In 1776, Bengt Qvist Andersson gave a speech at the Royal Swedish Academy of Sciences (Kungliga Vetenskapsakademien), on the making and marketing of metals. As a loyal employee of the Swedish Board of Mines (Bergskollegium), his political foundation was cameralism, in which a country’s “strength is dependent upon a plenitude of inhabitants, who help each other in cultivating the land, raising cattle, refine useful Metals and Minerals, establish specific handicrafts, practise trade and defend the country against the intrusion of foreign powers”. It was essential to make use of “the country’s return … and [it’s] best treasury”, and to employ “more working hands … at foreigners’ expense.” Qvist’s point of departure was a society where foreign trade was to be kept under close surveillance, and where imports were restricted in favour of domestic goods. In Sweden, the main “treasury” was found below ground, in the form of iron ore. It was a truism that Sweden should supply Europe and the world with bar iron, and that metalworking was the foundation on which wealth and happiness rested. Having said that, Qvist noted that this was difficult, as many foreign places had “a limited freedom of trade”, and that progress was needed; “an industrious People” had to “expand the prime trades [and to] encourage Science, useful arts and handicrafts”. Building on these observations, he elaborated on the extent of foreign markets and how to enhance Sweden’s position. The British market was at the centre of attention, and Qvist discussed how different suppliers competed, Swedish makers along with Russian and British producers. Still, he also noted that the reality was more complicated than uni-directional commodity chains, emphasising interconnected markets as well as intricate links between production, trade, and consumption; “nothing is more general than to hear that when one talks about the creation of iron and metal manufacture, it is the outcome of its sales”. It was through “diligence” and “endeavour” that people “maintained and expanded” these important sectors and rose to “prosperity”. Production should be improved through the encouragement of “Sciences, useful arts and crafts”, while marketing should be developed with an “Intrusive spirit”, which incorporated “new trading places, trading freedom as well as Factories with ample Warehouses”.

At the time of Qvist’s speech, Swedish metalworking had made a healthy recovery from a dismal outlook half a century earlier. Bar iron output had
risen and Swedish iron dominated European markets. The so-called Öregrund Iron had a monopoly position vis-à-vis English steelmakers, as high-quality steel was made from this brand. Re-exported bar iron also found a small market in West Africa, but an increasing number of bars remained in Sweden to be refined into metal wares. Steel production saw a remarkable development, with rising output geared towards domestic consumption, and providing customers with alternatives to imported goods. This development was linked to rising demand, but Swedish producers were also backed by a supportive state. True to the ideas of cameralism, metalworking was never far from the controlling ambitions of the authorities, being integrated into scientific, technological, and organisational discussions within the Bergskollegium. In 1747 the iron makers also created their own organisation, the Ironmasters’ Association (Jernkontoret), which often acted in tandem with the Board. They were both institutions “in which knowledge was collected, systematised, authorised and disseminated”, connected to the state and its ambition for “utility” and “welfare”. They employed travelling agents both in Sweden and abroad, viewing markets, mines, and production sites, reporting on the novelties they observed. As a result, production not only rose, but improved in quality as well.

Qvist was important in this development. He had begun work in the iron industry during the 1750s as an assistant to Sven Rinman, the greatest mind in Swedish iron making at the time. From 1764, he toured Europe with a special interest in steelmaking. On his return, he informed the Bergskollegium about crucible steel, a recent improvement in British manufacturing, and later founded his own steelworks. Even if his new venture was not a commercial success, it was a sign of a man involved in both the practical side of metalworking and its intellectual understanding. Qvist admitted in 1787 that part of his output could not find a market, and that much steel was only made “to enlighten the Theory about steel”. His steelworks was thus both a production site and a laboratory, and Qvist might be labelled a “hybrid figure”, to use Ursula Klein’s concept, combining as he did “natural and technological inquiry” with involvement in “industry and commerce”.

1776, when Qvist delivered his speech, is a year memorialised by the appearance of another text on the relationship between making and markets. Adam Smith began his Wealth of Nations by stating that “The greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgement with which it is any where directed, or applied, seem to have been the effects of the division of labour”. The title of Chapter 3 then notes that “the Division of Labour is limited by the Extent of the Market.” A precondition was that the market was unregulated and free. Qvist made a similar argument, relating the organisation of labour and the extent of the market to what Rinman called “general improvements”: economic growth was the outcome of an interplay between labour and markets. These relationships have since been called “Smithian growth”, and connected to the emergence of modern society.
development and the establishment of a parliamentary democracy, one might see them as the pillars of modernity. Neither Qvist nor Smith talked about technology, but it was only another year before the term was introduced into the discussion of economic development. In 1777 the German scholar Johann Beckmann published *Anleitung zur Technologie*, in which he defined technology as “the science which teaches how to treat natural products, or the knowledge of handicrafts.” It was a science of how to make things “in systematic order”, related to the organisation of labour. Qvist was not a stranger to “making things” from “natural products”, but he lacked this concept. It was another decade before the term was used in Sweden, and it was Rinman who defined “technology” as “the knowledge of how to prepare raw materials from the three natural kingdoms and to make use of them for oeconomy, factories, arts and crafts.”

Our ambition is to insert Qvist into this discussion about labour, markets, technology, and economic change. He might not have been aware that he lived in a period that we, in hindsight, have labelled the “revolutionary age”, but, as stated by the French historian Daniel Roche, this was a common denominator for eighteenth-century people. Neither Smith nor Beckmann saw themselves as harbingers of a modern society. But the task for historians is to look for signs of change in a period where contemporaries found no such signs. A man like Qvist might here be a better exemplar than Smith or Beckmann, as a “hybrid figure” combining making with an intellectual understanding. In this chapter, we concentrate on the intellectual side, leaving physical activities in laboratories and workshops for later analyses. Our beginning is Qvist’s speech from 1776, but the discussion also includes other officials in the metal trades, such as Johan Westerman and Eric Thomas Svedenstierna. Our aim is to analyse how the key concepts of the organisation of labour, markets, technology, and progress were transformed through the writings of these “hybrid figures” during the late-eighteenth century and the first decades of the nineteenth century.

1776 is an appropriate beginning to modernity, and scholars have rightly used it in that way. *The Wealth of Nations* was after all not the only emblematic text published that year, and it might be argued that *The Declaration of Independence* has had an even greater impact on later development. However, the 1770s was not only a decade of important texts, as it also saw significant technological and industrial developments, with James Watt’s steam engine as the paramount example. Making an analogy with the French Revolution, Arnold Toynbee suggested that the Industrial Revolution was initially set in motion by the “mighty blows of the steam-engine”, creating a narrative in which the advent of modernity had both political and economic sources. A crucial feature, in this context, is the question of economic growth. The full title of Smith’s book points in that direction, with division of labour leading to growth, and hence the establishment of ideas of “Smithian growth”. Later scholars have replaced the division of labour with technology, and instead pleaded for a “Kuznetzian growth” with technological development as an engine.
Economic historians have even made a chronological demarcation between them, with the industrial revolution as a watershed; “Smithian growth” took place in early modern society, while “Kuznetzian growth” signals modernity. A similar idea has been elaborated by the British scholar Anthony Wrigley, who viewed the industrial revolution in terms of a departure from what he called an organic economy. Initially the “advanced organic economy” grew, thanks to the division of labour. But sustained economic growth only developed when the consumption of mineral coal began to have an impact, a phase Wrigley called the “mineral-based energy economy”. These two models are complementary, with the steam engine, the emblematic machinery of industrialisation, as a voracious coal consumer.

If we listen to contemporary voices, it is difficult to make a clear distinction between division of labour and technology, separating “Smithian” from “Kuznetzian” growth. For Smith, the development of machinery was a logical outcome of the division of labour, as the latter created innovations. Also for Beckmann, Technologie was integrated into the organisation of labour, as “knowledge of handicrafts”, rather than something radically new. Furthermore, neither of these observers anticipated a period of prolonged growth. Well into the nineteenth century, as Wrigley has reminded us, none of the classical economists could foresee a future with fundamental changes; industrial society was not something that was on their horizon. Instead, they foresaw a stationary state, in which the fixed nature of land would curb any prolonged period of growth. Smith and Beckmann wrote their books when change began to appear, with agricultural development, a gradual replacement of organic fuel for mineral coal, and embryonic industrial growth due to division of labour and machinery. It is only in hindsight that we see the late-eighteenth century as the beginning of what we call the industrial revolution.

The advent of modernity was not only a material event. The German scholar Reinhart Koselleck has dubbed this period die Sattelzeit, and stressed that it was an epoch when people began to think in a “modern way” and use concepts familiar to us today – a time “in which the past was gradually transformed into the present”, and when old words “have taken on new meanings”. Important concepts like revolution, freedom, crisis, history, and progress became what he called “Janus-faced”; they opened up a past whose “social and political realities [are] no longer intelligible to us without critical commentary”, and also our present, where their meanings are “directly intelligible to us”. This created a rupture as radical as the industrial revolution, and Koselleck emphasised some general features of the way in which concepts gradually gained new meanings, and were given a temporal dimension pointing towards an open future. There was an “acceleration” of time, creating a gulf between the past and the future. Another feature was the appearance of more abstract and ambiguous concepts, so-called “collective singulars”. These traits were “mutually dependent”, and changed the way people perceived time, history, and the future. One important concept that changed its meaning during die Sattelzeit was progress, or Fortschritt. It “became a
modern concept when it shed or forgot its natural background meaning of stepping through space”. Its beginning was the spatial description of “taking a step forward”, but gradually it was filled with a temporal meaning of “moving” in time while leaving the past behind; it became a “collective singular”. Its meaning changed to “condense ever more complex experiences on a higher level of abstraction”, and assumed an independent and leading role in the development from the past to the future. It was given historical agency.19

Keith Tribe uses a similar approach when tracing the meaning of another concept, “economy”. He outlines its shifting connotation up until our present time, and indicates that it assumed a more intelligible meaning during the half-century after the publication of *The Wealth of Nations*. It, too, developed into a “collective singular”, and Tribe stresses how an independent economic discourse became separated from political thinking. Interestingly, he makes a comparison between developments in Britain, France, and Germany, and for our discussion, the German example is paramount, since it deals with dissolution of cameralism and the emergence of a nascent political economy, a development resembling parallel developments in Sweden.20

In tracing the changing meaning of concepts like division of labour, (free) markets, technology, and progress in Swedish texts, we strive to follow Koselleck’s and Tribe’s trail, highlighting gradually altered views on economic life in the “revolutionary age”.

**Johan Westerman and Signs of a “Smithian growth”**

Another man involved in the Swedish metal trades was Johan Westerman. He was a contemporary of Qvist, and followed the same career pattern, with academic studies, administrative training, and travelling in Europe.21 Not a practical man like Qvist, he was instead taught in “subjects that belong to common householding”, before being enrolled as a junior official at the Board of Trade (*Kommerskollegium*). Westerman’s continued work as a civil servant was enriched by his experiences during a long European study tour in the years 1758–1760. In 1763 he left Sweden again, this time with England as the main destination.22 He would rise through the ranks, and from 1773 Westerman served as State Secretary of trade and finance. His intellectual background was similar to Qvist’s, with cameralism and its structure of connected layers of householding. It was rooted in natural law and Wolffian philosophy, but incorporated inputs from natural science and state-making. It was the task of a ruling state – under whose protection community members renounced some of their liberties – to preserve the order of the common household through “Polity, Oeconomie, and taxation”. Supervision should be based on statistical surveying and “information-gathering”.23

Divergent ideas were however developed, with Anders Nordencrantz stressing the benefits of “private vices”, competition, and individual passions as a foundation for a well-functioning society. He drew inspiration from Samuel Pufendorf, but also from a “naturalistic view” in accordance
with Bernard Mandeville and Adam Smith. A good society was one in which the ruling power was based on “a fraternity of free, independent citizens” and where the state prevented “privileges and extraordinary advantages for certain individuals”. Such perspectives, often embedded in a critique of economic policies, gained momentum during the 1760s, and Westerman was one of those inspired by them. He maintained that Swedish shipping, which ideally gave “life and movement to all other trades”, had “taken a bad turn and deviated from its proper objective”. This was illustrated by the fact that “the value of imports exceeds our exports” and that “most of the trade relies on foreign capital”. As long as this was the case, he concluded, manufactures aiming “to improve common householding and reduce luxury” would fail.

Westerman included the iron trade in this discussion, and investigated the market for metal wares, given the extensive state effort to stimulate metal manufacture. He was influenced by his old teacher, Anders Berch, who supported the promotion of “those arts and crafts that employ larger numbers of people, make requisite goods for the inhabitants’ needs, [and] which cause a greater circulation of money, etcetera”. This seemed like an obvious course of action, but Westerman would also criticise the state’s agenda. In 1774, he denounced “the hitherto incorrect manufacturing-systems” that invested in “establishments that are built on artificial foundations”. In a sparsely populated country like Sweden, “improvement” was promoted by “bringing a few crafts, suited to the country’s nature, to the greatest possible perfection”. Each of these, especially those that contributed to a “significant increase in the realm’s exports”, was to be allowed to “pass from father to son like a national trade”. There was a consensus that metalworking had a central place in this group of trades, since Sweden was “endowed with the greatest natural advantages”, but the small domestic market was a constraint to the rise of a “national” manufacture. This became apparent in the 1760s. The state supervisor for fine metalworking, Samuel Schröder, emphasised that “the lack of sales is one of the most prevalent difficulties”, and stressed that “the Domestic Market will not suffice”. Exports had to be encouraged, and the potential for Swedish activity on the market was a key to both Schröder and Westerman when they embarked on their European journeys. Their discussions linked the spheres of production, consumption, and trade, while pointing towards two interwoven developments. The market expanded in a promising way, but it was characterised by growing competition, which would have negative consequences for Sweden if no changes were made.

Amsterdam was a hub for European trade in “iron wares”. It was so extensive, Westerman noted after a visit, that the “annual sale” of each ironmonger “by far surpasses the value of the entire Swedish bar iron export”. The reasons for Dutch supremacy had a long history. The republic had diligently sought out “all kinds of trading and householding branches”, while also seeking to acquire the seagoing trade of countries “that have neglected or not known about their own advantages”. Sweden belonged in the latter group, as it instead had “made war, the enemy of trade, into its main
Måns Jansson and Göran Rydén

concern”. A vast territory and “many favourable Products” made no difference, since the Dutch Republic was “the richest Country in the world” while Sweden was “the poorest Country in Europe”.31

However, the commercial networks converging in Holland also gave Westerman hope. Benefiting from generous policies regarding manufacture and trade, Swedish merchants could be persuaded to make “new trade attempts” to gain sales in Amsterdam, but also to compete with the Dutch for the southern European market. Westerman concluded that gaining access to this trade depended on the “adoption of a better System”.32 He was not alone in using such a metaphor for the metal trades. In the late-1740s, Schröder described Sweden’s role as an international supplier of bar iron in terms of an “Iron system” – a network that connected Swedish ironworks with English manufacturers, who in turn supplied a global market. To Schröder, this system was essentially static and could not generate change itself.33 Westerman had in view a radically different iron market, and envisioned “a future decline in our Bar iron exports”. If Sweden should keep its position in the iron trade, and “impede our competitors”, bar iron had to be shipped at low costs, but it also needed to be supplemented by “finer wares” customised to “the circumstances of foreign consumption”.34

To compete on foreign markets required in-depth knowledge as well as an active presence in important marketplaces, for example through the establishment of “trading offices”. Still, the circulation of metal wares was, to an even larger extent than that of bar iron, marked by fierce rivalry. While he was in Amsterdam Westerman emphasised how “caution and persistency” was needed “when one wants to enter a branch of trade, which has been occupied by others for many years”.35 In yet another memo, he pointed out that the Swedes still had not “sufficient funds and means” needed to compete with British traders, emphasising the “lack of harmony” in Sweden among “those who make and those who ship the goods” – that is, manufacturers and merchants.36 Despite these circumstances, Westerman was in no doubt that a rise of domestic manufacture had to be built on competition and reciprocal trading connections. In a speech to Vetenskapsakademien, in 1770, he questioned the protectionism that prevailed in Sweden, as in other countries. European states put up barriers to “a useful mutual trade” and “forgot the boundaries set by nature itself”. These “householding arrangements” did nothing but limit industry and commercial activity. In Sweden, he noted that “disorder” and an inadequate division of labour existed among merchants, but also stressed that the practitioners had to solve these problems themselves, “in line with the liberty that trade desires”. If necessary, the state should assist in creating “a better order”.37

These arguments should not be understood as an advocacy for a general free trade, but rather as favouring liberty within the common household, sanctioned by a benevolent state.38 “Far-reaching competition” would eventually “bring everything back to its natural condition”, Westerman noted, and the ruling power had an obligation to take active part in this process.39
Others would not agree. In 1765, Anders Chydenius, the Finnish cleric, pointed out that instead of following examples set by “great trading nations”, Sweden had turned to “restrictions, exclusive privileges and secrets”, measures that only benefited a small number of merchants. In a word, Chydenius later added, “monopolies, bill-jobbery and a national deficit can never arise unless they are protected by the laws[,] but may well be maintained once they have been established”. To the disadvantage of export sectors like the iron trade, these arrangements had been complemented by regulations that prevented foreigners trading “freely in the largest towns” and thereby challenging “the vested interests in the country through competition”. The creation of Jernkontoret in 1747, with the intentions of counteracting the low iron prices set by overseas traders and facilitating loans to ironworks-owners, had hardly made any difference: “as to whether this benefited the poorer or the more affluent ones is common knowledge”, Chydenius concluded. In 1766, this critique was developed, when he stressed that the ironmasters’ own association was a remnant of an old “Trading System”; countering the interests of influential merchants with such an institution was only to balance one monopoly with another. All “economic privileges”, Chydenius emphasised, led to “distortions [...] that favour certain people but hinder others in the conduct of their business”. The state’s protectionist agenda and Jernkontoret’s activities thus failed to invigorate exports and led to difficulties for the metal trades as a whole.

These discussions point to the importance of bar iron export, but also indicate that something more than commercial improvement was needed. Also in 1766, Rinman wrote of what “hinders the growth of [our] metal works” and created “the basis for such poor sales in foreign places”. He noted the lack of capital, expensive input goods, and a poor presence in overseas marketplaces, but he also stressed the lack of “competition” and few “facilitating machines”. General improvements could only be achieved if alterations were made simultaneously in the spheres of circulation and production. Westerman echoed this in his speech to Vetenskaps-akademien, noting that an “even sale” and “quality goods” went hand in hand; “manufacture and marketing are alternately the effect and cause of each other’s perfection and survival”. In this respect, he had already paid attention to the impact of individual liberties during his journey to Britain. A “Manufacturing Town” endowed with “unrestricted liberty”, where “Natives and foreigners of whatever religion they may have” could practise their trade, was “the first pillar” of improvements in “fine” metalworking. An urban area “liberated” from guilds and state regulations would result in an influx of artisans and “stronger emulation”, but also create opportunities for using a “rational economy and division of labour” and “Mechanical Machines”. Examples from Birmingham, Leeds, and Manchester, Westerman concluded, had, “in a short time”, proven how such a “principle of liberty” gave rise to a “remarkable strength and populousness”. These observations added a layer to Westerman’s ideas on overseas trade. In 1768
he discussed the “slower pace of Work”, a major reason for poor Swedish manufacture, by placing domestic production within a larger context. The making of saleable products and the expansion of export, as well as population growth and rising prosperity, were all associated with “more intensity and diligence” in the sphere of production. He emphasised Sweden’s disadvantage with a “small number of working hands”, which prevented “competition for employment”. Still, there were opportunities to follow “more advanced” countries. England, again, was the main comparison, with its concentration of the workforce, “the use of handier Tools and Machines”, and a “more convenient division of labour, by which each worker does not deal with more than one task”. Westerman was confident in following the English “method”, but more ambivalent when it came to the origin of these changes. On the one hand, “diligence and perseverance” in other nations seemed to have arisen “more because of population and other events, than of any general Householdings-regulations”. On the other hand, in promoting the application of piecework he stressed that such a matter “could profit from measures taken by the legislative power”, if employers failed to “voluntarily” adopt the correct organisational model. The state should, therefore, intervene if individual “householders” did not comply with changes that were for the “service of the public”, especially so when dealing with the “most useful arrangements” that took a “long time” to implement.47

We should not jump to any conclusions regarding the way in which the visit to Britain affected Westerman’s discussion of Swedish manufacture. It was one source of inspiration, but he was certainly also inspired by other commentators. Chydenius reasoned along similar lines, as he turned against the coercion and monopolies that characterised Swedish manufacture, stressing that “freedom” was “a term with too wide a meaning”. There was a real risk, he noted, that it became entangled with the privileges of specific groups – “the freedom of a few individuals”. In Den Nationelle winsten, he emphasised the mutually reinforcing connections between liberty, competition, and toil, and criticised what he believed to be excessive state interference.48

Industriousness and diligence require a cheerful disposition and constant competition if they are not soon to slacken off. They never exist under oppression, but when they are encouraged by liberty, a rapid turnover of products and individual profit, that natural sluggishness will be overcome which can never be permanently removed by violent means.49

Again, Chydenius went further than most in his critique. As with overseas trade, we should not regard the remarks by Westerman as a tribute to liberty in general. Instead, it was a way of promoting alterations within a well-defined segment of the economy; freedom and competition in the metal trades, combined with organisational and technical improvements, was to be initiated in a top-down fashion and framed by the “regulated structures” of the
existing householding system. Still, Westerman saw a potential for more extensive changes that went beyond the perimeters of “free towns”. After being active in promoting such an initiative, the foundation of Eskilstuana Fristad in 1771, he stressed that it would be of vital importance for metal manufacture, by “attracting working hands and fostering competition”. It was evidently the state’s task to provide for liberty and “proper competition”, but once in place, one could expect “good products at a low price” and “ample sales”, which in turn affected “the craft’s expansion”. In this way, “the creation of free manufacturing communities” could also “serve as a model for the improvement of the entire trade”. On the other side of the spectrum, Westerman saw “artificially created crafts”, as “alien plants in greenhouses”, which tended to “wither and die, if something is missing in their delicate care”.

Given the criticism from commentators such as Chydenius and Westerman, it is not difficult to imagine that these “alien plants” referred to misdirected and state-subsidised enterprises of the prevailing “manufacturing system”. Encouragement of domestic production, they stressed, should rather be geared towards trades with an innate potential for “expansive movement”, without excessive state governance. Metalworking was among these sectors, based upon rich “natural” resources. Still, other countries had the lead, and Sweden was trailing. In Westerman’s view, Fristaden was part of the solution, but liberty, technical improvements, and a better organisation of work had to be complemented by activities in the commercial sphere: “If Iron-refinement is to be duly assisted and improved, then this assistance must extend in a Systematically coherent manner to all parts”.

It must be remembered that these discussions reflected changes in the market, as Westerman observed during his foreign tours. Moreover, in British towns he had witnessed the positive effects of individual liberties and competition. Thus, when he spoke of “Systematically coherent” measures, it is evident that these were also intended to lay the foundation for man-made improvements in the metal trades. The same measures were promoted in texts that more explicitly favoured “free trade”. The anonymous Tankar om Fri Handel, from 1779, dealt with many of the improvements that featured in Westerman’s writings, but it did so with important additions. In criticising protectionist measures and promoting competition, the author referred to Smith’s newly published Wealth of Nations. If domestic products were made better and at the same price as imported ones, it was said, consumers would always choose the former and the latter would be “expelled” by the forces of the market. In this way, each country could specialise in making things from their own “raw goods”, at the same time as consumers and entire nations enjoyed the benefit of a “freer mobility”. This was unregulated markets and division of labour interacting to create improvements in the spheres of circulation and production. The text also referred to Qvist’s 1776 speech in stressing that competition did not exist simply within national borders. The author used the term “intrusive spirit”, and argued that the export of Swedish
products would be much facilitated “If Sweden just owned one Place, well, even the smallest of patches in the West Indies”.54

To Westerman and his peers, improvements in the metalworking sector were seen against a background of expanding markets, liberty, and an elaborate organisation of labour, features that have been identified as key qualities in “Smithian growth”; although in this case, these advances were conceived within a static system of householding still to be governed by cameralist principles of an active state. It would take a few more decades before further alterations generated a different, in many respects more modern, perspective on economic progress.

**Svedenstierna, Machinery, and Growth**

In 1801, Eric Thomas Svedenstierna left Sweden for Paris, where he went to lectures in chemistry and mineralogy. A year later, he crossed the English Channel, for London and British industrial districts. He viewed copper smelting in Swansea, the gigantic ironworks at Merthyr Tydfil, metalworking in Birmingham, coal mining at Newcastle, and much more. In 1803, he was back in Sweden, and the following year he wrote a book about his journey, “in a rather easy and free style”.55 Svedenstierna trod a similar path to Qvist and Rinman. Born to a family of ironmasters, he studied chemistry and mineralogy at Uppsala University, and defended a thesis in Oeconomia in 1782.56 He was soon appointed to a position at the Bergskollegium, where he stayed for a decade, being entrusted with “hands-on” tasks, such as overseeing pig iron making. In the 1790s an ironmaster gave him the resources to experiment with novel forms of making iron, but he also took part in canal construction. At the turn of the century, Svedenstierna was one of the most gifted young servants of Swedish iron making, and a perfect candidate for a journey to Britain, where he was expected to study iron production and market conditions for Swedish iron.

Much had happened in Britain since Qvist’s journey, but neither the Bergskollegium nor Jernkontoret had sent any travellers to report on developments. The Swedish authorities realised that they needed to know more about recent developments, especially about the advent of what Wrigley called the “mineral-based energy economy”, with coal being used in iron production. It had been acknowledged since at least mid-century that pig iron was made with coal, but Swedish officials were also aware about new ways of making bar iron. The latter was potentially a bigger threat, since Sweden competed in the British market for bar iron. Puddling, as the new process came to be known, was described in Rinman’s Bergwerks lexicon, where the author stated that the British iron was of inferior quality. Coal was also used in the newly invented steam engines, also powering hammers and rolling mills.57

Svedenstierna was the perfect choice for the mission of informing the mining administration about what was happening in Britain, but the book he published on his return was not what Jernkontoret wanted, even if the
section on Merthyr Tydfil included an account of puddling. They wanted a scientific treatment that expanded what was already known. Svedenstierna was aware of the plain narrative of the book, and noted that “in the future” he would “give a more complete description”. The coming decade saw a drawn-out conflict between Svedenstierna and Jernkontoret about such a publication. During that period, he was busy with other projects and returned to his employment, overseeing pig iron making and improving blast furnaces. In 1805, bar iron making was added to Svedenstierna’s tasks, and he was to educate younger colleagues in both practical work and theoretical knowledge. Moreover, he initiated the first Swedish periodical on iron making, *Samlingar in Bergsvetenskapen*. As both editor and main author, he contributed texts on the relationship between theory and practice, iron export, and technical upgrades. *Samlingar* only lasted from 1807 to 1811, but Svedenstierna had shown his proficiency, and in 1813 his long-awaited scientific treatment of British iron making appeared. It was indeed an ambitious book, with the production of iron inserted into a wide framework of economic and technological reasoning, but many readers were disappointed since it only dealt with pig iron. To some extent this was remedied four years later when he published an article called “On Puddling”, which was a compilation of what the French metallurgist Jean Henri Hassenfratz had written on the topic. That article was published in 1817, in the first volume of a new periodical, *Jernkontorets Annaler*. Once again, Svedenstierna served as both editor and main author.

A foundation for Svedenstierna’s thoughts in the early 1800s was the connection between Swedish iron and British development. Export was the obvious link, but British development implied so much more. The difficult times faced by Swedish iron producers in these years was the outcome of “a surprising development of England’s Political, Industrial and Trade System”, and it was with an analysis of this “system” that he gradually broke with his eighteenth-century predecessors. When people like Schröder imagined one system, Svedenstierna saw a plethora of systems, all related to each other. From this perspective, he created a flexible model in terms of which Swedish dependency on British developments should be analysed, centred on industry, market, science, freedom, and progress. He did not use the concept of technology, but technological development was crucial to his thoughts.

One novelty signalled by Svedenstierna was the dissolution of the unifying concept of trade used in the previous century, as an amalgam of making and commerce. He did not stop there, however, as he also made a distinction between the means of production and the practice of labour (“construction methods and labour processes”). This made him capable of dealing with the different aspects independently, before putting them together again, which, in turn, gave him the opportunity to analyse “the physical artefacts” on its own, and thus to scrutinise what we later have called technology. He abandoned Beckmann’s definition of Technologie, as “the knowledge of handicrafts”, for an analysis of technological development with a potential
to change society. His discussion of puddling is paramount, but it also related to coke-smelting, and James Watt’s improved steam engine. While the earlier generation discussed the division of labour and the importance of skill, Svedenstierna only mentioned these in passing, when dealing with labour costs in relation to machinery; with new blowing machines lower wages were an option. This separation between machines and labour pushed the latter into the background of the analysis, something that was accentuated by the emphasis on machine building. In this way, Svedenstierna emphasised the technological aspect of production, and it became his main theme.

To an extent this replacement of labour by technology is partly hidden by the slow introduction of a new concept, that of industry. The word had existed in Swedish for a long time, meaning to be diligent and industrious, but from the latter decades of the eighteenth century it began to appear with a modern meaning, pointing towards production taking place in mechanical workshops. Svedenstierna used the concept when looking back on his British journey and in his 1813 book “industry” denoted specific aspects of the British economy. Through this intellectual manoeuvring he was able to redirect the attachment of markets to production to a conception where the market – preferably a free market – was related to one particular type of production, that of industrial production. He gave a thorough account of the relationship between production and consumption, and how Swedish producers were completely dependent on the British market. Changes in British demand had an immense effect in Sweden, and the development of puddling was a threat, but high British tariffs were also a menace to Swedish producers. It was “England’s natural advantages, its wide-reaching commerce and its merchants’ money-strength and credits, along with Government measures” that created a strong British iron industry. Svedenstierna objected to British tariffs from two different angles. On the one hand, he had a pragmatic objection, since tariffs raised the price of Swedish iron and hampered its prospects. On the other hand, he objected in principle to state involvement in any market. When he discussed British iron making he regularly invoked the free market, and stated that the main reason for the low prices of British iron was to be found in “the competition … among those who act within the same industry”, so that those who have been successful undersell those who are less fortunate. In this way, Swedish producers were confronted by both a free and a regulated market; free British producers obtained an additional advantage from state enforced tariffs.

The advantages of “lighter pressure”, Svedenstierna explained, were evident during difficult times, since they brought about industriousness as well as “considerations to make smaller losses”. The free market had established the British iron industry as the force placing Swedish iron makers in a difficult situation, together with the gradual adaptation of coal, new technologies, and high tariffs. In 1813, he noted how these factors opened “prospects for a future with almost endless production”. Technology was the key to a radically different future and discussion about progress, and the 1760s
was a watershed. The seventeenth century had indeed seen a “happy gift of invention”, but the “imperfections of machinery […] held back progress”. Instead, Svedenstierna emphasised that “progress belonged to a different age”, that of the later eighteenth century; “English iron making can count its beginning” from the time of the introduction of Watt’s steam engine.

Everything that Svedenstierna wrote must be viewed in the light of the difficulties facing Swedish iron producers, many of whom struggled with declining exports. Here British developments revealed a pattern for survival. Its technology could be copied, and an unregulated market might spur industriousness and betterment. Gustaf Broling, a contemporary to Svedenstierna, wrote that England was “the most industrial country”, and became the first Swedish writer using the adjective “industrial” to describe this process. Svedenstierna added that one should have faith in development; it was necessary to “tirelessly [follow] the direction of the age and hence the improvements arising”. It was up to Swedish producers to do the same. His foundation was “discoveries in chemistry, physics and mechanics”, and how they might be put to productive uses. This was to follow “the direction of the age”, based on necessary features for the application of scientific knowledge, such as willingness, monetary resources, considerations, skills, and diligence. A lack of any of these would hamper further progress.

Like Qvist, Svedenstierna was a member of Vetenskapsakademien, and in 1810 he delivered his speech “On Swedish Iron Making in Older and Newer Times”. In doing so, he placed himself in the midst of Koselleck’s Sattelzeit. The speech began by stressing the long history of Swedish iron making, “since ancient times”; agriculture could not exist without iron, and Sweden had been cultivated since before “Oden”. The country was blessed with “rich deposits of iron ore”, a foundation upon which Swedish society rested. Svedenstierna elaborated a “stadial theory” of history, with development towards a progressive and enlightened present. Some disruption between stages was caused by monarchs, but there were other forces in motion as well. The ties between the market and production remained crucial, beginning with the links between iron and agriculture, but proceeded to an analysis of how rising foreign demand inspired Gustavus Vasa to recruit German artisans. Crisis awaited at the end of the seventeenth century, when producers suffered under the “weight of King Carl XII’s long-lasting and devastating wars”.

Swedish iron making recovered after the Great Northern War, and the period was characterised by “the Ruler’s tireless efforts” to re-establish the iron trade, efforts informed by a “corporative spirit”. Coming back to the free market, Svedenstierna stated that it would have been better if the trade had been left “both unassisted and untouched, with its own forces to work itself forward”. In this way “industriousness would be encouraged”. Despite this, he continued, Swedish iron making had reached a “greater height than ever before.” There was “competition” in the British market, with increasing Russian iron production and that of British makers, “with their unsteady transition from charcoal to mineral coal”. Swedish producers also improved
their knowledge about iron, and Svedenstierna praised Rinman’s publications as a source of inspiration, “the best that have come off the printing presses of any country”. The final decades of the century were “the most shining period” for domestic iron production, with steady demand, low grain prices, and a stable exchange rate. New production methods grew in importance; and without using the term “technology”, Svedenstierna talked about “happy inventions by known Mechanici”, and heralded improved blowing machines and new ways of managing waterpower. Rising output was a sign of “improvement”, and it was caused by “mechanical devices”, or, in other words, by technological developments.

The market dimension did not lose its importance, but the situation had changed, and Svedenstierna’s main argument was that it would change again. In 1810, he was aware that what happened before the turn of the century would affect what was to come. Recapitulating the results from his 1804 book, he noted that from the 1780s British production rose quickly, with large new ironworks using coal-based technology, coke-fired blast furnaces, puddling, and rolling mills powered by “the famous Mr. WATT’S improved Steam Engine”. As a result, Svedenstierna stressed, Swedish iron making balanced “on the outer edge, where it still stands […] undermined and weakened by foreign industry”. According to Svedenstierna, Swedish iron making would be salvaged and the reason for this was related to his way of writing history, “naturally divided into Three great Epochs”. The first one began with “new and improved Iron Processes”. The second came with the accession of Gustavus Vasa, and yet another wave of new processes. The beginning of the last age came when puddling had “gained enough substance”, and with Swedish producers placed on that “outer edge”. The same epoch also encapsulated, however, “the improvement of the sciences and their application; common enlightenment and connected consideration, industriousness and thrift”, and Svedenstierna had few hesitations about the future. It was only to follow “the direction of the age”, and “new ways” to markets being created through “Europe’s and other Continents’ recreation.” He predicted a new society with “an improved oeconomia”, without “the oppression” of state regulations, striving for “new ways to generate sales”.

Iron Making in die Sattelzeit

Our story began with a speech, delivered by the mining official Bengt Qvist to Sweden’s most important scientific association, Vetenskapsakademien. The year of this speech, 1776, is memorialised by another, far more important publication, that of Adam Smith’s The Wealth of Nations. As we have emphasised these two texts partly deal with the same theme, the relationship between making and markets. 1776 was also the onset of what has been labelled as the Revolutionary Age, with the signing of the Declaration of Independence and the beginning of the American Revolutionary War. Moreover, this period has been hailed as the beginning of the Industrial Revolution, which Arnold
Toynbee named and linked to the introduction of the new coal-based technology. Our story ended with yet another speech in the long line of discourses on domestic metal processing, when Eric Thomas Svedenstierna, in 1810, delivered a speech on the history of Swedish iron making. The first decades of the nineteenth century are normally not seen as the end of the Revolutionary Age, but it is obvious that much had happened since the time of Qvist and Smith.

When in 1810 Svedenstierna spoke about “an improved oeconomia”, he re-used a term that had been fundamental for eighteenth-century Swedish writers on economic matters. When “hybrid experts” like Qvist and Rinman used the concept of householding during the 1760s and 1770s, they were doing so with a firm belief in the world as a static structure, with interconnected oeconomic systems (such as the iron system) that could not generate change in themselves. Rinman spoke about the need for “general improvement”, and Qvist similarly discussed the benefits of simultaneous advancements in the spheres of production and circulation; “industriousness” and an “intrusive spirit” would pave the way for “expansion” in the Swedish metal trades. With extensive experience of both commercial and industrial hot spots in Western Europe, their colleague Westerman added that industry and competition was put into motion through liberty. All the same, none of them could imagine “the direction of the age” that Svedenstierna spoke about. The latter’s “improved oeconomia” was, in this way, a new type of improvement, guided not only by changes in the material world but also by viewing them as leaps ahead rather than altered versions of the same. In doing that, he moved from a discourse of improvements to one of progress, with the latter turning into what Koselleck thought of as a “collective singular”. With the words of the French historian Daniel Roche, it could be said that Svedenstierna’s speech placed the focus on “how change became possible in a world that saw itself as stable, changeless, and coherent by virtue of ancestral principles and age-old values”.

We do not imply that our eighteenth-century travellers were unaware of changes taking place. In the same way as Smith criticised “every system” built upon “extraordinary encouragements [and] extraordinary restraints”, these Swedes also began to question the all-encompassing doctrines of cameralism. Instead of monopolies, they promoted ideas of a liberated trade, and instead of a state-enforced division of labour, they saw the benefits of a changing organisation of labour related to market competition. In one crucial aspect, however, these men remained close to cameralist thinking, as they always believed that the solutions to the problems of Swedish economic development were to be found within the realm. There was a consensus among Qvist, Rinman, and Westerman that Sweden was endowed with rich resources below ground, and they agreed that by improving manufacture it would be possible to compete on the international market. To simply export bar iron would not suffice, as other countries had profited from taking metalworking further. Natural endowments, a changing organisation of labour, and a free market were all central pillars of what we now call “Smithian growth”.

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Conditions for Swedish bar iron export deteriorated from the beginning of the Napoleonic Wars, and around 1810 it had reached its nadir. Svedenstierna was aware of the difficult situation, but he did not only view what happened in Britain as a threat. The British development, with its innovative uses of new machinery, was also the way ahead for Swedish producers. Svedenstierna dated the beginning of a new age to the 1760s, with the introduction of Watt’s steam engine. This, rather than an altered organisation of labour, was to follow “the direction of the age”. In essence, he had what we call technological development in mind, and what Svedenstierna saw as “progress” we would now call “Kuznetzian growth”.

Svedenstierna belonged to what Koselleck has coined as die Sattelzeit, and from a Swedish standpoint, he belonged to its very centre. We have shown that he, in his writings, differed significantly from his predecessors, foremost in the way he viewed time and development. When Svedenstierna used the concept of progress, he did so in a way resembling what Koselleck defined as a “collective singular”. Progress to Svedenstierna was open to the future, with a rupture towards the past, and it had a more abstract and ambiguous meaning than the “improvements” described by Qvist and Westerman. Svedenstierna’s contemporary, Gustaf Broling, was also an advocate for progress, and an early user of the adjective “industrial”, in trying to capture British advances. In doing so, he came close to what Koselleck saw as “the non-simultaneity of the simultaneous”, the contemporary existence of features in different stages of development. 

Notes

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3 Ibid., 4–5, 7, 9, 22, 27–28.
7 Bengt Qvist Andersson, “Beskrifning om Gjutståls beredningen”, Bergsskolans biblioteks manuskript, E. 12, no. 5. Kungl. Tekniska Högskolans bibliotek, Bengt Qvist Andersson, report to Jernkontoret, 1787-04-26, Rinmanska arkivet, S-K:2, Tekniska museets arkiv (TMA); Bertil Boëthius, Åke Kromnow,


15 Smith, Wealth of Nations, 17.

16 Wrigley, Continuity, Chance and Change, Ch. 2.


21 The biographical data in this paragraph and the following ones build on earlier accounts of Westerman’s life; see, e.g., Åke W. Essén, Johan Liljencrantz som handelspolitiker: studier i Sveriges yttre handelspolitik 1773–1780 (Lund: Gleerup, 1928), 63–67; Svenskt biografiskt lexicon, Vol. 23 (Stockholm: Riksdarkivet, 1980–1981), 26–32, “Johan Liljencrants” (article by Kjell Kumlien). Westerman was ennobled in 1768 as Liljencrants.


28 Ibid., 98.

29 Samuel Schröder, report to the Diet, 1769-04-04, 718, Frihetstidens utskottshandlingar, R. 3494, RA.


37 Westerman, Tal, Om Sveriges Utrikes Handel i allmänhet, 7–9, 13, 17, 33.


39 Westerman, Tal, Om Sveriges Utrikes Handel i allmänhet, 9.


Johan Westerman, report to the Swedish Diet, 1765, 8–11, Frihetstidens utskottshandlingar, R.3338, RA.


Chydenius, *Den Nationelle winsten*, 20–21.


Johan Westerman, memo to *Jernkontoret*, 16 May 1770, Bergsrådet S. Schröderstiernas papper. Vol. 1:1, 2H, Eskilstuna stadsarkiv. Westerman’s memo was attached to the formal statement (about the creation of a fristad in Eskilstuna) that *Jernkontoret* delivered to Bergskollegium in November the same year.


Westerman, memo to *Jernkontoret*, 16 May 1770.

*Tanekar om Fri Handel* (Göteborg: Lars Wahlström, 1779), 11–14, n. 7.


Eric Thomas Svedenstierna, *Ändrings Vinnande, de vid Bergs-Tings-Rätterne Fällande Domar och Utslag* (Uppsala, 1782).

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65 Svedenstierna, Några Underrättelser, 14, 16; Svedenstierna, “Historiska upplysningar”, 27; Svedenstierna, “Till Herrar Bruks-Ägare”.


67 Svedenstierna, “Till Herrar Bruks-Ägare.”

68 Svedenstierna, “Försök till Svar” quotations at 88, 100, and 107.

69 Svedenstierna, Tal Om Svenska Jernhandteringen, quotations at 5, 9, 22, and 35. See also Boëthius, Kromnow, Jernkontorets Historia, D.3, 118–19.

70 Svedenstierna, Tal Om Svenska Jernhandteringen, 37, 41–45.

71 Ibid., 47, 52.

72 Ibid., 52–55.

73 Roche, France in the Enlightenment, 6.


75 Koselleck, The Practice of Conceptual History, 159.