arkhangel'sk. Similarly, they could expect preferential treatment in purchasing goods from the Treasury, etc.

Most foreign weaponry reached Russia via the White Sea port of Arkhangel'sk which, until the 1720s, constituted the leading center of Russian foreign trade. Dutch merchants were, by the early seventeenth century, the largest group of foreigners active on the Muscovite market and they accounted for the vast majority of Western weapons imports to Russia. Initially, the English also played an important role but over time, northern German merchants of Hamburg and Bremen established themselves as the second most important group.

---

[3] Esper, "Military self-sufficiency," 194.

[4] Ibid., 199.

[5] The Muscovite foreigners were Westerners who had taken up permanent residence in Muscovy and granted special privileges by the Russian government. Thanks to their knowledge of the West and language skills, they often played an important part in Russian trade and diplomacy.

Armaments trade was an important part of Dutch-English commercial rivalry in the early part of the seventeenth century. One of the main reasons for the special privileges of the English Muscovy Company in the late sixteenth–early seventeenth century was the Company's role in supplying the Muscovite government with firearms. The Company viewed the vagaries of the Time of Troubles as an opportunity to regain favor with the Russian authorities and may have been the leading arms supplier at least during some of this period.[6] After the initial dislocations of the Polish invasion, the Dutch were also able to capitalize on the warring parties' need for weapons by selling large quantities of lead, gunpowder, etc.[7]

In 1617, the English supplied the government with R 3,032 worth of gunpowder which had been purchased in Hamburg. Two years later, the Company imported 494 musket barrels worth R 370. Apparently, however, this fragmentary data constitutes part of a general decline in English arms supplies to Russia, something that became one of the main sources of tension in the two countries' relations in the post-*Smuta* years. The Russian government wrote to the English ambassador Christopher Cox in May 1624 complaining that "The English merchants did bring heretofore into the Empire of Russia ordinance to sell, and munition, as pouder, Brimstone, and Saltpeeter, but nowe there is none of this brought, but that litle they doe bringe is sould at double price."[8]

Table 22: Arms Imports from Europe through Arkhangel'sk in the 1620s and Early '30s

Date	Source	Goods supplied	Approx. value, R
1626	5 Dutch merchants	196 *pud* copper,	902
	1 Hamburg merchant	Iron	1,643
	2 Dutch merchants	403 *pud* sulphur (*sera goriachaia*)	241
	Russia Company (England)	118 *pud* tin	475
		Copper	1,441

[6] For more details on the rivalry, see: Anatolii Nikolaevich Ivanov, "Anglo-gollandskoe torgovoe sopernichestvo na russkom rynke (1587–1633 gg.)" (Candidate of Sciences diss., Moskovskii gosudarstvennyi pedagogicheskii institut, 1964).

[7] Indeed, a March 24, 1614 resolution of the States-General made a special commitment to support the new Russian government by selling them weapons and gunpowder. Ven'iamin A. Kordt, *Ocherk snoshenii Moskovskago gosudarstva s Respublikoi soedinennykh Niderlandov po 1631 god* (*Sbornik imperatorskago istoricheskago obshchestva*, vol. 116) (St. Petersburg, 1902), LXXXI.

[8] Public Record Office (PRO) SP 91/2, fol. 98^{v}.

Table 22 (*cont.*)

Date	Source	Goods supplied	Approx. value, R
1630	Russia Company (England)	708 *pud* tin	3,118
	The Netherlands, Hamburg	Iron	374
	Karel du Moulin (Netherlands)	4,000 *pud* copper, 4,000 *pud* Swedish iron, 1,500 *pud* sulphur	21,075
	David Ruts (Netherlands)	4,000 *pud* iron, 1,500 *pud* copper	4,200 c. 20,000
	Alexander Leslie, Paul de Willem, Jan van Lier (Netherlands)	2,000 swords, 750 pairs pistols, 5,000 muskets, 2,000 suits of armor, 100,000 lbs matches, 500 carbines, 2,000 partisans and halberds	
1631	Thomas Wich (England)	2,000 muskets	
	Karel du Moulin (Netherlands)	20,000 *pud* iron, muskets	
	Thomas de Swaen (Netherlands)	50,000 muskets, partisans, halberds, pistols, etc.	
1631–32	du Moulin, Ruts (Netherlands)	Iron: 5,000 *pud* (1631), 25,000 *pud* (1632)	17,929
1632	John Cartwright (England)	5,000 swords	5,000
1633	John Cartwright (England)	2,000 swords, 1,000 muskets, 3,000 cartridges, 1,000 bolts, 600 pairs of pistols, 400 pairs of barrels	
	Elias Trip, Thomas de Swaen (Netherlands)	10,000 *pud* gunpowder, 15,000 iron cannon balls, 3,000 saber belts (contract)	
1634	Thomas de Swaen (Netherlands)	12 copper cannon, 58,300 iron cannon balls, 141 partisans (from Trip's contract), 301 halberds	
1636	Zacharias Zachariasz (Netherlands)	30–42(?) cannon (based on a 1634 contract by Trip to deliver 72 cannon)	

(Source: Demkin, *Zapadnoevropeiskoe kupechestvo* 2, 42–3, Veluwenkamp, *Archangel*, 82, 93, 95)

As is shown by the available data in Table 22, the Dutch rose in the 1620s to fill the vacuum left by the Muscovy Company and tapped a growing market as the fiscal consolidation of Muscovy after the *Smuta* permitted a gradual military buildup. The disparity became all the more pronounced by the early 1630s as Muscovy began to prepare for its war of conquest against Poland-Lithuania which had (re)claimed the Principality of Smolensk during the Time of Troubles. Starting in 1630, the Russians began to create regiments of a new kind equipped in the West European fashion and trained by Western specialists.[9]

Equipping the army of 92,555 for a war anticipated after the expiry of the Truce of Deulino in 1633 imposed a serious strain on the Muscovite treasury which was still recovering from an unprecedented fiscal calamity.[10] Fortunately for the cash-stripped state, large-scale grain sales became an important component of Russian foreign trade in the late 1620s–early 1630s. Following accelerating grain price inflation in Western Europe, especially in 1630–31, Dutch and English efforts to gain access to the Russian market grew increasingly frantic. The Dutch sent their first formal embassy to Russia (Albert Koenraadsz Burgh and Johan Veltdriel, 1630–1) and made repeated official requests for grain sales. Karel du Moulin—a leading arms supplier—was among the Dutch merchants to receive permission to export 80,000 *chetvert'* of Treasury grain.[11]

Muscovite policy makers were clearly determined to exploit this Western interest in their favor. Grain sales were accompanied by elaborate diplomatic negotiations and the Westerners were made to see that strategically important supplies could work in their favor. The Dutch even proposed creating a monopoly of grain and saltpeter exports, for which they would pay with finished armaments. In 1631, the English gave the government 2,000 muskets for 30,000

---

[9] Robert I. Frost, *The Northern Wars: War, State and Society in Northeastern Europe, 1558–1721* (Harlow: Longman, 2000), 143.

[10] Anatolii Vasil'evich Chernov, *Vooruzhennye sily Russkogo gosudarstva v XV–XVII vv.* (Moscow: Voennoe Izdatel'stvo Ministerstva Oborony Soiuza SSR, 1954), 130–31.

[11] Kordt, *Ocherk snoshenii Moskovskago gosudarstva s Respublikoi soedinennykh Niderlandov po 1631 god*, CLXXXII–CLXXXIII; *Sbornik Imperatorskago Russkago istoricheskago obshchestva*, CXVI, 64, 147, 149–50, 188–90; Nicolaas Wilhelmus Posthumus, *Inquiry into the History of Prices in Holland*, 1 (Leiden: E. J. Brill, 1946), 19–20; Maria Bogucka, "Zboze rosyjskie na rynku amsterdamskim w pierwszej polowie XVII wieku," in *Przeglad Historyczny* 53 (1962), 3.

chetvert' of grain which Thomas Wich of the Muscovy Company was allowed to export.[12] In addition, Sweden, seeking support in the Thirty Years' War, supplied at least 10,000 muskets and undoubtedly also iron and copper, 10 bronze cannon and 2,000 muskets were donated in 1635.[13]

The total value of Muscovite arms purchases almost certainly reached at least R 50,000, which would have been at least one-fifth of the total value of Arkhangel'sk's annual imports at the time. Even spread over a couple of years, this represented a considerable financial sacrifice for the government. Large-scale grain sales made it possible to finance these purchases without straining the Treasury to the limit. It is tempting to consider a possible relationship between grain exports and the timing of the Muscovite offensive. While the available sources shed little light on this issue, we can assume that, without the additional revenue generated by grain, it would have been difficult to bring the planned offensive forward to 1632 when Zygmunt's death provided an unexpected opportunity.

A relative lull followed after the war, but arms imports still continued with the Dutch now ever more dominant. Hendrik van Ringen sold 30,000 *pud* of iron cannon balls in 1635–37. He, with two partners, supplied guns, carbines, pistols, muskets, and lead in 1636, whereas T. de Swaen delivered 30 cannon. Tielmans Akkema imported 5,000 swords in 1640, followed by 6,000 musket barrel the year after. In 1643, Peter Marselis visited Poland for the purpose of buying saltpeter and a year later, he shipped 10,000 muskets from Denmark to Arkhangel'sk. In 1643, de Swaen delivered 4,000 swords as did Marselis the year after.[14] The hypothesis of a link between grain trade and military purchases is further supported by data from the 1640s. Coenraet Burgh, heading a Dutch embassy to Russia in 1647–8, proposed an arrangement under which the Dutch would have exported grain and saltpeter in exchange for arms and munitions. Not faced with a military emergency, Aleksei Mikhailovich diplomatically promised to consider the offer at a later date.[15]

---

[12] Ivanov, "Anglo-gollandskoe torgovoe sopernichestvo," 346.

[13] Esper, "Military self-sufficiency," 205; RGADA f. 96, 1639g., No. 2, fols. 236–9; No. 3, fol. 1.

[14] Demkin, *Zapadnoevropeiskoe kupechestvo*, 2, 43; Veluwenkamp, Archangel, 97.

[15] Mikhail Ivanovich Belov, "Niderlandskii rezident v Moskve Baron Iogann Keller i ego pis'ma" (Candidate of Sciences diss., Leningradskii gosudarstvennyi universitet, 1947), 133–4.

A new series of purchases starting in 1647 effectively marked the beginning of another major round of import-led armament in connection with the Thirteen Years' War.[16] In 1653, a number of Muscovite foreigners and Russian officials were sent to the West to buy weapons. These included Andries Winius and russian officials, Ivan Marsov, Roman Boldinov, Joost van Kerckhoven, as well as Scribe Golovnin and interpreter Deriabin—the latter three with a brief to acquire 20,000 muskets, gunlocks, and 30,000 *pud* gunpowder and lead. Sweden supplied 20,000 muskets, and weapons were also imported from Germany.[17] Muscovite foreigners Andries Winius and Ivan Eremeeu Marsov traveled to the Netherlands in 1653 to buy weapons (20,000 muskets) and cloth for army uniforms. They were ultimately permitted to export 12,000 cuirasses and 10 *pud* lead bullets, but no gunpowder. The first wares reached Arkhangel'sk in 1654 when, during his visit to Arkhangel'sk, William Prideaux witnessed the arrival of 300 barrels of munitions from the Netherlands. In 1655, Jacob Westhof—a Musovite foreigner—was dispatched abroad for the purpose of selling Treasury grain, potash, and train oil in exchange for military supplies. *Stol'nik* Ivan Amirev sailed off on a mission to acquire 20,000 muskets. All the Russian requests were met by the dutch States-General.[18]

Table 23: Muscovite Arms Imports through Arkhangel'sk in the late 1640s–60s

Date	Source	Goods supplied	Approx. value, R
1647		5,000 muskets, 2,721 musket barrels, 2,267 carbines, 1,344 carbine barrels, 2,348 pairs of pistols, 12,578 swords, etc.	40,000+[a]

[16] For background details, see a recent treatment in: Henadz' Sahanovich, *Neviadomaia vaina* 1654–1667 (Minsk: "Navuka i tekhnika," 1995), 10.

[17] Sahanovich, *Neviadomaia vaina*, 10; Erik Amburger, *Die Familie Marselis: Studien zur russischen Wirtschaftsgeschichte* (Giessen: Wilhelm Schmitz Verlag, 1957), 117; RGDA f. 50, op. 1, 1653g., Nos. 2, 3, 7.

[18] Stefan Troebst, *Handelskontrolle—"Derivation"—Eindämmung: Schwedische Moskaupolitik 1617–1661* (Wiesbaden: Harrassowitz Verlag, 1997), 411. Troebst further provides data on Swedish reports of these supplies. Demkin, *Zapadnoevropeiskoe kupechestvo* 2, 43; Belov, "Niderlandskii rezident", 136.

Table 23 (*cont.*)

Date	Source	Goods supplied	Approx. value, R
1654	The Netherlands	4,014 swords, 1,163 suits of infantry armor, 528 carbines, 539 pairs of pistols, 1,410 pairs of holsters; 25 chests and 5 barrels of weapons	
1655	Ivan Amirev, Hendrik Bos	20,000 muskets (petition to the States-General)	
1656	Ivan Marsov (Netherlands)	4 pairs of pistols, 117 carbines	
1658	John Hebdon (Netherlands)	17,344 muskets, 1,059 barrels of gunpowder, three boxes of protazany	
1659	H. Swellengrebel (Netherlands)	1,000 pairs of pistols	2,300
		2,500 muskets	3,250
	Swellengrebel, Van Sweeden (Netherlands)	2,000 pairs of pistols	
1660	J. van Sweeden (Netherlands)	6,000 muskets, 1,000 pairs of pistols, 1,000 carbines, 1,000 swords, 1,000 suits of armor	13,200
	Swellengrebel, Van Sweeden (Netherlands)	20,000 muskets, 6,000 carbines, 6,000 pairs of pistols	
	Swellengrebels (Netherlands)	12,500 muskets, 2,225 carbines, 2,049 pairs of pistols	24,578
	H. Swellengrebel (Netherlands)	15,000 carbines, 15,000 pairs of pistols, 5,000 muskets (contract)	65,000
	John Hebdon (Netherlands)	12,800 muskets	10,249
		4,566 *pud* gunpowder	15,068
1661	Swellengrebel, Van Sweeden (Netherlands)	10,000 carbines, 10,000 pairs of pistols	
	J. & R. Hebdon (Netherlands)	muskets	36,200

Table 23 (*cont.*)

Date	Source	Goods supplied	Approx. value, R
1662	H. Swellengrebel (Netherlands)	3,000 carbines, 3,000 pairs of pistols, 5,000 muskets+	21,165+
	Swellengrebel, Van Sweeden (Netherlands)	8,602 pairs of pistols, 8,602 carbines, 8,500 muskets	
	Swellengrebel (Netherlands)	1,000 carbines, 1,000 pairs of pistols	
1663	John Hebdon (Netherlands)	gunpowder	18,690

[a] Estimated based on the median value reported in: Richard Hellie, *The Economy and Material Culture of Russia: 1600–1725* (Chicago: The Univesity of Chicago Press, 1999) 232–33.
(Source: Petr Pavlovich Epifanov, "Uchenie i khitrost' ratnogo stroeniia pekhotnykh liudei," *Uchenye zapiski kafedry istorii SSSR MGU* 167 (1954), 85; Sahanovich, *Neviadomaia vaina* 10; Demkin, *Zapadnoevropeiskoe kupechestvo* 2, 43–4; Repin, "Vneshniaia torgovlia," 272–73; Nikolai Nikolaevich Bantysh-Kamenskii, *Obzor vneshnikh snoshenii Rossii (po 1800 god)* 1 (Moscow: Tipografiia E. Lissnera i Iu. Romana, 1894), 184–85; Natal'ia Apollinar'evna Baklanova, "Privoznye tovary v Moskovskom gosudarstve vo vtoroi polovine XVII v.," *Trudy Istoricheskogo muzeia* 8 (1928), 72).

In 1658–60, the Russian government chose a different tack. It appears to have turned almost exclusively to foreign merchants and concluded contracts with three Dutchmen and one Englishman.[19] In 1658, John Dumble was engaged to buy or order weapons in England. In 1659, an agent, Torms, and a Dutch-man, Johan van Sweeden, were dispatched to the West to buy muskets and sabers. Even Novgorod *Gost'* Petr Mikliacv appeared before the States General to purchase 100 cannon, guns, and pistols.[20] In 1659–62, Van Sweeden and his compatriot Hendrick Swellengrebel emerged as the leading suppliers of Western weaponry to Russia.

Even as foreign merchants dominated weapons supplies, the tsar's special commissar, John Hebdon, also acquired large quantities of

[19] Demkin, *Zapadnoevropeiskoe kupechestvo*, vol. 2, 43.
[20] Ibid.

military supplies in the Netherlands.[21] In 1660, Hebdon dispatched western weapons from Arkhangel'sk to the De Vogelaer brothers in Moscow. In 1661, he operated with his son Richard instead and dispatched muskets from the Netherlands.[22] In 1663, Hebdon bought gunpowder from the Netherlands.[23]

The volume of known military imports can be compared against weapons distributed by the Russian arms office before the Lithuanian campaign: 31,464 muskets, 5,317 carbines, and 4,279 pairs of pistols, which left reserves of 10,076 muskets and 12,998 gun barrels.[24] The reliance on Western weaponry was extremely high and, in 1660–1 alone, Russian arms imports from the West attained well over R 100,000. At the time, this would have been at least 15 percent of the total value of Arkhangel'sk's exports and probably one-quarter of the total imports. Even more than with the Smolensk War, it is possible to speak of large-scale mobilization of very limited financial resources. The Russian dependence on foreign arms imports may have reached its peak in the 1650s and 60s, which was marked by protracted warfare and still very little domestic production of either metals of weapons.

As in the 1630s, the Muscovite government once again had the good fortune of being faced with a dramatic increase in the Western demand for grain. Prices at the Amsterdam Bourse peaked in 1648–53 and shipping from Arkhangel'sk experienced a protracted boom between 1650 and 1666. Grain exports were clearly the driving force behind the boom, their total value equaling some R 250,000, or some one-fifth of the total, around 1653.[25] Indeed, Tsar Alcksei Mikhailovich repeatedly authorized large-scale sales of grain, potash, and other goods in return for western arms and munitions. The remarkable correlation between grain sales and military need is much

---

[21] Baklanova, "Privoznye tovary," 72; Demkin, *Zapadnoevropeiskoe kupechestvo*, vol. 2, 43–44.

[22] Il'ia Iakovlevich Gurliand, *Ivan Gebdon: Kommissarius i rezident (Mater'ialy po istorii administratsii Moskovskogo gosudarstva vtoroi poloviny XVII veka)* (Iaroslavl': Tipografiia Gubernskogo Pravleniia, 1903), 21, 26.

[23] Demkin, *Zapadnoevropeiskoe kupechestvo*, vol. 2, 44.

[24] Iurii Vasil'evich Arsen'ev, *K istorii Oruzheinago prikaza v XVII veke* (St Petersburg: Tipografiia P. P. Soikina, 1904), 143–44.

[25] Posthumus, *Inquiry into the History of Prices in Holland*, 1, 19–20; J. T. Kotilaine, "Quantifying Russian Exports via Arkhangel'sk in the XVIIth Century," *The Journal of European Economic History* 28 (1999) 2, 250, 260; Riksarkivet (Swedish National Archive) Muscovitica, vol. 601; Belov, "Niderlandskiirezident," 137.

stronger than the relationship between grain exports and prices in Amsterdam. The opportunity to export grain throughout the period of war preparations and the subsequent campaigning afforded, once again, a way of shouldering an enormous fiscal burden.

Table 24: Arms Imports through Arkhangel'sk in the Closing Decades of the Seventeenth Century

Date	Source	Goods supplied	Approx. value, R
1670	Willem de Hartuch (Netherlands)	475 carbines, 475 pistols	487
1671	Daniel Hartman (Netherlands)	arms	
1680		7,318 *sluzhby*, 7,318 pairs of holsters, 7,318 *pereviazi s kriuki*	14,713
1681	Heinrich Butenant (Hamburg)	2,611 complete sets of cavalry equipment (each inc. a carbine and a pair of pistols)	
	Egidius Tabbert (Netherlands)	800 muskets, 1,800 sets of cavalry equipment 1,500 musket, pistol, and carbine bolts	8,565
1682	Egidius Tabbert (Netherlands)	4,000 Spanish musket bolts	2,000
1678–82	Daniel Hartman (Netherlands)	pistols, carbines, muskets	42,175
1687	Egidius Tabbert (Netherlands)	2,087 pud sulphur	1,662
1688	Thomas Kelderman (Moscow)	2,000 sets of cavalry equipment	(8,500)
1689	Thomas Kelderman (Moscow)	100 sets of cavalry equipment	427
	Egidius Tabbert (Netherlands)	carbines, harquebuses, pistols	2,930
1687–89	Daniel Hartman (Netherlands)	600 muskets	960
		1,000 suits of armor	8,525
1690	The Netherlands	2,000 carbines and pistols	
	D. Hartman and E. Tabbert	muskets	36,000

Table 24 (*cont.*)

Date	Source	Goods supplied	Approx. value, R
1698	Egidius Tabbert (Netherlands)	10,000 pud lead (for the Cannon Chancellery)	
1695–99	Andries Brest (Netherlands)	13,000 muskets	
	D. Hartman (Netherlands)	3,500 muskets	
	Rudolf Meijer (Netherlands)	5,625 muskets	
	A. Dix and E. Tabbert (NL)	1,000 muskets	
	B. Andrews	800 muskets	
	P. Westhof	2,100 muskets	
1700	Christoffel Brants (Netherlands)	3,997 muskets	4,796
	Zacharias Dix (Netherlands)	10,000 bayonet blades	1,600

(Source: Repin, "Vneshniaia torgovlia cherez Arkhangel'sk," 272; Demkin, *Zapadnoevropeiskoe kupechestvo* 2, 44–45; Mikhail Ivanovich Belov, "Rossiia i Gollandiia v poslednei chetverti XVII v.," in *Mezhdunarodnye sviazi Rossii v XVII–XVIII vv. (ekonomika, politika i kul'tura): Sbornik statei*, ed. Liubomir Grigor'evich Beskrovnyi, (Moscow: Izdatel'stvo "Nauka," 1968), 72; RGADA f. 50, op. 1, 1687 g., No 3, l. 66)

Weapons imports continued, albeit on a smaller scale, after the Andrusovo peace with a small number of Western merchants again dominant as suppliers. The Hamburg merchant Heinrich Butenant von Rosenbusch brought arms to Russia in 1679–80, the Dutchman Daniel Hartman in 1691 and 1696, Hart's son-in-law Andries Brest in the closing years of the century, the Dutchman Egidius Tabbert in 1687 and 1696, etc.[26] Following a marked diplomatic rapprochement since 1685, Dutch and Russian strategic interests coincided around the beginning of the 1690s as damage suffered by Dutch ships in the Mediterranean prompted Amsterdam merchants to support Russian in her war against the Ottoman Empire. The 2,000 carbines and pistols exported by Thomas Kelderman and Ivan Pankrat'ev (Table 24) appear to have been a direct response to this.[27]

[26] Repin, "Vneshniaia torgovlia," 272.
[27] Belov, "Niderlandskii rezident," 220; RGADA f. 50, op. 1, 1690 g., no. 4, ll. 1–2.

The steady military buildup in the 1690s was followed by a further expansion during the Great Northern War (Table 25). The conflict, which was eventually to fundamentally alter the balance of power in the Baltic region, initially revealed the limited capacity of the domestic arms industry, as well as the vulnerability of the Russian army to sudden reversals of fortune, such as the 1700 defeat at Narva which left them with little military hardware to fall back on. At the beginning of the eighteenth century, a Dutch merchant, Jan Lups, supplied Russia with 19,213 rapier blades, 67,792 musket locks, 7,116 pairs of pistols, 11,546 muskets with bayonets, 3,000 regular muskets, 750 dragoon carbines, 12,098 musket barrels, 13,000 dragoon broadswords, and 6,900 blades.[28] Lups, along with Christoffel Brants, appear to have been the leading, and at times the only, foreign supplier of weapons to the Russian army. In 1706, he supplied weapons worth R 54,000, to be followed by R 176,639 worth over the ensuing two years. In 1709, Lups undertook to supply standardized muskets for which he received R 44,705.91 in 1710, along with R 15,652 for other weapons. In 1712, Lups' sales were down to R 31,253 and apparently he stopped importing weapons by 1714.[29] In 1710, metal and metal products made up 50 percent of the R 322,984 worth of goods acquired by the Treasury. In 1711, metals and metal products accounted for 65.1 percent of such purchases (R 89,200). By 1712, their share already stood at 86 percent (R 124,600).[30] Data on Arkhangel'sk's metal imports is presented in Table 26.

While Arkhangel'sk was the absolutely dominant center of arms trade, the Baltic region played an important secondary role. Northwestern Russian merchants regularly supplied the Cannon Chancellery with Swedish iron. Indeed, metals—almost entirely copper and iron—accounted for virtually all Russian imports from Stockholm. During periods of Russian-Swedish rapprochement, most notably in the 1630s,

---

[28] The total value of these deliveries was at least R 51,363, since in 1706 Lubs and Dicks were commissioned to purchase weapons for R 25,463, to which R 25,900 was to be added. Repin, "Vneshniaia torgovlia," 278.

[29] Repin, "Vneshniaia torgovlia," 277–78.

[30] Lead purchases by the government totaled R 11,700 in 1710 and R 5,475 in 1712. The figures for tin were R 7,055 in 1710 and R 2,692 in 1711. Ruf Iosifovna Kozintseva, "Vneshnetorgovyi oborot Arkhangelogorodskoi iarmarki i ee rol' v razvitii vserossiiskogo rynka," in *Issledovaniia po istorii feodal'no-krepostnicheskoi Rossii*, ed. Sigizmund Natanovich Valk (Moscow: Izdate'lstvo "Nauka," 1964), 122; Repin, "Vneshniaia torgovlia cherez Arkhangel'sk," 276–77.

there were ambitious plans establish trade in weapons. The Swedish envoy Anton Monier in 1630 explored the possibility of exchange 3,000 *pud* of Russian saltpeter p.a. free of duty for Swedish copper, weapons, and other goods. The Russian diplomats F. Plemiannikov and A. Aristov arrived at the Swedish headquarters in Germany in early 1631 with instructions to buy 10,000 muskets and 5,000 swords, some of which were indeed purchased. In the spring of 1632, Gustav II Adolf offered to supply Russia with 10,000 muskets with cartridges, 5,000 sets of cavalry equipment, and 2,000 pistols in exchange for 50,000 *chetverti* of Russian grain. The Russians expressed interest in 2,000 cavalry outfits and received at least 1,510 of them.[31] Novgorod merchants played a leading role in this trade. In 1641, Ivan Stoianov brought 26 Swedish copper pistols to Moscow. In 1649, Semen Stoianov supplied nearly 420 *pud* of iron to the Chancellery. Mikifor Mikliaev brought over 230 *pud*. In 1630, Peter Mikliaev sold, along with 630 *pud* iron, 30 muskets, to the Iverskii Monastery. In 1656, Semen Stoianov imported 9,471 muskets from Narva and Nyer.[32] During the Thirteen Years' War, Lübeck merchants played a small part in the weapons trade. In 1660, a Russian was sent to Lübeck to buy 2,000 pairs of pistols and 1,000 carbines. The same year, the Lübeck merchant J. von Horn sold cannon and 10,000 *pud* copper. In 1661, his agent Sebastian Ritter sold 100 pairs of pistol and 100 carbines, which were delivered in Pskov. In 1665, 2,500 pairs of *bandolcers* were delivered in Novgorod. In 1663, an agent of the De Vogelaer-Kleck partnership sold 450 *pud* gunpowder there for R 1,575.[33] *Gost'* Semen Gavrilov of Novgorod frequently carried out commercial missions for the Tsar in the 1660s–'80s. In 1686, he supplied the Cannon Chancellery with 2,500 *pud* lead.[34] Some 44,000 *pud* iron and some 14,000 *pud* copper were sent from Stockholm to Russia in 1685. The combined value was over D 230,000. Iron

---

[31] Igor' Pavlovich Shaskol'skii, *Ekonomicheskie otnosheniia Rossii i Shvedskogo gosudarstva* (St Petersburg: "Dmitrii Bulanin," 1998), 39–41, 45–46.

[32] Vladimir Alekseevich Varentsov, *Torgovlia i tamozhennoe upravlenie Novgorod v XVI–XVII vekakh* (Novgorod: Novgorodskaia tamozhnia—Novgorodskii gosudarstvennyi universitet im. Iaroslava Mudrogo, 1996), 59; Vladimir Alekseevich Varentsov, *Privilegirovannoc Kupechestvo Novgoroda XVI–XVIII vv.: Uchebnoesposobie po spetskursu* (Vologda: Ministerstvo narodnogo obrazovaniia RSFSR—Vologodskii gosudarstvennyi pedagogicheskii institut, 1989), 55.

[33] Amburger, *Die Familie Marselis*, 117; Demkin, *Zapadnoevropeiskoe kupechestvo* 2, 44.

[34] Varentsov, *Torgovlia i tamozhennoe upravlenie*, 58–59.

imports from Sweden between September 1692 and 1699 totaled at least 127,326 *pud* of rod-iron and 15,723 *pud* of sheet-iron. The cost of these purchases must have been at least R 75,000.[35]

The growing Russian interest and involvement in the Ukraine in the middle of the century presented the Muscovite government with new sources of supply of a various strategically important goods. From the very beginning of the Ukrainian war against Poland, grain, salt, harquebois and all manner of weapons, lead, and saltpeter were taken across the border to Russia.[36] The Military and Cannon Chancelleries were particularly eager to import Ukrainian saltpeter, as well as potash. In January 1648, Prince S. Bolkhovskii, with the Tsar's explicit instruction, bought 44.5 *pud* of saltpeter from Ukrainian merchants at R 1.60 a *pud*.[37] In June 1652, the Diplomatic Chancellery ordered the Putivl' *Voevody* F. Khilkov and P. Protas'ev to establish contacts with Ukrainian merchants for the purpose of establishing new supply sources of saltpeter. The authorities were ordered to use Putivl's customs and tavern duty receipts for the purchases at R 1.80–2 a *pud*. If necessary, they were ordered to borrow more from the local merchants.[38]

After establishment of Russian control in the Left Bank, Ukrainian saltpeter appears to have been brought to Moscow on a fairly regular basis.[39] During the wars of the turn of the century, the Ukraine became one of the main suppliers of saltpeter among Russian dominions. In 1693–4 alone, 1,686 *pud* saltpeter, valued at R 4,200 reached Moscow from the Left Bank. In 1700, the Treasury acquired 30,000

---

[35] This is based on price the government paid Peter Marselis on domestically produced iron after 1668. Fuhrmann, *The Origins of Capitalism*, 107–08; Bertil Boëthius and Eli Filip Heckscher, eds., *Svensk handelsstatistik 1637–1737: Samtida bearbetningar* (Stockholm: Bokförlags Aktiebolaget Thule, 1938), 166–67, 740–55.

[36] An August 1649 letter by Ukrainian merchants to Trubechevsk *Voevoda* N. Nashchokin. Rossiiskii gosudarstvennyi arkhiv drevnikh aktov (RGADA), f. 79, 1649 g., d. 1a, l. 357.

[37] RGADA, f. 210, Sevskii stol, stb. No 137, l. 66; Fedir Pavlovych Shevchenko, *Politychni ta ekonomichni zv'iazky Ukraïny z Rosiieiu v seredyni XVII st.* (Kyiv: Vydavnytstvo Akademiï Nauk Ukraïns'koï RSR, 1959), 434.

[38] Volodymyr Iosifovych Borysenko, *Sotsial'no-ekonomichnyi rozvytok Livoberezhnoï Ukraïny v druhii polovyni XVII st.* (Kyiv: Naukova dumka, 1986), 150–51.

[39] In 1685, K. Dorofieiev, who served Hetman I. Samoilovych, brought 221 *pud* saltpeter to the Russian capital. The same year, a Kiev merchant O. Sorodka brought R 5,000 worth of goods to Moscow, in large part saltpeter. Borysenko, *Sotsial'no-ekonomichnyi rozvytok Livoberezhnoï Ukraïny*, 157; RGADA, f. 124, op. 1, d. 21, ll. 1–3; f. 229, op. 1, stb. no. 174, l. 79.

pud saltpeter in the Ukraine. The following year, one contingent alone contained over 10,000 *pud.*[40]

Russia also received some military supplies from Asia. For instance, some saltpeter came from Persia. In 1649, the Shah's envoy Magmet Kulibek brought R 8,500 worth of goods including saltpeter. In 1658, another envoy, Khanadakul Saltan brought R 9,097 worth of raw silk and saltpeter.[41] At the end of the century, China became another source of saltpeter. In 1685, I. Chir'ev exchanged sable furs for 1,700 *pud* saltpeter.[42]

Table 25: Weapons deliveries to Russia by Western European merchants, 1701–10

	Muskets (*fuzei*), musket barrels	Carbines	Musket locks	Pistols, pairs	Sword blades	Rapier blades
1701	2,786	793	3,723	124	84	1,672
1702	423		400		11,996	4,814
1703	9,511		9,438		5,098	40,762
1704	3,457		532	40	5,503	22,805
1705	6,814		3,562	1,918	1,241	24,228
1706	16,458	100	37,506	5,304		12,258
1707	28,101	743	21,919	7,177	14,820	26,289
1708	10,140	1,096	11,169	1,304	11,049	8,861
1709	1,788			3,677	12,815	148
1710	34,903					
Sum total	114,381	2,732	88,249	19,544	62,606	141,837

(Source: Zakharov, *Zapadnoevropeiskie kuptsy v Rossii*, 225)

---

[40] Berngard Borisovich Kafengauz, "Ekonomicheskie sviazi Ukrainy i Rossii v kontse XVII-nachale XVIII stoletiia," in *Vossoedinenie Ukrainy s Rossiei 1654–1954: Sbornik statei*, ed. Aleksei Ivanovich Baranovich *et al.* (Moscow: Izdatel'stvo Akademii nauk SSSR, 1954), 424; Pavel Mitrofanovich Luk'ianov, *Istoriia khimicheskikh promyslov i khimicheskoi promyshlennosti Rossii do kontsa XIX veka*, II (Moscow: Izdatel'stvo Akademii nauk SSSR, 1949), 163.

[41] Nina Grigor'evna Kukanova, *Ocherki po istorii russko-iranskikh torgovykh otnoshenii v XVII-pervoi polovine XIX v.: po materialam russkikh arkhivov* (Saransk: Mordovskoe knizhnoe izdatel'stvo, 1977), 47–48.

[42] Mark Mancall, *Russia and China: Their Diplomatic Relations to 1728* (Cambridge, MA: Harvard University Press, 1971), 163–71; Vadim Aleksandrovich Aleksandrov, *Rossiia na dal'nevostochnykh rubezhakh (vtoraia polovina XVII v.)*, 2nd edition (Khabarovsk: Khabarovskoe knizhnoe izdatel'stvo, 1984), 106.

Table 26: Foreign metal imports at Arkhangel'sk, 1710–22

	1710	1715	1720
Copper, *pud*	21,347	3,713 + 572 pieces, 100 rolls of wire, 490 "books"	8,093
Iron, *pud*	2,600	260 + 467 bars,	193
Barrels	211	67 *politsy* 685	249
Steel, barrels	311	391 + 3 *pud*	809 + 5 boxes
Lead, *pud*	22,657	5,762 *svinki*	5 *svinki*
Tin, *pud*	3,593	4,482	2,609

(Source: Repin, "Vneshniaia torgovlia cherez Arkhangel'sk," Table 38, after p. 240)

Import Substitution: Domestic Production of Metals and Military Supplies

The search for Russian sources of metals was a constant feature of late Muscovite history and an important priority of the government's economic policy. While the country had a long tradition of iron production, inputs were invariably low-grade swamp or lake ore. S. G. Strumilin's largely conjectural—and probably sig-nificantly exaggerated—estimate of Russian iron production at the end of the sixteenth century was 1,800 tons a year.[43] There was no domestic copper or tin production, which left Russia completely at the mercy of foreign exporters. For instance, when the Livonians discovered in the late fifteenth century that Russians were using imported copper to cast cannon, they imposed curbs on copper exports.[44] The Swedes in the seventeenth century regularly limited the sale of their copper to Russia.[45]

This dependency on the West was naturally of utmost concern to the Russian government and, in order to curb it, the Muscovite

---

[43] Strumilin's estimate is based on extrapolating from the known civilian and military consumption, and it is thus possible that a realistic estimate should be even lower to take into account iron imports. Stanislav Gustavovich Strumilin, *Istoriia chernoi metallurgii v SSSR* (Moscow: Izdatel'stvo Akademii nauk SSSR, 1954), 25–26.

[44] Esper, "Military self-sufficiency," 195.

[45] For examples, see: Helmut Piirimäe, *Kaubanduse küsimused Vene-Rootsi suhetes 1661.–1700. a. (Tartu Riikliku Ülikooli Toimetised*, 113) (Tartu: Tartu Riiklik Ülikool, 1961), 56–60; Shaskol'skii, *Ekonomicheskie otnosheniia*, 152.

authorities ironically turned to the West for assistance. Western specialists were hired to locate possible deposits as well as to exploit those discovered. Two important centers of metal industry were built in the seventeenth century: (i) the Tula-Kashira region to the south of Moscow and (ii) the Olonets area on the northern shores of Lake Ladoga.[46] In addition, there was some substantial artisan production in the Urals and in Siberia.[47]

The Russian state in 1630–31 built an iron works on the Nitsa River in the Urals. Exploiting the local marsh ore and the labor of 16 peasant families, the facility attained an annual production level of 2,700 *pud.* By 1634, the state opened the Pyskorka copper mill in the region. Moved to the Kama in 1640, the facility attained an annual total of only 600 *pud* and was closed down by 1666. Dmitrii Tumashev in 1669 opened an iron mill on the Neira with an annual output of some 1,200 *pud.* The facility was closed down in 1669.[48] The short life-span and limited output of these mills highlighted the difficulties of import substitution by means of local resources. There is no evidence of any of these iron works, or other smaller facilities, producing military equipment. However, local artisans were sometimes commissioned to produce military equipment for the government. For instance in 1631, the Treasury ordered 3,000 *pud* of gun barrels from Ustiuzhna Zhelezopol'skaia Smiths. Two years later, they produced cannon balls and in 1647, they received a commission for 1,000 bear-spears.[49]

The central Russian region was the first one to be more systematically developed after the Dutch entrepreneur Andries Winius, with his brother Abraham and Julius Willeken, received in 1632 a

---

[46] Much of the surviving source material has been published in: *Krepostnaia manufaktura v Rossii*, Tom 1: *Tul'skie i kashirskie zheleznye zavody*, ed. Mikhail Nikolaevich Pokrovskii (Leningrad: Izdatel'stvo Akademii Nauk, 1930); *Krepostnaia manufaktura v Rossii*, Tom 2: *Olonetskie mednye i zheleznye zavody*, ed. Mikhail Nikolaevich Pokrovskii (Leningrad: Izdatel'stvo Akademii Nauk, 1931).

[47] N. A. Minenko, L. A. Dashkevich, I. V. Poberezhnikov, S. V. Ustiantsev, A. G. Tomilov, V. G. Zhelezkin, V. A. Shkerin, D. V. Gavrilov, S. V. Golikova, "Ural before in the Industrial Revolution," in *Ironmaking in Sweden and Russia: A Survey of the Social Organisation of Iron Production before 1900*, ed. Göran Rydén and Maria Ågren (Uppsala: Historiska Institutionen, 1993), 43ff.; Fuhrmann, *The Origins of Capitalism*, 136–39.

[48] Minenko et al., "Ural before the Industrial Revolution," 44–46.

[49] N.V. Ustiugov, "Remeslo i melkoe tovarnoe proizvodstvo v Russkom gosudarstve v XVII v.," *Istoricheskie zapiski* 34 (1950), 176.

charter with a three-year tax exemption for iron mills in the Tula region. Soon, their compatriot Akkema became involved in the project.[50] From the very beginning, armaments production was high on the agenda. The initial complex of four factories had two furnaces and four hammer shops for the production of cannon and projectiles.[51] Labor, however, remained a serious constraint and Winius waited until 1638 before requesting that the 250 serf households of a neighboring area be assigned to his factories, a demand which was met on the condition that he deliver to the government "grain and military equipment" equal in value to the serfs' old R 470 quit-rent. Labor costs were clearly minimal compared to the scale of Russian iron imports from the West and highlight the embryonic nature of the project. The tsar further provided Winius with 50 miners from among the local Cossacks and musketeers. The workers were divided into five groups working in shifts. Four miners worked at a single pit, and each man produced one cartload, 25 *pud*, of ore a day. Each team had to provide 100 carts of ore without pay, or a total of 1,250 carts p.a. Another 1,750 carts were to be provided by the Cossacks and other free people.[52]

The production process was modeled on the most up-to-date Dutch technology which Winius adapted to local conditions. The blast furnaces at used 200 *pud* of ore and 300 carts of fuel to produce a maximum of 36,000 *pud* p.a. but probably as much as 30 percent less. The methods of production often remained highly wasteful and potential production levels were never attained.[53] Similarly, low pay and interventions by the local administration resulted in recurrent strikes by the workforce. In spite of this, the Tula mills with their advanced division of labor were quite efficient in weapon production. In 24 hours, one master could cast 2–3 large cannon balls, 5–6 small ones, 100 large and small grenades, or 15–20 iron sheets 2 *arshin* in length. A team of one master and two workers could produce two cannon in 24 hours. In another Tula factory three groups each composed of one master and two workers could bore 12 mus-

---

[50] Tsar Aleksei confidant B. I. Morozov joined the project as a silent partner. Fuhrmann, *The Origins of Capitalism*, 63.

[51] Ibid., 68.

[52] Ibid., 75.

[53] Strumilin, *Istoriia chernoi metallurgii*, 130; S. Tomsinskii, "Nachal'naia stadiia krepostnoi manufaktury v Rossii," in *Krepostnaia manufaktura v Rossii*, 1, XXII.

kets per day, or 3,600 musket barrels p.a. Three other teams of one master and three workers each could manage 18 a day, or 5,400 p.a. A single hearth in a hammering shop produced 30 *sazhen* of rod-iron in 24 hours, or 9,000 *sazhen* (c. 7,000 yards) p.a.[54]

The mills made some substantial deliveries to the government: for example 2,537 cannon balls in 1641. By 1647, the factory was producing over 5,000 *pud* of joint-iron p.a., which demanded as much as 10,000 *pud* of pig iron. Annual production of cannon and cannon balls probably reached at least 20,000 *pud*. Strumilin estimates the value of total production at R 10,000 or more. Yet quality varied with some of the cannon exploding, which Kilburger attributed to the use of cold-short (*kholodnolomkoe*) instead of red-short iron (*krasnolomkoe zhelezo*).[55]

The 1640s saw a major turning-point in the development of Russia's incipient iron industry. Growing tensions among the Dutch partners erupted into the open and Winius' efforts to discredit Marselis and Akkema even became an issue in Dutch-Russian diplomacy. In an effort to settle the issue, the government in November 1647 nationalized the Tula mills. Not for the last time in Russian history, state control led to a total disintegration of operations. Largely as a result, Marselis and Akkema were restored as owners less than a year later with a 20-year charter exempting them from taxes and duties. Swedish resident Karl Pommerening, who used the disruption to try to induce the remaining iron masters to leave Russia altogether, claimed as late as January 1649 that the Tula mills were lying idle.[56]

The resolution of the ownership question marked the beginning of a new phase in the expansion of iron production. Between 1648–62, eight new ironworks were established in central Russia.[57] Boris Morozov set up a mill at Pavlovskoe in 1651, although output quality appears to have been low.[58] A much more significant step was the creation

---

[54] Fuhrmann, *The Origins of Capitalism*, 71–72.

[55] Ibid., 78; Strumilin, *Istoriia chernoi metallurgii*, vol. 1, 105.

[56] Fuhrmann, *The Origins of Capitalism*, 80ff.; Strumilin, *Istoriia chernoi metallurgii*, vol. 1, 118; *Sochinenie Kil'burgera o russkoi torgovle v tsarstvovanie Alekseia Mikhailovicha*, ed. B. G. Kurts, 455.

[57] Fuhrmann, *The Origins of Capitalism*, 91.

[58] J. Kilburger's testimony from 1674, when the factory was operated by the Privy Chancellery suggests that the mill may have relied primarily on local swamp iron. *Sochinenie Kil'burgera o russkoi torgovle v tsarstvovanie Alekseia Mikhailovicha*, ed. Boris Grigor'evich Kurts (Kiev: Tipografi ia I. I. Chokolova, 1915), 90.

of four new factories by Marselis and Akkema in the Kashira district near Tula in 1653. At least three of these facilities produced musket and carbine barrels, among other things.[59] The largest facility, at Chentsova, was estimated in 1662 to have an annual production of 7,200 musket barrels. The eight masters of the factory were able to produce eight complete suits of cavalry armor in one week.[60] Marselis and Akkema subsequently acquired two more mills in the area—one on the Porotva and the other on the Ugodka—which were under contract to supply the state with 15,000 *pud* of iron p.a. in the 1660s. They produced, among other things, cannon, projectiles, grenades, cannister shot, arquebuses, swords, armor, and helmets.[61]

Table 27: Estimates of iron and arms production at the Tula and Kashira mills

Year	Iron, *pud*	Iron plates	Cannon	Cannon balls	Muskets	Hand grenades
1648	10,000		20,000			
1658	20,000	5,000		6,000		10,000
1669	5,000					
1674–96					2,000	

(Source: I. V. Chekan, "Tul'skie i kashirskie zheleznye zavody XVII v.," *Trudy Istoricheskogo muzeiia* 8 (1928), 159; Liubomir Grigor'evich Beskrovnyi, "Proizvodstvo vooruzheniia i boepripasov na russkikh zavodakh v pervoi polovine XVIII v.," *Istoricheskie zapiski* 36 (1951), 106)

Another period of confusion followed in the 1660s. Marselis' fortune was confiscated in June 1662 after he was implicated in an embezzlement scandal. The state became Akkema's partner, an arrangement that the latter found highly unsatisfactory. Akkema's plea for a divorce was accepted and, in 1663, he was given the Porotva and Ugodka mills for a 20-year tax exempt period and R 5,000 in compensation for the Tula-Kashira factories retained by the state.[62] However, in 1667 the Tula-Kashira complex was returned to the Marselis family for a 20-year period. Apparently, the complex had

---

[59] *Krepostnaia manufaktura v Rossii*, vol. 1, 31–32, 35–36, 39.
[60] Fuhrmann, *The Origins of Capitalism*, 96–97.
[61] Amburger, *Die Familie Marselis*, 108–09.
[62] Fuhrmann, *The Origins of Capitalism*, 99–102.

again declined during the period of government control, and the Tula mill was basically idle, which may have been the reason for this "re-privatization." However, the state continued to burden the Marselis family with various demands for loan repayments from the very beginning.[63] In addition, the state initially commissioned no deliveries, which made it difficult to hire workers and to get large-scale production started. The initial payment of R 2,690 for R 3,690 worth of goods delivered in 1668 was made with a year's delay.[64] Starting in April 1668, the state formally ordered a range of goods from him on annual basis. These consisted of 25,000 *pud* rod, angle and sheet iron, 20 cannon, 6,000 cannon balls, 10,000 grenades, 100 hand-mills, 1,000 *tuyères*, 50 iron ingots, 50 grinding mortars, and 100,000 nails, the total cost of which reached R 18,020.[65] Although deliveries were never made at this scale, they were still quite significant. For example, between September 1673 and August 1674, Marselis supplied the state with R 10,077.55 worth of iron, a total weight of 17,255 *pud*.[66]

A contemporary description by J. P. Kilburger points to expanded production facilities in Tula by the 1670s. There were three blast furnaces and ten water-hammers, each with a double hearth. He says that the Marselis family produced three kinds of rod-iron for construction purposes but suggests that Akkema's products were of higher quality, with his inputs and outputs being consistently somewhat more expensive than Marselis'. Both producers, especially Akkema, began to reorient their production increasingly toward the domestic market and Akkema even abandoned weapon production in 1663. In 1684–5 the Marselis produced over 2,700 sheets of cast iron, 1,000 corrugated sheets, and 200 *pud* bar-iron for non-military purposes. However, in the late 1660s they built a small factory, wholly dependent on state orders of cannon, projectiles, and grenades, near Kashira and received a 20-year grant of privilege in 1671.[67] In addition, in 1668–72, the state built two factories in the Zvenigorod

---

[63] In 1670, the state maintained that the Marselis' loans totaled R 6,319. *Krepostnaia manufaktura v Rossii* I, 258, 290–92; Fuhrmann, *The Origins of Capitalism*, 104–06.

[64] *Krepostnaia manufaktura v Rossii*, vol. 1, 219–22, 373–77, 382.

[65] Fuhrmann, *The Origins of Capitalism*, 107–08; *Krepostnaia manufaktura v Rossii*, vol. 1, 276.

[66] Fuhrmann, *The Origins of Capitalism*, 108.

[67] Ibid., 111–13.

area, which produced exclusively for the army and other government needs.[68] Werner Muller, with the help of cannon and grenade masters from Austria, set up the Istenskii iron works in the late 1670s in Borovskii *uezd*.[69] Even as the Tula mills managed to produce 2,000 muskets a year between 1674 and 1696, gun barrels remained an area of weakness. In response, the government in 1648 set up a special chancellery (*Stvol'nyi prikaz*) to promote barrel production. A contract with the Dutch master Hendrik van Aken in 1648 for a barrel mill on the Iauza very soon came to nought with his death in 1650.[70] Yet, by the middle of the 1670s, the chancellery was producing 1,600–2,000 barrels a year.[71] In 1689 Butenant built a new mill for the Marselis in Aleksin *uezd*, although in 1690 it was transferred to Naryshkin and a forging shop built on the site. By the 1690s, the only foreigner to build iron works was Evert Isbrand Ides who established a mill near Moscow. According to Kafengauz, "Isbrand's armaments factory was so famous that masters and government officials were sent there to study the factory's specifications and operation and calculate the productivity ratios."[72]

Another important center of metal production in the seventeenth century, the Olonets region, was virtually on the Swedish border. Some copper and iron had been produced in the area for centuries, but the last decades of the century saw the establishment of industrial production. The first serious attempt to exploit local resources was made by a Novgorod *Gost'* Semen Gavrilov in the 1660s, but it was largely unsuccessful. At the same time, Leonhard Marselis, Peter's son, conducted some of his own prospecting. In 1669 the family was granted a R 600 loan and authorized to expand their activities into copper production. Following a series of deaths in the Marselis family, Heinrich Butenant von Rosenbusch effectively took control of the enterprise by the late 1670s and established at least one more copper works in Foimogubskaia *volost'* by 1676. However,

---

[68] Ibid., 113–14.
[69] Ibid., 130.
[70] Ibid., 93.
[71] Iurii Vasil'evich Arsen'ev, "K istorii Oruzheinogo prikaza v XVII veke: Oruzheinichestvo boiarina Grigoriia Gavrilovicha Pushkina (1647–1655)," in *Vestnik arkheologii i istorii* 16 (1904), 138–39, Beskrovnyi, "Proizvodstvo vooruzheniia i boepripasov," 106–07.
[72] Berngard Borisovich Kafengauz, *Istoriia khoziaistva Demidovykh v XVIII–XIX vv.: Opyt issledovaniia po istorii ural'skoi metallurgii* (Moscow: Izdatel'stvo Akademii nauk SSSR, 1949), 23.

the small scale of production prompted Butenant in 1681 to switch to iron production in 1681 and he soon built a blasting enterprise and a forging shop, followed by two more factories by 1700.[73] Water power was used to operate two furnaces and hammers and hearths and mining took place in the summer. According to the 1681 charter, issued for 20 years, he was to deliver rod- and angle-iron and other items to the state, while the remainder could be sold within Russia or exported. The iron masters were local Russian and Karelian artisans. There were considerable tensions with the local peasant population, however, which periodically burst into open violence.[74] The data on levels of production in Olonets is scarce, but we do know that at least 34,000 *pud* pig-iron was produced in 1701–2. Almost certainly, the levels achieved in the seventeenth century were much lower.[75]

Overall, the seventeenth century effectively saw the creation of a domestic Russian metal industry from scratch. Starting at a modest total of 450 *pud* in the late 1630s, the Russian iron industry expanded to churn out some 150,000 *pud* (2,700 tons) in the 1670s and perhaps as much as 250,000 *pud* by the end of the century.[76] While still a mere tenth of the output of the Swedish industry, this significantly cut Russia's dependency on her Western rivals. Advances in metallurgy translated into a sharp increase in domestic weapons production, although some technological bottlenecks were not completely solved until well into the eighteenth century. The increase in production levels was accompanied by a considerable standardization of the output. For instance,

> [c]annon began to be produced according to field experience, and a primary concern . . . was to increase the mobility of the pieces by decreasing their weight. In the 1660s the Moscow armory manufactured a number of two and three-pounders. In the 1690s, the manufacture of five, seven, nine, ten, fifteen, and fifty, and seventy-pounders was suspended, as well as of one and one-half, two and one-half, and three and one-half, and four-pound mortars. This reduced the variety of ordnance considerably.[77]

---

[73] Fuhrmann, *The Origins of Capitalism*, 116–21.
[74] Ibid., 124–28.
[75] Ibid., 128.
[76] Ibid., 262.
[77] Esper, "Military self-sufficiency and weapons technology in Muscovite Russia," 202.

As impressive as the seventeenth-century developments were, Peter I's reforms marked a dramatic transition to a completely different scale of industrial production. While there were 12 works producing 2,000 tons of cast iron a year at the beginning of the century, by 1725, Russia had 52 works producing over 20,000 tons of cast iron and 3,600 tons of copper. Weapons production remained insufficient until 1716. Thus in 1711, the army needed 122,600 muskets, 49,800 carbines, and 200,000 swords, sabers, and lances. In addition 12–15,000 guns a year were needed as replacements. The state demanded 18,000 firearms a year from the Tula works but received only 2–4,000, which necessitated the large-scale imports described above. The problem was solved only with reorganization of the Tula works in 1715 and the implementation of a new finishing process for barrels which increased the level of production eight-fold. In 1715, the Tula mill produced 11,000 muskets, 7,000 carbines, and 8,000 pistols. Between late 1715 and early 1718, the works turned out over 45,000 muskets and carbines and nearly 19,000 pistols.[78]

Another important precondition for military self-sufficiency was the development of a Russian chemical industry. Muscovy made considerable progress in both saltpeter and gunpowder production in the seventeenth century. Manufacturing methods were adopted in an activity traditionally dominated by small-scale artisan production. The first gunpowder factory was built near Moscow in 1626. In 1636 the Dutch merchant Hendrik van Ringen received a 10-year monopoly for saltpeter production. All production was to be delivered to the state at R 2–2.20 a *pud* during the first two years and thereafter at R 1.80–2.20.[79] Van Ringen set up a mill near Novgorod but quickly ran into local opposition. The operation soon closed and another attempt to produce saltpeter in Velikie Luki was similarly unsuccessful.[80] In 1637, Van Ringen moved his operations to Mtsensk and Karachev and requested R 15,000 for a saltpeter factory. In return, he agreed to supply 8,000 *pud* saltpeter in the first year, to be followed by 10,000 and 12,000 *pud* in the second and third year, respectively.[81] Also Marselis and Akkema had produced

---

[78] Ibid., 207.

[79] The high price applied to the first third and the lower to the remainder of the production.

[80] Demkin, *Zapadnoevropeiskoe kupechestvo*, vol. 2, 25.

[81] Ibid., 26; A. S. Muliukin, *Ocherki po istorii iuridicheskago polozheniia inostrannykh kuptsov v Moskovskom gosudarstve* (Odessa: Tipografiia "Tekhnik," 1912), 92, 204–05.

gunpowder on a small scale since 1644. In 1650, a Dutch merchant David Bacheracht built a powder works on the Ucha River near Moscow and gained permission in 1655 to build another large factory in Moscow on the Iauza near the New Foreign Quarter. The capital for the mills, which initially amounted to R 13,000, was almost entirely provided by the Dutch merchants Daniel and Jean Bernarts. Bacheracht undertook to supply the Treasury with 50,000 *pud* of gunpowder p.a. The actual production data is sketchy, although we know that 2,397 *pud*—worth R 11,340—was produced in 1652 and 1654. In 1662, Bacheracht produced 1,823 *pud* worth R 5,670, and in 1668, he supplied the Treasury with R 8,000 worth of gunpowder.[82] The state evidently converted the Iauza facility into a paper mill soon after Bacheracht's death in 1671, until Hermann Löfken re-established gunpowder production there 11 years later at 9,000 *pud* p.a. Isbrand also began operating a gunpowder mill in 1698.[83]

Throughout the century, gunpowder continued to be produced by artisans, as well. For instance, Astrakhan' had its own armory (*Artillerskii dvor*) which, among other things, produced gunpowder from local saltpeter and sulphur.[84] According to Beskrovnyi, seventeenth-century Russia was largely self-sufficient in gunpowder production. However, O. L. Vainshtein argues that certain types of gunpowder continued to be imported, because domestic powder was large-grained and not suitable for all weapons.[85] In fact, both explanations may be somewhat unrealistic in that large quantities of powder were still imported in the middle of the century. The availability of new saltpeter supplied in the Left-Bank Ukraine may have reduced this dependency somewhat and there is much less evidence of powder imports toward the end of the century. Indeed, complete self-sufficiency was probably attained by the turn of the century, since gunpowder and related

---

[82] Liubomirov, *Ocherki istorii russkoi promyshlennosti*, 513; Demkin, *Zapadnoevropeiskoe kupechestvo*, vol. 2, 26–27.

[83] Fuhrmann, *The Origins of Capitalism*, 134.

[84] Apparently, also the local saber and harness producers were known across the country. Liubov' Konstantinovna Ermolaeva, "Torgovye sviazi Astrakhani v XVII-pervoi chetverti XVIII v. (K probleme formirovaniia vserossiiskogo rynka)" (Candidate's diss.: Leningradskii gosudarstvennyi pedagogicheskii institut, 1981), 274.

[85] Beskrovnyi, "Proizvodstvo vooruzheniia," 107; Osip L'vovich Vainshtein, *Rossiia i tridtsatiletniaia voina, 1618–1638 gg.: Ocherki iz istorii vneshnei politiki Moskovskogo gosudarstva v pervoi polovine XVII v.* (Leningrad: Gospolitizdat, 1947), 94–95.

products which were no longer imported via Arkhangel'sk at the beginning of the eighteenth century.[86]

There were times when the Russians actually exported military supplies to the West. Thus in 1628, 55 tons of saltpeter were given to the Dutch.[87] The Tula iron works exported 600 30–61-*pud* cannon to the Netherlands in 1646 and another 360 the year after.[88] On April 5, 1644 the Tsar authorized Marselis and Akkema to export their products to non-hostile countries under a 20-year charter authorizing duty-free trade. Similarly, foreign owners of the central Russian iron mills exported at least some cannon balls. The explanation for this puzzling phenomenon seems to be twofold. Exports by Winius, Marselius et al. were tolerated, since the export revenues constituted one aspect of the entrepreneurs' financial compensation. Similar, saltpeter and other exports were at times permitted by Moscow for political reasons when they could reasonably be expected to be used to weaken Russia's enemies.

Concluding Remarks: How Self-Sufficient?

Military considerations were of paramount importance in Russian economic policy-making in the seventeenth century. During the first half of the century, the state, devastated and impoverished during the *Smuta*, had limited resources to commit to developing domestic weapons production. Enormous financial sacrifices were made to import weapons so as to equip the Muscovite armed forces for the Smolensk campaign and the Thirteen Years' War. In the 1650s, the scale of these imports rose to one-fifth of Arkhangel'sk's annual imports. The state was able to cover these fiscal emergencies be permitting large-scale grain exports. Indeed, it seems likely that the Russian authorities, who closely controlled all grain trade, exploited record high grain prices in Western Europe to pursue their military objectives. With the gradual fiscal consolidation of the state and the modernization of the army, armaments trade become more regular in the second half of the century.

---

[86] Repin, "Vneshniaia torgovlia cherez Arkhangel'sk," 279.

[87] Vainshtein, *Rossiia i tridtsatiletniaia voina*, 76–77, 94–95; Amburger, *Die Familie Marselis*, 78.

[88] Fuhrmann, *The Origins of Capitalism*, 78.

In addition to weapons, large quantities of Swedish iron and copper were brought in every year and volumes increased rather dramatically in the closing years of the century. Naturally, not all iron and copper went into weapons production, but a significant enough proportion did to make trade with Sweden a high strategic priority.

While perhaps fiscally expeditious, the heavy reliance on Western imports of military supplies entailed serious risks by leaving the country vulnerable to various contingencies. The seventeenth century consequently saw a highly concerted effort on the part of the Muscovite authorities to reduce their dependency on imports. Two important centers of iron-production were created and manufacturing methods were adopted for gunpowder production. By the end of the century, Russia had a relatively developed iron and arms industry with a dozen factories. Overall, Russia advances were far from sufficient to ensure complete independence from foreign suppliers. While peacetime armament imports declined—especially in relative terms—in the second half of the century, the purchases during the Great Northern War again paralleled—and at times exceeded—the import levels of the mid-century. However, the relative weight of these imports was much smaller after a dramatic expansion of foreign trade volumes in the second half of the century. Moreover, the demands of the Great Northern War triggered a supply-side response which increased weapons production tenfold. By the time of the Nystad Peace, Russia was definitely self-sufficient in gunpowder and had nearly reached the same position in weapons.