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**LATE ECONOMIC DEVELOPMENT  
IN A REGIONAL CONCEPT**

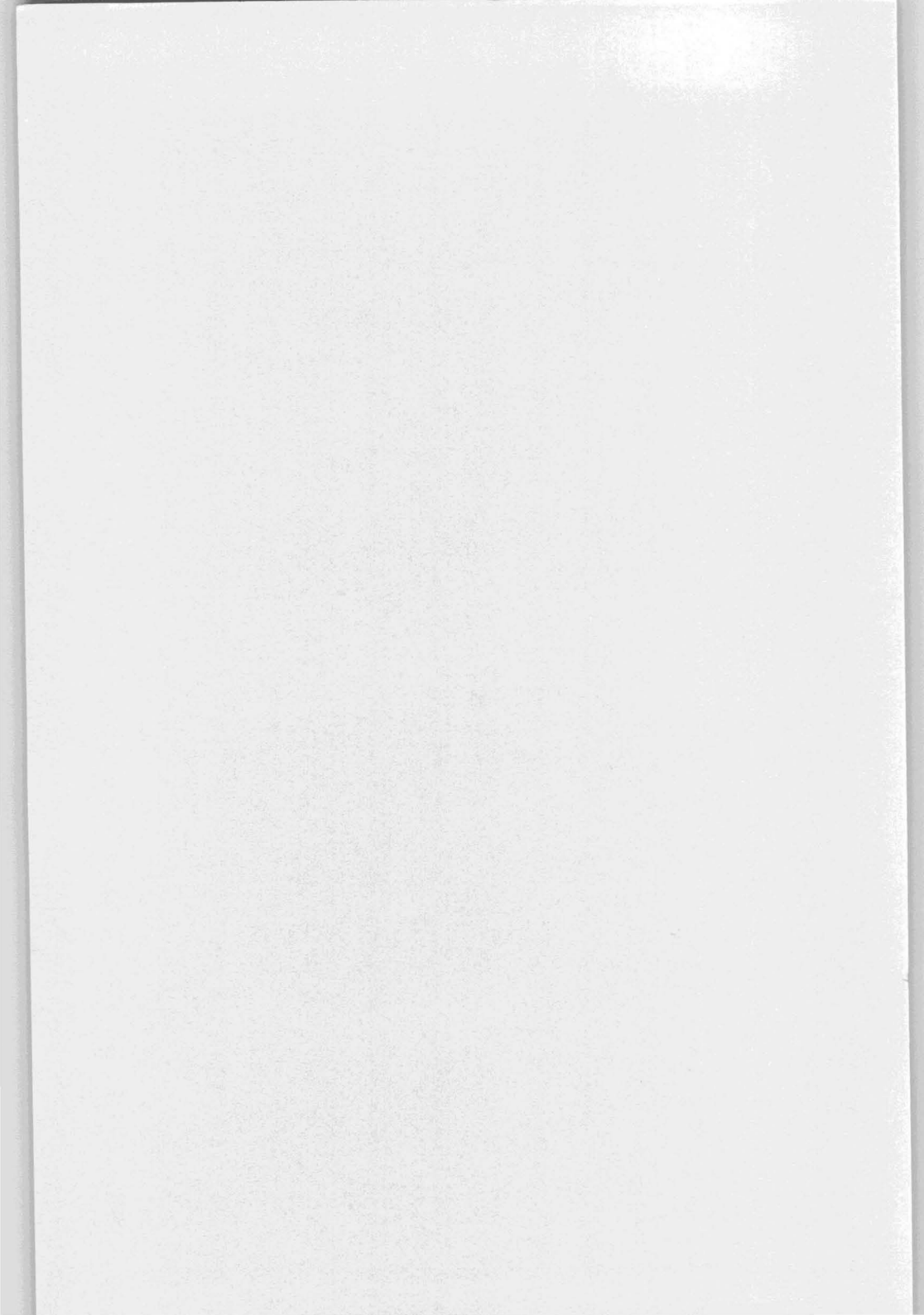
**Domingos Giroletti, Max-Stephen Schulze, Carles Sudrià**

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**Late Economic Development in a Regional  
Context**

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## **Entrepreneurship in a Later Industrialising Economy: the case of Bernardo Mascarenhas and the Textile Industry in Minas Gerais, Brazil<sup>1</sup>**

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### **Introduction**

The modernization of Brazil began in the second half of the last century. Many factors contributed to this development: the transfer of the Portuguese Court to Rio de Janeiro and the opening of ports to trade with all friendly countries in 1808; Independence in 1822; the development of coffee production; tariff reform in 1845; and the suppression of the trans-Atlantic slave trade around 1850, which freed capital for investments in other activities. Directly and indirectly these factors promoted industrial expansion which began with the introduction of modern textile mills. Many factories were organized, from Maranhão in the north to Rio Grande do Sul in the south. The greatest concentration of these factories was in the prices of Rio de Janeiro, São Paulo, Bahia and Minas Gerais.<sup>2</sup> Most were owned by small companies, employed less than one hundred workers and produced for local markets. A few larger factories, with more than three hundred employees were located mainly in Rio de Janeiro and São Paulo. The Rio mills produced for wider markets and used a commercial network to sell imported industrial fabrics.<sup>3</sup> The most dynamic economy

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<sup>1</sup>I would like to thank Francis Goodall, Nick Tiratsoo, Terry Gourvish and Colin Lewis for their useful suggestions. This project was financed by a CNPQ grant.

<sup>2</sup>More details about Brazilian economic development are contained in C. Furtado *The Economic Growth of Brazil: a Survey from Colonial to Modern Times* (Berkeley, 1963) and W. Suzigan *Indústria Brasileira: Origem e Desenvolvimento* (São Paulo, 1986). For a survey of the literature, see C M Lewis "Brazilian Business History, 1850-1945: recent trends in the literature" (unpublished paper, LSE, 1993).

<sup>3</sup>For a general view of the Brazilian textile mills, see, SJ Stein *The Brazilian Cotton Manufacture: Textile Enterprise in an Underdeveloped Area, 1850-1950* (Cambridge, Mass., 1957).

was São Paulo, which was based on coffee production and exports and used free labour, mainly Italian immigrants. The coffee trade made possible railway construction and fostered urbanization and industrialization. These changes, and the export-import trade, increased the internal market for Brazilian cloth. Most skilled workers in the Rio and São Paulo mills were European immigrants. Many of the industrial entrepreneurs and managers came originally from the export-import trade and they, too, were usually immigrants or foreign traders. The literature usually states that skilled workers and entrepreneurs were already trained when they arrived from abroad.<sup>4</sup>

This paper will focus on Minas Gerais. The region was originally settled when gold and diamond mines were established there during the eighteenth century. Gold and diamonds became important items in the international trade markets of colonial Brazil and the trade promoted exchanges amongst previously isolated regional economies. During the golden age (1700-1770) many towns were founded in central Minas Gerais. These towns became a focus for commercial activities and production as well as important mining areas. The exhaustion of individual mines did not mean the abandonment of precious mineral production: some slave owners continued to work in extraction. Such production kept the internal market ticking over<sup>5</sup>. However, many left the gold areas with their families and slaves and settled previously unexplored forest land in the south, west and northeast. They organized plantations to produce coffee for export via Rio de Janeiro. Until their coffee established a

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<sup>4</sup>There are several contributions about the São Paulo industrial and urban development: W. Dean *The Industrialization of São Paulo, 1880-1945* (Austin, 1969); W Suzigan, op. cit; W Cano *Raizes da Concentração Industrial em São Paulo* (São Paulo, (1977).

<sup>5</sup>There is a very important literature about gold development and settlement. See C R Boxer *The Golden Age of Brazil, 1694 - 1750: Growing Pains of a Colonial Society* (Berkeley, 1962); A B Castro *7 Ensaios sobre a Economia Brasileira* (Rio, 1971); P Singer *Desenvolvimento Econômico e Evolução Urbana* (São Paulo, 1968).

reputation in external markets many *minerio* farmers manufactured goods to be sold in the growing city of Rio de Janeiro.<sup>6</sup>

Most factories in Minas Gerais were situated in the coffee area. Juiz de Fora, known as the Brazilian Manchester, became an internal centre of distribution after the União e Indústria turnpike was built to transport coffee to Rio de Janeiro. Coffee production, trade and transport were the main factors that explained the great concentration of capital in Juiz de Fora. Before beginning construction of the road, the União and Indústria Company brought German skilled craftsmen to Juiz de Fora for the project. They came to prepare the materials to be used in road-building. When work for the Company finished, most of these craftsmen stayed in town and opened their own workshops to produce industrial goods for the internal market. Many other factories, textile mills, shops and services were organized there during the last century. In these businesses, European skilled workers occupied the leading positions, just as they did in São Paulo industries. In Juiz de Fora there were two kinds of industrial entrepreneur: local capitalists came from agricultural, service and trading backgrounds; other manufacturers were immigrants, especially Germans and Italians<sup>7</sup>.

From this brief description, it can be seen that there are more differences than similarities in the industrialization processes of São Paulo and Juiz de Fora. European skilled workers were to be found in both areas and coffee production created the general conditions for growth, including capital, markets, infrastructure, transport, and

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<sup>6</sup>To get more information about the development of coffee production, see S Silva *Expansão Cafeeira e Origens da Indústria no Brasil* (São Paulo, 1976); J D Wirth *Minas Gerais in the Brazilian Federation, 1889-1937* (Stanford, 1977); O Valverde "Estudo Regional da Zona da Mata de Minas Gerais" *Revista Brasileira de Geografia*, Rio de Janeiro, 20(1)3-82, 1958.

<sup>7</sup>D Giroletti *A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900* (Belo Horizonte DCP/UFMG, 1980, unpublished paper).

so forth; but there were differences. In Minas Gerais, coffee production and most agricultural activities were carried out almost exclusively by slaves and the internal market was more limited. In São Paulo, on the contrary, coffee was increasingly cultivated by free workers. After the opening of the Santos Jundiaí Railway in 1867 and the subsequent construction of a locally-financed provincial railway network in the 1870s, São Paulo became the most important city in Brazil and the greatest industrial, service, trade and financial centre.<sup>8</sup> After the opening of the União and Industria Road, Juiz de Fora grew as an industrial and trading centre but only to a very limited extent. The social origin of the industrial entrepreneurs in the two locations was also different. The *paulista* capitalist usually came from import and export trading and most were immigrants. In Juiz de Fora, however, entrepreneurs did not come from a background in international trade and only half were immigrants, so their foreign commercial linkages were very weak. As already indicated, most domestic *mineiro* industrialists had previously been active in agriculture, services or internal trading.<sup>9</sup> Even within Minas Gerais, there were many differences amongst the sub-regions. The nineteenth century Minas Gerais economy was described as a mosaic, meaning that linkages between regions were weak. Perhaps this explains why the development of the textile mills in the centre and north on Minas Gerais was not directly related to coffee production. As a result these factories did not use European immigrants as workers. Instead they relied on native Brazilians - free whites, slaves and ex-slaves - and on former peasants or craftsmen. Most of the textile workers were children and women (around 70%). With no previous experience to draw on, the textile entrepreneurs had to develop a process to transform these unskilled workers into a skilled industrial workforce. A special strategy was developed, beginning at the mill

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<sup>8</sup>C.M Lewis *Public Policy and Private Initiative: Railway Building in Sao Paulo, 1860-1889* (London, 1991); F.A.M. de Saes *A Grande Empresa de Servicos Publicos na Economia Cafeeira, 1850-1930* (Sao Paulo, 1986).

<sup>9</sup>This process was analysed by D Giroletti *Industrialização de Juiz de Fora, 1850-1930* (Juiz de Fora, 1988).



and continuing in the industrial village . The textile mills were organized around British machinery, using skilled English workers to supervise production and to train Brazilian workers<sup>10</sup>.

Looking at entrepreneurial and managerial formation in textiles during the last three decades of the nineteenth century, it should be said to begin with that Brazil was a slave society until 1888 with little industrial tradition. What did textile entrepreneurs do to become successful and what had they done to modernize in technological and industrial terms? This question may be addressed by examining the family and educational background of the *minerio* entrepreneuriate, taking as an example the career of Bernardo Mascarenhas. Mascarenhas established one of the earliest textile mills in Minas Gerais, the Cedro Mill (CEM), which was set up in 1869. Gradually the firm expanded and it is today the biggest textile group in Minas Gerais and one of the largest in Brazil<sup>11</sup>.

#### **Family and educational background**

The main textile entrepreneurial group in Minas Gerais came from one large family. Antonio and Policena Mascarenhas had thirteen sons and daughters. Antonio was the son of a Portuguese muleteer, married to a native woman. His parents were killed when he was a child. Antonio was adopted by a farmer and he grew up and learned to read and write. When he was 12 years old he went to live with his godfather and there he learned metalwork with an Italian immigrant. When he reached adulthood he

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<sup>10</sup>For more details about that strategy, see D Giroletti *Fábrica Convento Disciplina* (Belo Horizonte, 1991).

<sup>11</sup>For more information, see A M Vaz *A Indústria Têxtil em Minas Gerais, o Papel da Família Mascarenhas: 1872 a 1892* (Belo Horizonte, 1976); G M Mascarenhas *Centenário da Fábrica do Cedro, Histórico, 1872-1972* (Belo Horizonte, 1972); D Giroletti *Modernização Capitalista em Minas - a Formação do Operariado Industrial e de uma Nova Cosmovisão* (Rio de Janeiro, Museu Nacional, 1987, PhD Thesis).

was invited to manage his godfather's farm. He was able to save some money as a manager and metalworker and later was married to a farmer's daughter. With his savings, he moved from the west to the central area, Paraopeba, en route to Diamantina, a gold and diamond town in the north of Minas Gerais, organizing a grocery store there in 1832.

As a trader, Antonio made a lot of money which he invested in several farms and many slaves. One of these enterprises, São Sebastião, was a very big plantation with one hundred and fifty slaves, producing coffee, cotton, sugar, beans, maize, rice, handmade cotton fabric, salt pork, mules and cattle for the internal and external market. Most of the Mascarenhas farms had their own craft workshops including a watermill, brickworks, cane crushers, sawmill and abattoir; and many skilled slave workers including carpenters, joiners, blacksmiths, metalworkers, shoemakers and dressmakers. The craft slaves usually attended to the farm's needs but sometimes they were let to outside farmers or attended to external orders. In 1883, Antonio organized the São Sebastião textile mill using the farm's slaves as industrial workers.

All thirteen of Mascarenhas's sons and daughters received a very strong catholic upbringing. They learned to work from childhood onwards. The work had a moral value, but was also seen as the best way to personal fulfilment and economic independence, following the example of their father, Antonio. These strong moral and work values, evident in the letters of many sons, were very important to stimulate their descendants to progress in the business.<sup>12</sup>

All the sons and daughters were sent to catholic boarding schools. These secondary schools were the best in Minas Gerais. There, the boys had a general education in

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<sup>12</sup>For more details about Mascarenhas Family, see P Tamm *A Família Mascarenhas e a Indústria Têxtil de Juiz de Fora em Minas Gerais* (Belo Horizonte, 1940).

Portuguese, Latin, French, mathematics, science and accounting. They acquired a very strong discipline and were taught to see work as an ethical imperative and a way to personal fulfilment. The school education gave them the basic knowledge to continue their education at university (two sons became doctors) or to start their business life as farmers, traders, or modern industrial entrepreneurs. During the holidays, they went back to work at their father's plantation, workshops or trading establishments. They became familiar with relatives and a family business network developed.

When they finished their studies each son and daughter was provided with a capital of 26 contos de reis (1/6 of the real cost of the first textile mill) to start their own businesses. Most of them used this money to buy a farm and slaves and pack mules to transport goods and begin trading. At the beginning, Bernardo and Caetano, the younger sons, invested their money buying and selling salt and cattle. Caetano became a farmer and Bernardo, with the support of his brother, planned to set up a textile mill. But this was an uncertain investment; the first factory, organized in Minas Gerais by two foreigners, had not succeeded. The father and some of the other brothers would not agree to support the new investment. Only the eldest brother, Antonio Cândido, farmer, trader and capitalist, agreed to participate, but he insisted that the new mill had to be located near Paraopeba where he had his own business. Antonio Candido, as an experienced businessman, chose this site because it was easy for him to control his younger brothers and the new investment. Their slaves could work constructing the new factory. Their farm also provided timber for the factory buildings. Finally, the surrounding areas produced much cotton which could be obtained at a good price and with low transport cost.<sup>13</sup>

Eventually Bernardo left his first project to found a new mill in Juiz de Fora. He had many reasons to choose that town: there were many skilled workers in the region; the

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<sup>13</sup>Letter from Antonio Cândido da Silva Mascarenhas to Melo Viana (10/8/1870) in CCC Letter Copier, p.243.

União and Indústria road opened the way to Rio de Janeiro; it was easy to get raw materials; and was close to the regional coffee and Rio markets. In 1887, he realized his original plan, organizing the Bernardo Mascarenhas weaving mill in Juiz de Fora.<sup>14</sup>

### **Bernardo Mascarenhas as a moderniser**

In 1869, Bernardo, Caetano and Antonio Cândido organized a firm to construct the first textile mill. They bought a farm where it was possible to use water for motive power. Bernardo was responsible for planning the new factory. He went to Rio de Janeiro to visit two modern working mills and to buy a sawmill and the tools and equipment necessary to set up a carpentry shop and smithy. These workshops were to prepare material needed to build the factory and houses for workers. He also signed a contract with Gme. Van Vlick Lidgerwood to buy textile machinery made by Arthur Danfort of Paterson, New Jersey (USA). By this contract, the agent had to send two skilled American workers to assemble the new mill. They had to stay for two years running the factory and training Brazilian workers. From Rio, Bernardo went to Itu (São Paulo), and visited a textile mill that was being constructed with American machinery similar to that which he had ordered.

The construction of the Cedro textile mill marked the beginning of Bernardo Mascarenhas's career as a very successful industrial entrepreneur. The Cedro, a small textile mill with eighteen looms, began work in 1872. Its total cost was 142 contos of which the American machinery, (\$19,668) amounted to 42.4 contos (1 conto = c.\$ 463).<sup>16</sup> The wages paid were very low and the price of cotton was cheap. The profit of the first year was 43.6 contos, a value greater than the total machinery cost. The

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<sup>14</sup>For more information about Bernardo Mascarenhas' biography, see N L Mascarenhas *Bernardo Mascarenhas: o Surto Industrial de Minas Gerais* (Rio de Janeiro, 1954).

<sup>16</sup> G M Mascarenhas *op. cit.* p.46.

mill was so profitable that the total investment was recovered in three years<sup>17</sup>. Twenty years later, a French engineer, teaching in the provincial capital, Ouro Preto, and referring to the *mineiro* mania, wrote that the new textile mills were "the real gold mines of Minas Gerais". In 1893 some mills were declaring dividends as high as 42%<sup>18</sup>. Organizing textile mills became a national mania. In Minas Gerais alone from 1872 to 1900, 28 textile mills were set up, fourteen in the central area and six in the north. Textiles were the most important industrial sector in Minas Gerais and in Brazil until the 1920s<sup>19</sup>.

The success of Cedro encouraged the other brothers to become partners but Cedro was a small factory producing cheaper fabrics used by slaves and sacks for agricultural products. Three brothers and one brother-in-law decided to organize a new firm to build another factory. They contracted for Bernardo to organize the Cachoeira textile mill. This invitation was very important to complete Bernardo's industrial engineering training. During the construction of Cedro, Bernardo started to learn English to be able to talk with the American workers. He improved his knowledge studying, reading and speaking with the Americans. In September 1874, Bernardo, as partner of the Mascarenhas & Barbosa firm, travelled to England to order machinery for the Cachoeira. Before buying, he went to the USA to examine American machines. Comparing the different equipment, he decided to buy the American ring spinning frame because it was more modern than the similar English machine. He went to the maker, Tenk, to learn how to assemble it. He went back to Manchester and there he bought fifty two looms and other mill machinery because the English equipment was

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<sup>17</sup>This general evaluation was done by Wells visiting the Cedro factory in that time. For more details, see J Wells *Three Thousand Miles through Brazil from Rio de Janeiro to Maranhão* (London, 1886).

<sup>18</sup>A Thiré "L'État de Minas Gerais et sa Situation Economique Actuelle" *Revista Industrial de Minas Gerais*, Ouro Preto, Anno I, 10, Jan. 1894, p.241/3.

<sup>19</sup>See D. Giroletti, *op. cit.* 1987 and S J Stein, *op. cit.*

cheaper than the American. Again, he went to British textile manufacturers to be trained in assembling their machinery. After ordering all the machinery for the new factory, Bernardo prepared a detailed plan and sent it to his youngest brother, Francisco, who was building the Cachoeira plant. From 1875 to 1876, Bernardo worked directly with two British skilled workers, contracted to assemble the Cachoeira factory, run the fabric production, and train Brazilian workers. At the beginning of 1877, the Cachoeira factory started work.

In 1877, Bernardo went back to manage the Cedro factory. While he was away his brothers were more interested in their farms than in supervising the factory which was left in the charge of unskilled workers, so that it began to make losses. Consequently, Bernardo again assumed charge at Cachoeira. He streamlined the administration and the firm again became profitable. Meanwhile, he also modernised the Cedro factory. The renovated Cedro began to work with 55 looms producing dyed and fine, rather than coarse fabrics, well made and more profitable.

After completing the Cedro renovation, Bernardo convinced his brothers that it was time to train and appoint a new manager. He began to look for a reliable partner to share the Cedro factory management. The favoured candidate was Theophilo Marques Ferreira, married to Bernardo's niece. He was an engineer working on the construction of the Pedro II Railway. Ferreira had become a family member by marriage and had a good education, professional experience and enough capital to be a new shareholder. It was the custom that only a substantial partner could be appointed to manage a factory. This practice became established as the rule in the new limited company. In March 1880, Theophilo was contracted as the Cedro deputy-manager, starting his practical training supervised by Bernardo. During the middle of 1882, Theophilo assumed responsibility as manager of the factory in place of Bernardo. Theophilo stayed as a manager until 1893. From 1886 to 1889, as well as being Cedro manager, he became a Cedro and Cachoeira Company director, with overall

responsibility for both factories. Before finishing his contract, Theophilo trained Francisco Bahia, the future manager of the São Vicente textile mill.

Bernardo, founder of Cedro, became a partner of Cachoeira with the intention of selling the idea that the two factories should merge into only one limited company. He argued that they did not need to compete between themselves and if they combined they would become better equipped to compete against other factories. They would achieve greater economies of scale (more rationalized production and administration, a unified labour policy and so forth) and wider product range. Finally, Bernardo had seen the international trend for companies to merge, as was happening in England, France and America, and he wished their Brazilian companies to follow suit. The merger project was successfully accomplished in 1882 and the two factories were united under the control of the Cedro and Cachoeira Limited Company (CCC). Bernardo's view was paramount in defining the organizational features of the new limited company. Through his influence the new partners maintained the same name, known by dealers and customers as a trade mark. He suggested the creation of a reserve fund saving 10% of the general profit until they had 10% of the total capital in order to renovate the machinery or expand their factories. In economic terms, the merged company became stronger. The factories expanded from 166 looms in 1885 to 223 in 1886. And the profit increased continuously to a peak of 32% in 1893<sup>20</sup>.

The CCC managers started to introduce some scientific labour management principles like wage incentives, and consumer and health services, in order to encourage the labourers to stay working at the factories. At the time there was no labour protection law for children, women or injured workers. They were paid only by the number of days worked. If they were injured at the factory, the workers had no health and wage protection. It was difficult to convince the partners, accustomed to the slave system,

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<sup>20</sup> A M Vaz *op. cit.* p.82.

that some protection was desirable. Bernardo usually used the argument that these kinds of social measures were being introduced in more industrialized societies. This kind of labour policy was efficient in training and retaining the better paid Brazilian skilled workers but was not used with all the workers due to the slave society mentality and the easy availability of unskilled labourers.<sup>21</sup>

On his second journey to England in 1878, Bernardo created another initiative that was very important for the future of Cedro and Cachoeira Company, for him as an industrial businessman and for many other Brazilian entrepreneurs. Visiting one English textile manufacturer, he was shown around by Robert L. Kerr, a British engineer working at the factory. Bernardo suggested to him that he should leave the company and set up a textile agency to sell equipment and other machines in Brazil and South America. To encourage Kerr to start his own business, he offered to pay a commission on all his machinery orders. Kerr organized his own enterprise in Manchester. They became friends and Bernardo signed a commercial agreement. Robert Kerr continued to be the CCC commercial agent into the twentieth century, exporting machinery, engaging skilled English workers and so on. Because of this agreement, Bernardo did not need to travel to England any more to buy new textile or other kinds of machinery.

In 1882, Bernardo was invited to plan and assemble a new textile factory, São Sebastião, for his father. He sent the plan and an order to Robert Kerr asking him to buy the machinery and contract British skilled workers to assemble it. During the construction of São Sebastião, Bernardo trained two other entrepreneurs. These were

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<sup>21</sup>Many authors understated the facilities in using Brazilian workers by textile mills, writing "local labour adapted easily to industrial employment..." For example S J Stein, *op. cit.* p.50 and F R Versiani *Industrial Investment in an "export" Economy: The Brazilian Experience before 1914* (London, ILAS, WP,1980, p.10). The entrepreneurial strategy to transform slaves into industrial workers is discussed in D Giroletti *Fábrica Convento Disciplina* (Belo Horizonte, 1991).



his brother, Victor, who would become manager of the São Sebastião farm, and his nephew, Aristides José Mascarenhas. Victor became manager of the São Sebastião factory and Aristides was his deputy-manager. Aristides was later elected director of CCC and became Cedro manager and superintendent of all the CCC factories from 1895 to 1901. When Aristides resigned to join the São Sebastião factory, there were no more Bernardo-trained entrepreneurs. The management succession failed and from 1901 to 1912, the CCC had no professional managers, directors or superintendent managers. By 1911 the economy was in serious decline. A new direction and the market opportunities offered by the First World War then gave new life to the company.

In 1887, Bernardo left the CCC and moved to Juiz de Fora. There he could fulfill his destiny as the most important Minas Gerais industrial entrepreneur in the three last decades of nineteenth century. In 1888, Bernardo organized his own small weaving factory to produce a special cloth with imported fibre, aiming to compete with imported fabric. The machinery was bought in Manchester by Robert Kerr.

Bernardo extended his industrial capacity as founder or partner of many other important business and initiatives. He organized a building company with another partner. This company was responsible for building his factory and his workers' houses. In 1887, he was a founder of the Immigrant Improvement Society of Minas Gerais, which aimed to bring European labourers to work in the farms and in the cities<sup>22</sup>. In 1889, he was a founder of the Commercial Academy, a secondary school to prepare Brazilian students to work in trading and service companies and factories. In the same year, he was one of the most credit-worthy founders and shareholders of the Banco de Crédito Real of Minas Gerais. The Bank was organized with the capital

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<sup>22</sup> N L Mascarenhas *op. cit.* p.104.

of many farmers, traders and manufacturers.<sup>23</sup> Finally, Bernardo Mascarenhas was the main founder of the Mineira Electricity Company which began to generate and supply electricity in 1891.

In conclusion, Bernardo Mascarenhas was not only the founder of the modern textile industry and the promoter of many companies in Minas Gerais. His contribution to the modernization of Minas Gerais was wider because he trained many industrial managers and industrial workers. He prepared three generations of industrial managers in the CCC. In all the factories where he worked, Bernardo trained Brazilian workers to take the place of the high paid, skilled British workers.<sup>24</sup>

In Juiz de Fora, Bernardo's modernizing actions expanded even further, with the creation of his own textile mill and his participation in founding the Credito Real Bank and the Mineira Electricity Company. His contributions to improving the skilled labour market was not confined to the Immigrant Society and the Commercial Academy in training many educated workers. Bernardo Mascarenhas died in 1899.

### **Entrepreneurial efforts to update technology.**

How did Brazilian textile entrepreneurs respond to the need to keep up-to-date in technological terms? Industrial managers worked at the head of an internal network which provided them with information about local and regional markets. They studied regional newspapers and *The Jornal do Commercio*, the main national newspaper, to get information about the Rio de Janeiro market, then the main centre of consumption. Based on this, they calculated cost in relation to the Minas Gerais countryside, adding or reducing the transport cost.

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<sup>23</sup>D Giroletti *Industrialização de Juiz de Fora, 1850-1930* (Juiz de Fora, 1988).

<sup>24</sup>For more details about English skilled workers see D Giroletti *Fábrica Convento Disciplina*, p.82-97.

Because technology was produced abroad, the greatest challenge for Brazilian industrial entrepreneurs was how to keep up with innovations in machinery and fabric production processes. How did they update their knowledge? First, many Brazilian textile entrepreneurs hired American or English skilled workers. This was the best way to improve their knowledge about textile machinery and the production processes. From 1872 to 1896, the Cedro and Cachoeira factories had at least two foreign skilled workers as their employees. Many Brazilian entrepreneurs had to learn English to speak to their foreign employees. Bernardo started to learn English as a means to communicate with the American and English skilled workers who had arrived to assemble the Cedro, Cachoeira and São Sebastião factories. During the Cedro assembling, they had contracted the special services of a Briton to translate from English to Portuguese and vice-versa for six months. At that time, 1872, Bernardo began to learn English and had improved his knowledge by talking and studying with the American and British workers. During the nineteenth century and until the middle of twentieth century French, not English, was taught as a second language in Brazilian secondary schools.<sup>25</sup>

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<sup>25</sup>The textile "Mineiro" entrepreneurs were not the only ones to undergo the great English modernizing influence during the nineteenth century. Ireneu Evangelista de Souza (1813/89), the greatest Brazilian entrepreneur, was trained under the English trader, Richard Carruthers. He learned to read and write in English and used the British accounting system. He also read British and American magazines and newspapers to stay up-to-date in new technology. He started as a Carruthers' employee and after some time he became his partner. In 1845, he began his career by developing important industrial projects including iron foundries, ship and railway construction, gas services and public lighting and set up a Amazonas river transport company, etc. After the 1860s he organized a bank which had branches in the most important Brazilian towns and in other South America cities like Montevideo and Buenos Aires and he also established branches in the world's major cities such as Paris, London and New York. For more details about the English influence in Souza's businesses, see A Faria *Ireneu Evangelista de Souza, Barão e Visconde de Mauá, 1813 - 1889* (Rio, 1926); A Marchant *Viscount Mauá and the Empire of Brazil, a Biography of Irineu Evangelista de Souza, 1813 - 1889* (Berkeley, 1965).

Bernardo had a strong motivation to learn English as a condition to do business, and to organize textile factories and the hydroelectric schemes to produce electric power. Bernardo improved his English skills, not only talking with the British workers or reading technical books, but during his travels to England and the USA in 1874, and on his return to England in 1878. He could speak, read and write in English. In the same way, Francisco Mascarenhas, Cachoeira manager, began to learn English in 1874 when that mill was being assembled and he continued to speak with the English workers and to read British books, newspapers and magazines. The textile managers of the second and third generation did not learn English, however, probably because the knowledge of this language was no longer necessary. By then there were many Brazilian skilled workers employed at textile mills and some British workers living in Brazil had learned Portuguese.

The second way to be up-to-date in technological terms was through reading English textile literature, books, magazines and newspapers. Many times during the nineteenth century, Brazilian textile entrepreneurs had complained to the government about the lack of textile manuals in Portuguese, arguing that they and their workers needed to study the textile techniques. Sometimes, they had suggested that the government print textile books for use in factories and schools, but at the end of the nineteenth century there were still manuals available in Portuguese.

In order to get technological information, the Brazilian textile entrepreneurs had resorted to foreign literature, specially English material. Robert Kerr, the British machinery agent, was the channel to obtain this kind of book from England. For example, in 1883 the Cachoeira manager wrote to Kerr telling him that he had received three books about cotton spinning and the "Explaining Letter of Messrs Dobson & Barlow Co". In 1886, Bernardo, preparing to move to Juiz de Fora, wrote to Kerr: "I am very willing to know something about electricity. Please send me about four or more good books about electric light, etc and information about the best

looms". In another letter to H. Lomay (Darwen), Bernardo requested information on modern looms that he had read about in the *Textile Recorder*.<sup>26</sup>

Possibly the best way to get technological information was by reading specialized English reviews, such as the *Implement Machinery Review*, which usually published short political and economic pieces and large articles about technological and machine improvement, referring to all industrial fields not only to textiles. Others, like the *Textile Manufacturer* and the *Textile Recorder*, were more specialized magazines related directly to textile machinery and business. These were probably more interesting to Brazilian entrepreneurs and represented their most important source of technological information during the nineteenth century.<sup>27</sup>

Another way to get technical information was by ordering textile machinery and product catalogues. Here, again, the services of Robert Kerr were vital, as we can see by his letters. For example, he wrote: "I have pleasure in accordance with your request in sending you four catalogues of various parts of George Hodgsons Looms for which there is no charge."<sup>28</sup> From 1894/95 when international competition to supply the Brazilian textile mill market increased, many foreign textile manufacturers started to send their product or machinery catalogues, unsolicited, to Brazilian textile mill owners. This gradually diminished not only the role of the commercial middleman, but also the British technological preëminence in the textile industrialization during the second half of the nineteenth century.

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<sup>26</sup> D Giroletti *Fábrica...* p.94.

<sup>27</sup>The Industrial Museum Archive "Decio Mascarenhas", Caetanopolis, Minas Gerais, contains detailed subscriptions list cataloguing trade journals and newspapers ordered from overseas by members of the Mascarenhas family.

<sup>28</sup>Companhia Ceareo Cachoeira "Livro de Cartas, 1894", Robert Kerr to company manager, 19th July 1894, Industrial Museum Archive "Decio Mascarenhas".

## **Conclusion**

With Bernardo Mascarenhas' death in 1899, Minas Gerais lost her most competent industrial entrepreneur. It also marked the end of the more difficult Brazilian industrialization period when the country had no modern trained managers and no skilled workers to tackle the take-off stage of the industrial development process. The maintenance of slavery until 1888, while it may not have been incompatible with capitalist development in Brazil, hardly helped to stimulate modern industrial management, nor did it create new business initiatives. The Minas Gerais textile entrepreneurs were very successful not only in eliminating the negative heritage of slavery, one of the most important factor of the Brazilian industrial backwardness in last century, but also in training new industrial managers and in creating new businesses. As a consequence, their actions in assembling textile mills with the transfer of American or British technology were a very important step in the creation of Brazil's modern industrial and urban society.

# Capital Goods and the Process of Industrialization in the Habsburg Monarchy, 1870-1914

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## Introduction

The process of industrialization, its timing and pace are the themes which dominate much of recent research in Habsburg economic history<sup>1</sup>. Yet little attention has been focused on Austria-Hungary's capital goods sector, despite the country's position as one of the world's leading machinery producers<sup>2</sup>. In terms of total output and employment, the Habsburg Monarchy's machine-building industry was surpassed only by that in the United States, Britain, and Germany<sup>3</sup>.

Industrialization can be viewed as a process of increasing utilization of fixed capital over time<sup>4</sup>. The machine-building industry<sup>5</sup> is, then, a key sector for its "output

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<sup>1</sup> Good, *Economic rise and 'Austria-Hungary'*; Komlos, *Customs union, and Stature, nutrition, and economic development*; Rudolph, *Banking and industrialization*.

<sup>2</sup> An exception is Klíma, 'Machine-building industry'. But studies comparable to Saul, 'Market and development', and 'Machine-tool industry'; Floud, *British machine-tool industry*; Barth, *Entwicklungslinien*; and Schröter and Becker, *Maschinenbauindustrie* have not been produced for the Habsburg Empire.

<sup>3</sup> Verein Deutscher Maschinenbau-Anstalten, *Denkschrift über die Maschinenindustrie*, pp.22, 26. The data reproduced in this source clearly refer only to Austria proper; they correspond exactly to figures provided in other sources. If output and employment in Hungarian machine-building are added to the respective figures for Austria, then the combined total is well above the level of Russian output, but still slightly below Russia's level of employment.

<sup>4</sup> Reitschuler, *Stellung der Maschinenindustrie*, p.31.

<sup>5</sup> Because of the heterogeneity of the engineering sector's output there was no uniform usage or definition of the term *machine-building* at the time. However, reflecting this heterogeneity, the organizational structure of the German machine-builders' association serves here to illustrate the scope of what will be referred to as mechanical engineering or machine-building. The association was organized in thirteen divisions relating to major product groups (each of them composed of several sub-

constitutes replacement of or additions to the economy's stock of physical capital"<sup>6</sup>. Indeed, recently presented evidence suggests not only a close long-run association between machinery investment and productivity growth at the macro level, but also the likely direction of causality: output per worker rose in the past *because* of high rates of investment in machinery<sup>7</sup>. Viewed in this light, rising expenditure on capital goods appears not as a mere concomitant of economic expansion but as a strategic factor accounting for growth.

This essay focuses on the development of industrial machine-building and is thus concerned with some of the sectoral aspects of industrialization and economic growth. First, it will be argued that the new evidence from the capital goods sector supports the traditional notion of a *Great Depression* in Austria. The findings presented here cast doubt on the revisionist view that the Habsburg economy grew without major interruptions in the late nineteenth century<sup>8</sup>. Secondly, they also challenge Alexander Gerschenkron's hypothesis that the more backward a country is at the time of its initial industrialization, the greater will be its stress on producer and capital goods rather than consumer goods<sup>9</sup>.

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groups): I: machine tools; II: textile machines; III: agricultural machines and implements; IV: locomotives; V: power machines; VI: working machinery; VII: plant equipment and machinery for iron and steel works and rolling mills; VIII: mechanical conveyors (cranes, lifts, elevators, etc.) and scales; IX: machinery for the paper-making and graphical industries; X: machinery for the food processing and chemical industries; XI: dressing/separation and crushing machines; XII: special machines and machinery parts; XIII: apparatus; VDMA, *Denkschrift über die Maschinenindustrie*, p.63. This grouping is in accordance with the contemporary description of the sector in Fischer, 'Maschinenindustrie'.

<sup>6</sup> Rosenberg, 'Capital goods', p.143.

<sup>7</sup> De Long, 'Productivity growth'.

<sup>8</sup> Good, 'Stagnation and 'take-off''.

<sup>9</sup> Gerschenkron, *Economic backwardness*.



### Estimating Machinery Production

Austrian output of machines was estimated in a three-stage process. As a first step, the gross value of production was approximated on the basis of wage-sum data given in the Austrian workers' insurance statistics - though only for 1889 to 1911<sup>10</sup>. Fellner estimated output of Austrian machine-building for 1911/13 within the framework of his national income calculations<sup>11</sup>. He approximated the "raw value of production" by applying a wage-sum/gross output ratio derived from Hungarian data to Austrian figures on wage-sums in machine-building. This concept has been utilized here as well. For 1897 to 1911, gross output of individual machine-building branches was estimated using Fellner's (1911) percentage shares of wages in gross output and then aggregated<sup>12</sup>. For 1889 to 1896, the statistics provide only the *total* wage-bill in machine-building. In these cases, the implied 1897 weighted average ratio was used. Thus a complete series of gross production in Austrian machine-building was obtained for 1889 to 1911<sup>13</sup>.

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<sup>10</sup> Ministerium des Innern, *Unfallstatistik 1889-1896*, and *Unfallstatistik 1897-1901, 1902-1906, 1907-1911*. Included are Gruppe VI, Titel 166 to 184 (machinery, tools, apparatus) which correspond to the contemporary definition of *machine-building* used in Bibliothek der Kammer der gewerblichen Wirtschaft für Wien, Vienna, Sign. IV.6316: Handelspolitische Zentralstelle, *Gutachten zum autonomen Zolltarif: Die Entwicklung der österreichischen Maschinenindustrie seit 1905 bis 1913*, typescript, no place, no year, (hereafter HKB Wien, *Gutachten*), pp.6-8.

<sup>11</sup> Fellner, 'Volkseinkommen', pp.558-572.

<sup>12</sup> *Ibid.*, Table VI, p.621.

<sup>13</sup> The assumption of a constant wage-bill/turnover ratio for either the industry as a whole or its individual branches is a simplification necessitated by the lack of more detailed data. The ratio varied not only between different branches of machine-building, but within these between different companies and over the business cycle, too; HKB Wien, *Gutachten*, pp.3-8. But the overall ratio is unlikely to have displayed any significant upward or downward trend over time. Hoffmann, for example, used labour incomes in the German metal-working industry as a proxy for output. His evidence shows that the shares of wages, depreciation and profits in (net) output remained fairly constant over the long run; Hoffmann, *Wachstum*, pp.357-9.

Gross output in current prices was then converted into constant (1913) prices. Because of the almost complete lack of machinery output prices for Austria-Hungary<sup>14</sup>, a version of Hoffmann's index of German steam engine prices was used after adjustments had been made to account for Austrian rather than German iron and steel input prices<sup>15</sup>.

As a second step in estimating output, an annual series for iron and steel consumption in Austrian machine-building (in 1000 metric tons) was compiled. This series is composed of twelve subseries, spanning the period 1870 to 1913<sup>16</sup>:

Austrian iron and steel production:

1. cast iron production
2. steel production
3. wrought iron production

*plus* Austrian net imports of iron and steel:

4. net imports of cast iron
5. net imports of bar iron and steel
6. net imports of sheet metal and plate
7. net imports of smelted iron and ingots

*minus* Austrian non-machine-building iron and steel consumption:

8. rail production
9. production of railway related materials
10. production of structural steel for construction purposes
11. iron and steel consumption in the metal-working industry

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<sup>14</sup> Tinbergen, Cairncross and Feinstein faced similar difficulties in their attempts to construct price indices for British engineering. See Tinbergen, 'Business cycles', pp.12-5, Table I A; Cairncross, *Home and foreign investment*, pp.158-7; Feinstein, *National income*, p.188, Table 63.

<sup>15</sup> See Appendix.

<sup>16</sup> For sources and methods used see Appendix.

## 12. iron and steel consumption in the production of transport equipment.

In a third step, the iron and steel input series was divided by the value of gross production of machines (as derived from wage-bill data) in constant (1913) prices. This procedure yielded a series of annual input-output ratios for 1889 to 1911. While displaying annual fluctuations, this series shows a downward trend over time. Between the five-year averages centred around 1891 (1889/93) and 1909 (1907/11), the ratio declined by an average rate of .97 per cent per annum. This rate was used to extrapolate the input-output ratio backwards (for 1870 to 1888) and forwards (for 1912 and 1913). Finally, the annual input-output ratios so obtained facilitated the estimation of machinery output for 1870 to 1888 and 1912 to 1913 on the basis of the previously derived iron and steel input series. The production of Hungary's machine-building industry was approximated in essentially identical fashion, though as a consequence of lacking data the estimation had to rely on a thinner statistical basis than that for Austria.

### **The Pattern of Output Growth**

The economic development of Austria-Hungary's machine-building industry was principally a reflection of the course which the Habsburg economy took in the late nineteenth century. Periods of expansion and phases of contraction in mechanical engineering generally coincided with those in the industrial sector at large. Just as overall industrial growth rates in Austria and Hungary were out of phase with one another between 1870 and 1913, so were the rates of expansion in the machine-building industry. While Hungary's industrial sector grew at a more rapid pace than Austria's, Hungarian machinery output, too, increased at a faster rate than in the Western half of the Empire. In both countries, however, the rates of growth of engineering output over individual business cycles as well as over the full period under review differed markedly from those observed in other branches and the industrial economy at large. Though machine-building was an industry particularly exposed to

the impact of variations in the business cycle, it was also one of the most dynamic branches of industry.

Table 1. *Compound rates of growth* (% p.a.)

	Austria		Hungary	
	Mach.-Build.	Industry <sup>a</sup>	Mach.-Build.	Industry <sup>a</sup>
1872-1912	4.57	2.36	7.14	3.08
1872-1894	2.57	2.07	7.93	3.47
1894-1912	7.07	2.78	5.92	2.98
1872-1882	-1.75	1.86	5.05	3.08
1882-1894	6.31	2.32	11.72	3.82
1894-1900	7.86	2.08	3.23	0.73
1900-1912	6.67	3.24	7.56	3.77

*Note:* Peak-to-peak measurement. Since the peaks in the four series may not correspond exactly to one another the periods of measurement are not always identical.

<sup>a</sup> manufacturing, mining, construction

*Sources:* Appendix, Table A.1; Komlos, *Customs union*, Appendix E, Table E.4.

The new output estimates indicate that Austria's machine-building industry took a course that was quite different from that implied in earlier research by Richard Rudolph<sup>17</sup>. Contrary to recently held views, the temporal pattern of output growth shows that the capital goods sector in the Western half of the Habsburg Monarchy was subject to a severe downturn and prolonged depression after the stock-market crash of 1873<sup>18</sup>. It was not until 1888 that the contraction of the 1870s and the subsequent stagnation of the 1880s was finally overcome as output reached again its pre-crash peak (Appendix, Table A.1). This finding amounts to fresh evidence in support of the

<sup>17</sup> Rudolph, 'Pattern of Austrian industrial growth', Table 2, and *Banking and industrialization*, Table A.3, p.207.

<sup>18</sup> Rudolph, *Banking and industrialization*, pp.28-9; Good, *Economic rise*, p.165.

controversial notion of a *Great Depression* which has featured so prominently in recent Austrian historiography.

In the 1960s and early 1970s, Eduard März and Herbert Matis formulated what is now generally regarded as the traditional view of Austria's economic development in the latter half of the nineteenth century<sup>19</sup>. Proceeding from a largely non-quantitative approach, both authors argue that economic growth in Austria conformed "... to the long-wave pattern that Kondratieff and others sketched out for the late nineteenth century"<sup>20</sup>. According to their hypothesis, the years 1873 and 1896 mark trend breaks. A long upswing from 1848 to 1873 was dominated by the rapid construction of railways. The 1873 crash rung in a downswing, the *Great Depression*, which was characterized by price deflation and low rates of growth of real output. The main driving forces of the new upswing which began in 1896 were the rise of new industries and the increase in demand associated with Austria-Hungary's re-armament programme<sup>21</sup>. This periodization of Austrian economic development and especially the view that the years between 1873 and 1896 is adequately understood as one of great depression was first challenged in 1974 by David Good<sup>22</sup>. He estimated rates of growth of financial intermediary assets in Austria and translated them into GNP growth rates by using a finance-income ratio originally calculated for several other countries. Good concludes that real per capita output in Austria grew at approximately the same rate between 1873 and 1896 as between 1896 and 1913, and so rules out a break in secular trend in 1896. In terms of the behaviour of real output, he maintains

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<sup>19</sup> März, 'Genesis der Schumpeterschen Theorie', and *Industrie- und Bankpolitik*; Matis, *Österreichs Wirtschaft*.

<sup>20</sup> Good, *Economic rise*, p.163.

<sup>21</sup> März, 'Wirtschaftliche Entwicklung', p.368; Matis, *Österreichs Wirtschaft*, p.19.

<sup>22</sup> Good, 'Stagnation and 'take-off''.

that, as in Britain, the *Great Depression* in Austria is essentially a myth<sup>23</sup>. John Komlos challenged Good's results and argues that output growth accelerated after the mid-1890s, following sluggish expansion during the preceding two decades<sup>24</sup>. In support, Komlos draws on his own estimates of Austrian industrial output<sup>25</sup>. The debate about Austria's *Great Depression* was resumed again in Good's 1984 synthesis of Habsburg economic history<sup>26</sup>. Though David Good rejects the traditional interpretation, his new estimates of real per capita regional product in the Habsburg Empire seem to provide evidence in its favour. Between 1890 and 1910, Austrian per capita output grew by more than double the rate than during the preceding twenty-year interval<sup>27</sup>.

Due to a lack of adequate data, the new output estimates presented here do not stretch further back than 1870 and, consequently, do not permit any inference about the early 1870s as a break in the secular trend of Austrian machinery production. Thus no conclusions can be drawn on the validity of the long-wave concept as such. But the experience of Austria's machine-building industry in the 1870s and 1880s clearly diverged from its course in the following two decades, when output growth was markedly faster. This result has major implications for an understanding of the timing and pace of Austrian economic development.

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<sup>23</sup> Ibid.. Saul, *Myth*.

<sup>24</sup> Komlos, 'Depression in Austria'; for Good's response to the criticism see 'Great depression'.

<sup>25</sup> Komlos, *Customs union*, Appendix C, pp.243-51, and Appendix E, Table E.4.

<sup>26</sup> Good, *Economic rise*, pp.162-85 and Komlos, Review of Good, *Economic rise*.

<sup>27</sup> Good, 'Austria-Hungary', Table 11.3, p.230. It should be emphasized that the increase in per capita output growth was achieved in a period characterized by an acceleration in the rate of Austrian population growth; Fischer, 'Wirtschaft und Gesellschaft', Table 3, p.14.

The link that justifies using a section series like machinery production for making main economic inferences is the nature of the machine-building industry's output, which constitutes replacements or additions to the capital stock of an economy<sup>28</sup>. If the domestic machine-building industry produces primarily for the domestic market and if it holds a dominant share in this market, conditions that both apply in the Habsburg case, then changes in the rate of growth of machinery production are likely to reflect changes in investment demand in the economy. The revisionist thesis, which postulates steady and uninterrupted growth in the Austrian economy from 1870 to 1913, implies that no significant differences in the rate of machinery investment existed between the subperiods in question<sup>29</sup>.

It is argued here that, when aggregate demand for industrial goods first contracted and then slowly recovered in the 1870s and early 1880s, machinery *users* disposed over an enlarged capital stock which had been built up in the preceding boom years. Machinery purchases were thus largely confined to replacements only. Sluggish manufacturing growth led to low levels of net investment in capital goods and a further fall in levels of demand for machinery, which were already depressed due to the collapse in railway construction<sup>30</sup>. This state of the Austrian machinery market in the 1880s is well reflected in the experience of individual machine-building firms. The growth of engineering companies and the related rise of capital requirements were restricted. In response to slow growth of output and insufficient capacity utilization, investment in new production equipment remained low throughout the decade. As a result of very low or even negative rates of net investment the average value of fixed assets and plant equipment actually fell between 1880 and 1890. It was not until the

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<sup>28</sup> Rosenberg, 'Capital goods', p.143.

<sup>29</sup> This holds to the extent that similar rates of growth of an economy's output require roughly similar rates of investment, i.e. no abrupt changes in the structure of the economy take place which alter the output-investment ratio.

<sup>30</sup> Schulze, 'Machine-building industry', pp.31-9.

close of the century that Austrian machine-building companies substantially expanded their production capacity to meet the rising demand for their output<sup>31</sup>. All available evidence, whether it be the growth of domestic machinery production, the investment behaviour of machine-building firms, or the changes in machinery imports<sup>32</sup>, points to low levels of demand for machinery during most of the 1870s and 1880s. It was only in the last two decades before the First World War that, responding to renewed investment demand, output growth in Austrian engineering accelerated and surpassed that in most other sectors of the industrial economy. But Austria's machine-building industry displayed a pattern of development that is not compatible with this view.

However, apart from the function as a provider of capital goods the rest of the economy, there is a further important reason why the machine-building sector should be looked at: it was a sector of considerable size and as such influenced directly the volume of total industrial output. This holds especially for Austria. The effects of expansion and contraction in machine-building on total value-added in manufacturing are illustrated in Table 2. Incorporating value-added in machine-building into Komlos' manufacturing series for Austria widens markedly the already significant gap in growth rates between the two periods 1872-1895 and 1895-1912. Moreover, it further accentuates the pattern of a depression composed of two distinct business cycles with a particularly severe recession during the first cycle (1872-84)<sup>33</sup>.

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<sup>31</sup> *Ibid.*, pp.102-7.

<sup>32</sup> *Ibid.*, Table V.1, p.144.

<sup>33</sup> A proportion of 53 per cent was used to convert gross output (Appendix, Table A.1) into value-added in machine-building; Fellner, 'Volkseinkommen', pp.570-1. It should be noted, however, that for a more complete and accurate assessment of the machine-building industry's relative contribution to total industrial growth in Austria the output of all those branches of industry not included in Komlos' manufacturing index would need to be estimated, too.



Table 2. *Growth of manufacturing (% p.a.)*

	Austria		Hungary	
	A	B	A	B
1872-1895	2.31	2.18	4.92	4.48
1895-1912	3.27	2.68	3.71	3.47
1872-1884	1.77	1.90	6.06	5.80
1884-1895	2.91	2.51	4.13	3.58

Key: A = including machine-building B = excluding machine-building

Notes: Peak-to-peak measurement. Since the peaks in the four series may not correspond exactly to one another the periods of measurement are not always identical. Calculations based on sum of value-added not adjusted for variation in the composition of the aggregate.

Sources: Appendix, Table A.1; Komlos, *Customs union*, Appendix E, Tables E.5 and E.6.

### The Structure of Manufacturing Output and Late Industrialization

The consumer goods industries continued to hold a dominant share of total manufacturing output throughout the period under review<sup>34</sup>. As late as 1911, the textiles, clothing, and foodstuffs branches accounted for almost 50 per cent of value added in Austria's manufacturing industry<sup>35</sup>. In Hungary, this share was only slightly lower<sup>36</sup>. But it was, to a large extent, the producer goods sector, including mechanical engineering, that carried industrial expansion forward in the late nineteenth century<sup>37</sup>. Faster than average long-run rates of growth in machine-building might have been expected, as both agriculture and industry shifted to increasingly complex and capital-intensive production processes which translated into an acceleration in the

<sup>34</sup> Gross, 'Industrialization in Austria', Table 15, p.70.

<sup>35</sup> Ibid.

<sup>36</sup> Fellner, 'Volkseinkommen', pp.548-56.

<sup>37</sup> See Komlos, *Customs union*, Tables E.5 and E.6, for a sectoral breakdown of value-added in manufacturing.

growth of demand for capital goods. But expansion of industrial machine-building in fact gained such a momentum that this sector became one of the *main* sources of growth in industry. This holds especially for Austria after full recovery from the Great Depression had been achieved. Measured over the whole period 1870 to 1913, machinery output grew faster in Hungary than in Austria. But since Hungarian industry as a whole, too, expanded at a higher rate, the impact of engineering growth on total manufacturing growth was somewhat smaller in Hungary than in the Western half of the Empire during most cycles (Tables 1 and 2).

Nachum Gross concluded in his thesis that "Long-run industrial growth in nineteenth-century Austria was not sufficiently rapid to make her economy relatively less backward at the end of the period than it had been in the middle of the century"<sup>38</sup>. Though drawing only on growth rates and thus ignoring the qualitative changes in the composition of total industrial output, this statement refers to some of the core elements of the debate about the path of the Habsburg Monarchy's industrialization. The data that are available show that modern economic growth began during the mid-1820s in the Western regions of the Empire, yet without displaying any signs of a Gerschenkronian *great spurt* or Rostovian *take-off*<sup>39</sup>. But up to the early 1870s, output growth was not as fast as to keep pace with the more advanced nations of Western Europe. The degree of Austria-Hungary's relative economic backwardness probably increased between 1820 and 1870<sup>40</sup>. Recent comparative research has produced results which suggest that, in relative terms, economic growth in the Habsburg Monarchy accelerated during the four decades under review. Between 1870 and 1910, Austria-Hungary's real per capita product grew faster than in most Western European countries. As a result, the gap in per capita output levels to Great Britain,

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<sup>38</sup> Gross, 'Industrialization in Austria', p.96.

<sup>39</sup> Good, 'Austria-Hungary', pp.221-5; Komlos, *Customs union*, pp.90-111.

<sup>40</sup> Good, 'Austria-Hungary', pp.225-8.

France, Belgium, and, to a lesser extent, Germany, narrowed. "By 1914", David Good remarks, "the Empire's position relative to Western Europe was no better and may have been somewhat worse than a century before, and it had lost out to Germany for political dominance of Central Europe. But in its final four decades the Empire began to 'catch-up'"<sup>41</sup>.

Most of this 'catching-up', it should be stressed, took place in the last two decades before World War I, i.e. during the period which the traditionalists in Austrian historiography view as marked by a renewed long-run upswing after the end of the *Great Depression*. Real per capita output in Austria rose by only 0.9 per cent on annual average between 1870 and 1890, but by more than 2 per cent between 1890 and 1910; similar rates of growth are calculated for Hungary<sup>42</sup>. This acceleration in per capita output growth matched changes in the rate of growth of machine-building and the rising contribution of the machine-building sector to total industrial production observed here. There is evidence suggesting that the improvements in macro-economic productivity measured by Good may have been causally linked to changes in machinery investment, which are reflected in the output series for the machine-building industry.

In a study covering six major industrial countries during the past century, Bradford De Long detected a strong association of machinery investment and per capita income growth<sup>43</sup>. Moreover, his regression results indicate that machinery investment was more strongly associated with GDP per capita growth than investment in general (including non-residential construction investment). Even if allowance is made for political stability and investment in education, two factors often regarded as a key to growth, the magnitude and significance of the coefficient on machinery investment is

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<sup>41</sup> Ibid., p.229.

<sup>42</sup> Ibid., Table 11.3, p.230.

<sup>43</sup> De Long, 'Productivity growth'.

not reduced. The problem is, of course, whether causation runs from machinery investment to economic growth or from growth to machinery investment. If faster growth causes higher investment because of rising profit expectations, then investment should respond equally to increases in output resulting from improved productivity (higher per capita incomes) and to those caused by population growth. "It should not matter whether larger demand comes from having more consumers or richer consumers"<sup>44</sup>. De Long's regression results show a strong association between output per capita growth and machinery investment and a weaker and imprecisely estimated association between population growth and machinery investment. He thus argues that "Intensive growth that raises productivity and income levels is especially strongly associated with machinery investment"<sup>45</sup>. He estimates that each additional percentage point of total output allocated to machinery investment raises output per worker by more than half a percentage point per annum. This is a high estimate and it may result from the fact that the nations included in the sample are today wealthy and successfully industrialized countries; the high coefficient may, to some extent, reflect the good luck that these economies had in the past. Those economies that have grown most rapidly in the past have been those that have invested heavily in machinery<sup>46</sup>. Given the temporal coincidence of changes in per capita output and those in machinery production, it seems plausible to view the rise in productivity in the Habsburg Monarchy as an outcome of increased machinery investment.

However, the conclusion that mechanical engineering was at the core of industrial expansion in late nineteenth century Austria-Hungary does not amount to a corroboration of Alexander Gerschenkron's hypothesis that the capital goods sector was likely to dominate over the consumer goods industries in the process of

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<sup>44</sup> Ibid., p.317.

<sup>45</sup> Ibid.

<sup>46</sup> Ibid., p.323.

industrialization of follower countries, like the Habsburg Empire<sup>47</sup>. Industrialization in Austria started much earlier in the nineteenth century and rested to a large degree on advances in the textile industries. In Hungary, the first widespread wave of industrialization in the 1870s and 1880s was dominated by the rise of flour milling. What has been observed here is that the machine-building industry, as part of the capital goods sector, became an increasingly important source of economic growth in a period *after* initial industrialization. This finding could be interpreted as evidence in support of Walter Hoffmann's hypothesis that over the process of industrialization the consumer goods industries lose their dominant position in favour of the capital goods sector, including iron and steel, metals and engineering<sup>48</sup>. However, what has been shown is that among those manufacturing branches for which comparable output estimates are available, the machine-building industry belonged to the most rapidly advancing sectors in both Austria and Hungary. It should be kept in mind, though, that these branches do not represent the full range of manufacturing output<sup>49</sup>. Any inference about trend shifts from the consumer goods sector to the capital goods sector would require a more complete coverage of industrial sectors and an analysis of the input-output relationships necessary to allocate outputs between them<sup>50</sup>. For Austria-Hungary the essential data are not available.

The domestic machine-building industry was able to make a major contribution to economic growth in the Habsburg Empire in the face of difficult circumstances. The

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<sup>47</sup> Gerschenkron, *Economic backwardness*.

<sup>48</sup> Hoffmann, *Growth of industrial economies*, pp.31-41, 145-159. The empirical basis of Hoffmann's concept has been criticized by O'Brien, 'Typology', pp.310-1.7

<sup>49</sup> Komlos' estimates of manufacturing output, which have been used here for comparative purposes and the measurement of the machine-building industry's contribution to industrial growth, are based on eight sub-series (beer, iron, distilled spirits, sugar, cotton textiles, woollen textiles, flour, electricity); Komlos, *Customs union*, Appendix E, Tables E.5 and E.6.

<sup>50</sup> O'Brien, 'Typology', pp.310-1.

findings presented here suggest interpreting the industry's performance largely in terms of its response to the prevailing market conditions. Nathan Rosenberg has shown that the efficient operation of a capital goods sector is critically dependent on a sufficiently high level of demand for capital goods permitting output specialization<sup>51</sup>. Though Rosenberg refers to specialization at the firm level, the concept can also be used to explain the composition of output at industry level. The growth in machinery output, and its variation over time, was associated with changes in the structure of the machine-building industry's output. These changes were determined by shifts in the absolute and relative size of product markets. Austria-Hungary's machinery producers focused on the manufacturing of those machines for which the domestic economy provided sufficiently large markets. The available data for Hungary indicate an engineering sector which, by the turn of the century, was capable of providing increasingly diverse and complex outputs. But steam technology, agricultural machinery and implements, and plant and equipment for the food processing industries accounted for particularly high shares in total machinery output<sup>52</sup>. In the early 1870s, at a time of rising demand associated with rapid railway construction, locomotive engineering was probably the most important single branch of Austria's machine-building industry. However, as later in Hungary, its relative importance declined over time as the fall in the rate of new railway building brought with it a decline in demand for railway related output. Operating in a country with a large agricultural sector, both in absolute terms and relative to industry, the machine-building industry was increasingly geared to the provision of agricultural machinery, demand for which was secularly rising as a result of mechanization and the spread of more capital intensive farming techniques. Power machines like steam engines and, at a later stage, internal combustion engines were used in virtually all branches of industry. The market for these machines was thus substantially larger than that for highly specialized machinery like machine-tools or spinning machines which found use only in a limited number of

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<sup>51</sup> Rosenberg, 'Capital goods', p.143.

<sup>52</sup> Schulze, 'Machine-building industry', pp.39-48, 74-87.

industries. Moreover, proximity to the predominantly agricultural economies of Eastern and South-Eastern Europe helped widening the market. Exports accounted for a substantial share of domestic production of agricultural machinery. Though the argument does not account for the increasing specialization in steam technology, it appears that Austria-Hungary's tariff structure, too, had some bearing on the pattern of output specialization. At least part of the shift towards the production of agricultural equipment, with a relatively low iron and steel content per unit of output, can be explained as a response to high tariffs on iron and steel inputs<sup>53</sup>.

### Conclusions

The absolute and relative rise of the machine-building industry under at times adverse conditions bears witness to the underlying dynamism and increasing complexity of the Habsburg economy in the late nineteenth century. Rising macro-economic productivity was, to a considerable extent, facilitated by investment in domestically produced machinery. These results thus fit in well with what now seems to emerge as consensus among Habsburg scholars, namely, that the long-held view of Austria-Hungary's economic development as essentially one of failure can no longer be accepted<sup>54</sup>. However, Austrian economic growth between 1870 and 1913 was not a process of smooth, uninterrupted expansion. Rather it unfolded in two major phases: sluggish growth up to the mid-1890s and an acceleration in economic activity thereafter. In short, Austria's depression after 1873 is not a myth but an integral part of her growth experience.

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<sup>53</sup> *Ibid.*, pp.178-89.

<sup>54</sup> See Good, *Economic rise*, pp.237-55, and 'Austria-Hungary', pp.225-9; Komlos, *Review of Good*, p.452. The most recent exposition of the failure hypothesis is Gerschenkron, *Economic spurt that failed*.

## APPENDIX

### Austrian and Hungarian Output of Machinery

(1) Results

Table A.1. *Austro-Hungarian Machine-Building*

	Iron & Steel Input (1000 Tons)		Real Output (Mill. Crowns)		Nominal Output (Mill. Crowns)	
	Austria	Hungary	Austria	Hungary	Austria	Hungary
1870	110.50	17.06	61.35	7.89	109.54	14.08
1871	138.75	22.55	77.80	10.51	145.58	19.66
1872	187.59	21.64	106.21	10.17	199.39	19.09
1873	162.58	20.06	92.95	9.50	174.87	17.87
1874	102.09	15.09	58.94	7.21	112.40	13.74
1875	102.36	16.53	59.67	7.96	111.09	14.81
1876	101.03	25.08	58.48	12.18	103.36	21.16
1877	94.01	22.69	55.89	11.11	92.55	18.40
1878	112.97	20.06	67.82	9.90	106.31	15.52
1879	97.92	20.86	59.36	10.39	92.31	16.16
1880	106.90	20.81	64.43	10.45	97.56	15.58
1881	128.59	31.67	79.48	16.05	117.03	23.63
1882	142.59	32.93	89.00	16.83	127.13	24.04
1883	139.65	38.21	88.02	19.71	123.57	27.67
1884	124.94	39.67	79.52	20.64	112.78	29.28
1885	126.62	39.89	81.37	20.94	114.61	29.50
1886	105.85	31.62	68.69	16.76	92.61	22.59
1887	117.84	32.99	77.22	17.64	101.17	23.12
1888	165.10	46.98	109.25	25.36	138.91	32.24
1889	185.71	46.57	112.94	25.37	142.95	32.11
1890	193.71	63.71	126.33	35.04	159.58	44.27
1891	199.91	65.26	138.33	36.23	176.23	46.16
1892	207.18	84.03	146.21	47.11	186.84	60.20



1893	215.00	104.38	163.81	59.09	201.75	72.78
1894	271.42	108.43	185.48	61.99	221.19	73.92
1895	285.70	115.67	191.21	66.79	225.16	78.64
1896	318.64	121.49	203.66	70.86	236.16	82.16
1897	328.62	124.94	220.28	73.61	252.27	84.30
1898	364.20	130.38	245.70	77.60	282.38	89.19
1899	386.73	135.66	270.30	81.59	307.93	92.95
1900	380.74	136.38	292.01	82.88	329.68	93.57
1901	381.18	133.93	284.36	82.25	328.27	94.95
1902	350.13	138.17	260.43	85.77	304.34	100.23
1903	347.77	128.02	279.79	80.33	307.55	88.30
1904	374.46	135.93	307.29	86.22	320.95	90.05
1905	419.10	155.42	326.25	99.68	344.03	105.11
1906	455.72	169.43	376.02	109.88	395.51	115.58
1907	531.10	198.36	431.98	130.10	452.79	136.37
1908	620.70	237.10	463.42	157.29	496.05	168.36
1909	550.25	213.89	454.07	155.07	491.73	167.93
1910	565.59	242.38	450.20	160.49	478.37	170.53
1911	561.08	230.96	493.83	156.32	504.21	159.60
1912	760.36	268.82	634.15	177.73	641.37	179.76
1913	684.12	240.77	576.16	169.43	576.16	169.43

## (2) Contemporary Output Measures and Wage-Bill Data

Austria: See main text. Hungary: Though fairly comprehensive spot estimates of output are available for 1898 and 1906 (see Table A.2 below), wage-bill data from the Hungarian accident insurance statistics which could be used for further approximations of output exist only for 1909 and 1912; see Munkás-biztosítási Hivatal, *Jelentés az országos munkásbetegsegélyző és baleset-biztosító pénztár működéséről 1909-1912* VIII., tételszáma 199-214, 219, 254-255. It was, therefore, assumed that the input/output ratio in Hungarian machine-building moved along a path similar to that

in Austrian machine-building. A linear trend line was fitted to the series of Austrian input/output ratios (1870-1913). Since the input/output ratios implied in the Hungarian data for 1909 to 1912 are on average 21 per cent above the Austrian trend figures, the trend of the Austrian input/output ratio was adjusted accordingly before being applied to the Hungarian iron and steel input series for an estimation of Hungarian machinery output (1870-1908; 1913).

### (3) Iron and Steel Inputs

*Subseries 1 to 9. Austria and Hungary:* For a detailed discussion of the methods and sources used in the derivation of iron and steel production, net imports of iron and steel and the production of rails and railway related materials see Schulze, 'Machine-building industry', Appendix A, pp.206-215, 242-244, and Tables A.7 to A.10, A.16 to A.19.

*Subseries 10. Austria:* for 1887 to 1911, data on the cartelized iron works' domestic sales of support iron (Träger), primarily used in construction, and their combined exports of bar iron, support iron and plate, are given in Handelsministerium, 'Materialien zur Kartellenquete 1912', Abschnitt III Table VIII, pp.12-13. Exports of support iron were isolated using its share in domestic sales of bar iron, support iron and plate. Thus an estimate of total Austrian output of support iron was obtained for 1887 to 1911. This series was then extrapolated backwards (1870-1888) and forwards (1912-1913) using the average 1887-1891 and 1907-1911 shares in total wrought iron and steel output. According to *Kartellengnete*, practically all Austrian production of support iron was cartelized by the 1880s. However, the series so obtained is still likely to reflect only the minimum of iron and steel consumption in construction. In Germany, for example, support iron accounted on average for only 78 per cent of domestic shipments of structural shapes (1908-1912); see Kaiserliches Statistisches Amt, *Statistisches Jahrbuch 1915* (Berlin, 1915), p.117, and Institut für Konjunkturforschung, *Dynamik des Baumarkts*, p.63. *Hungary:* Hungarian production of structural steel was approximated by applying the share of support iron output in total Austrian output of wrought iron and steel to total Hungarian output of wrought iron and steel.

*Subseries 11 and 12. Austria:* Using the 1889 to 1911 wage-bill data provided in the *Unfallstatistik* and Fellner's wage-sum/gross output ratios, output in the metal-working industry (Gruppe Vb, Titel 109-141) and in transport equipment production (Gruppe VIb, Titel 184a-190) had been estimated in a fashion identical to that used for machine-building. I then computed the value of input materials as a percentage of output in these industries and in machine-building on the basis of the ratios provided in Fellner, 'Volkseinkommen', p.571. The *quantity* of iron and steel used in each industry was then determined by multiplying its share in the total *value* of input materials with total iron and steel consumption (net of subseries 9 to 11). For the years with missing value data (1870-1888; 1912-1913), iron and steel quantities were allocated by using the average 5-year shares for 1889-1893 and 1907-1911, respectively. *Hungary:* Hungary's use of iron and steel in metal-working (titles 141 to 174 of the Hungarian accident insurance statistics) and in the production of transport equipment (titles 215-218, 220-222) was approximated in the same way as for Austria. However, since Hungarian wage-bill data are available only for 1909 to 1912, iron and steel quantities were allocated between the machine-building, metal-working and transport equipment industries using their respective consumption shares in 1909 and 1912 for the years with missing value data (1870-1908 and 1913).

#### (4) The Price Index

Hoffmann observed a close correlation between steam engine prices and iron prices and used the latter to interpolate and extrapolate missing annual values of the steam engine price index; Hoffmann, *Wachstum*, pp.571-574. Regressing Hoffmann's index of derived steam engine prices on iron prices and a time trend yielded this result for 1870 to 1913 (44 observations):

CNT	2.5804 (54.05)	R2	.994
LIP(-2)	.5162 (51.82)	DW	2.101
T	-.0080 (-46.80)	F(2, 41)	3422.4

where CNT = constant term; LIP(-2) = log of iron prices, lagged two years; T = time trend; R2 = corrected coefficient of determination; DW = Durbin-Watson test statistic; F = F test statistic; t-statistics are given in parentheses. Assuming that

Austrian machinery prices were equally responsive to changes in iron prices and subject to a similar downward trend, the estimated coefficients were then employed in an approximation of Austrian machinery prices using an index of Austrian iron and steel prices. A Laspeyres index was constructed as a weighted arithmetic average of price relatives for iron and steel inputs. Four series of price relatives are included:

- (a) average price per ton of Austrian cast iron at place of production (1913=100; weight: .2778);
- (b) average price per ton of Hungarian cast iron at place of production (1913=100; weight: .0434);
- (c) price per ton of imported cast iron *inclusive* of tariff (1913=100; weight: .2288);
- (d) wholesale price of bar iron in Vienna (1911/12/13=100; weight: .450)

According to a study by the German Machine-Builders' Association, cast iron and bar iron -by far the two most important engineering material inputs - had a share of 40 to 50 per cent and 30 to 35 per cent, respectively, in the total volume of iron used in machines; VDMA *Denkschrift über die Maschinenindustrie*, p.39. These percentages have been used to compute weights with which to combine four input price series. As no continuous price data for other raw materials and semi-finished inputs are available, the weight share of cast iron has been raised to 55 per cent, that of bar iron to 45 per cent. The three prices for cast iron have been weighted according to the average 1870 to 1913 shares of Austrian cast iron, Hungarian cast iron and imported cast iron, respectively, in total Austro-Hungarian cast iron consumption. The lack of adequate price data does not permit the construction of a separate price index for Hungarian machine-building. The price index is, therefore, used for deflating estimated machine-building output in both Austria and Hungary. Hence Hungarian cast iron prices have been included as well. Import prices for cast iron apply to both countries alike because of their common customs border. For sources see Schulze, 'Machine-building industry', Appendix A, Tables A.7, A.8 and A.16; Appendix C, Tables C.1 and C.4.

#### (5) An Evaluation of the New Estimates

Austria: Converting the new estimates from constant into current prices allows for a comparison with contemporary accounts of Austrian machinery production. However, as a consequence of changes in the data collection procedures, the three Austrian industrial surveys of 1870, 1880 and 1885 do not present fully compatible sets of information; see Gross, 'Industrialization in Austria' pp.167-185, and 'Austrian Industrial Statistics 1880/85', pp.39-48. Nachum Gross has pointed out that "they cannot be utilized for determining short-run trends of development"; Gross, 'Industrialization in Austria', p.173.. But the results of these surveys nevertheless prove useful in evaluating the new estimates derived here. If the quality of the survey data suffers mainly from incomplete coverage of the various industries, then the reported output levels in each industry are likely to represent *minima*. In general, a firm had to pay more than 42 florins business tax for inclusion in the 1880 industrial survey. In the 1885 survey, the limit was lowered to 21 florins in Vienna and 10.5 florins anywhere else. Both surveys stress that the reported output figures are minimum values. Similarly, the value of output reported in the 1870 survey is largely that of 'factory establishments' only, though some small-scale manufacturers had been included in the survey, too. See Handelsministerium, 'Statistik der österreichischen Industrie 1870, 1880, 1885', *NIHV*, vols. 3, (1874) No.2, p.173; 28 (1884), pp. VIII-X, 94-97; 38 (1888/89), pp. VII-VIII, 106-109. Cf. Gross, 'Industrialization in Austria', p. 170. The reported 1870 level of machinery output (89.78 million crowns) understates the actual level for a further reason. While production is that of machinery only, the number of workers involved in the generation of this output includes also workers in firms which produced both railway waggons or ships *and* machinery. Accounting for this mismatch yields a corrected value of output per worker which was then used to re-calculate total output on the basis of the total corrected machine-building labour force (including those in firms whose output was not recorded and excluding the number of workers wrongly assigned to machine-building). For 1870, an adjusted value of machinery output of 109.23 million crowns was obtained. The contemporary spot estimates of production in Austrian machine-building can thus be seen as lower limits against which to measure the new output estimates. Estimated

output is very close to the minimum level for 1870. The value of production appears as not being over-estimated and one may thus assume that no downward bias has been introduced into computed long run growth of output. For 1880 and 1885 the new estimates are well above the benchmarks. Though the divergence may to some extent be explained by cyclical variations in the actual input-output ratio, it seems more likely that the contemporary approximations are indeed reflecting only a part of total output in the industry. This holds especially for 1880. However, assuming the difference between the output estimates were to originate from an over-estimation of input (and thus output) levels for 1880 and 1885, the argument put forward here, namely that the rate of expansion during this period was considerably slower than assumed so far, would be strengthened further. For the survey data imply a fall in nominal output between 1870 and 1885. If anything, the implied rates of growth of output over all business cycles are upwardly biased because of the use of a highly deflationary price index. Since Austrian iron and steel prices fell more rapidly over the period than German prices and since we assumed a similar time trend reflecting productivity advances, the index of Austrian machinery prices declines more rapidly than Hoffmann's index for Germany, yet not nearly as fast as business equipment prices in the United States; Gallman, and Howle, 'Fixed Reproducible Capital', Table 5, p.209. However, one could argue that due to larger market size the scope for specialization and productivity growth was somewhat wider in Germany than in Austria. The growth rates of machinery output presented here thus represent probable upper limits. The increase in the iron and steel input series, in contrast, can be seen as the lower limit of expansion in machine-building, given an implicitly constant input/output ratio. Hungary: The new output estimates are well above of what one might regard as minimum levels of Hungarian machinery output. In 1898, only establishments employing more than 20 people were surveyed; Kereskedelmügyi Miniszter, 'Gép-gyártás 1898' pp.4-5. Eight years later, an even more restrictive definition of factory establishment was used as some of the smaller establishments included in the 1898 survey were omitted; Központi Statisztikai Hivatal, *Gyáripár 1906*, p.546. Thus, a presumably significant number of smaller producers were not

included in the surveys and, as a result, their output was not recorded. The activity of railway repair shops - which employed about one-third of the total workforce in engineering - was considered, too. As the surveys emphasize, many of these did not only carry out repair work but were engaged in the production of completely new machinery. Their output, though, is not included in the total for mechanical engineering but recorded separately (see Table A.2). Both factors - the restricted scope of the two surveys and the exclusion of machinery production in railway repair shops - suggest a downward bias in the contemporary output estimates. Viewed in this light, the new output estimates presented here seem plausible; they are certainly in the right order of magnitude.

Table A.2. *Comparison of Output Levels (Million Current Crowns)*

	Austria		Hungary		
	Contemporary Estimate	New Estimate	Contemporary Estimate	New Estimate	
1870	109.23 <sup>a</sup>	109.54	189	61.67 <sup>b</sup> -91.30 <sup>c</sup>	89.19
1880	59.83	97.56	190	89.00 <sup>b</sup> -25.35 <sup>c</sup>	115.58
1885	86.09	114.61			

<sup>a</sup> adjusted

<sup>b</sup> machine-building proper

<sup>c</sup> machine-building plus railway repair shops

Sources: (1) Handelsministerium, "Statistik der österreichischen Industrie 1870, 1880, 1885", *NIHV*, vols. 3 (1874) No.2, pp.108, 145-146, 149-154, 157-158, 160, 162, 173; 28 (1884), pp.94-97; 38 (1888/89), pp.106-109; Kereskedelmügyi Magyar Kir. Miniszter, "Gép-gyártás 1898", pp.93-96; Magyar Kir. Központi Statisztikai Hivatal, *Gyárpar 1906*, pp.716-717. (2) Table A.1.

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# The Economic Backwardness of Spain in the Nineteenth Century: An Approach to the Debate<sup>1</sup>

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## Introduction

The purpose of this paper is to present an approach to the debate that is taking place in Spain regarding the economic development of the country during the nineteenth century. The issue has been approached by a number of scholars from several points of view. The first articulate explanations of Spanish backwardness were set out twenty years ago by Jordi Nadal and Gabriel Tortella.<sup>2</sup> The debate acquired momentum with new proposals and quantitative estimates presented in the 1980s by Albert Carreras and Leandro Prados.<sup>3</sup> A surge of research in the 1990s has increased the number of

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<sup>1</sup> This paper was prepared for a seminar at the Department of Economic History of the London School of Economics. I am indebted to Colin Lewis, Dudley Baines, Janet Hunter, and all the other participants at the seminar for their helpful comments. I am also grateful to Albert Carreras, James Simpson and Francisco Alcalá for careful and detailed suggestions, and to Jordi Nadal for allowing me to use the findings of our joint research.

<sup>2</sup> J. Nadal, 'The failure of the industrial revolution in Spain, 1830-1914', in C. Cipolla, ed., *The Fontana Economic History of Europe, IV, The emergence of industrial societies*. (London, 1983), pp. 532-626; *idem*, *El fracaso de la Revolución industrial en España, 1814-1913*. (Barcelona, 1975); G. Tortella, 'Spain, 1829-1874', in R. Cameron, ed., *Banking and Economic Development: Some Lessons of History*. (New York, 1972), pp. 91-121; *Idem*, *Banking, railroads, and industry in Spain, 1829-1874*. (New York, 1977).

<sup>3</sup> A. Carreras, 'La producción industrial española, 1842-1981: construcción de un índice anual'. *Revista de Historia Económica*, vol I, n. 2, 1984, pp. 127-157; *Idem*, 'Gasto nacional bruto y formación de capital en España, 1849-1958: primer ensayo de estimación', in P. Martín Aceña and L. Prados, eds., *La nueva historia económica en España*. Madrid, 1985), pp. 17-51. Both reprinted in A. Carreras, *Industrialización española: estudios de historia cuantitativa*. (Madrid, 1990). L. Prados, 'El crecimiento económico moderno en España, 1830-1973: una comparación internacional'. *Papeles de Economía Española*, 20, 1984, pp. 151-154; *Idem*, *De imperio a nación. Crecimiento y atraso económico en España (1780-1930)*. (Madrid, 1988).

participants in the debate and the number of questions under consideration. Some of these questions have recently been reassessed by Nadal and Sudrià.<sup>4</sup>

This paper is divided into five principal sections. First, a short quantitative reassessment of the background to this issue is presented. Secondly, there is a discussion of the causes of economic stagnation in Spain before 1840. Thirdly, some recent macroeconomic explanations for the evolution of the Spanish economy in the second half of the century will be presented. The last two sections analyse these explanations and also present some alternative arguments.

### **A quantitative assessment: weak numbers, strong facts**

In the last ten years a considerable effort has been made by Spanish economic historians to build up estimates of major macroeconomic variables. The main contributors to work on the nineteenth century have been Albert Carreras and Leandro Prados. In a seminal work of 1984, Carreras used all available statistical information to construct an annual index of industrial production from 1831 onwards. Later, he broadened his work to obtain an estimate of GDP.<sup>5</sup> Prados first presented some benchmark estimates using a distinct set of data.<sup>6</sup> Recently, he has built up a new annual series for GDP from 1850 onwards, using mostly the data compiled by Carreras but applying a different weighting system.<sup>7</sup> These alternative estimates show big differences (see Table 1). The main cause of the differences is the lack of reliable

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<sup>4</sup> J. Nadal and C. Sudrià, 'La controversia en torno al atraso económico español en la segunda mitad del siglo XIX (1860-1913)'. *Revista de Historia Industrial*, 3, 1993, pp. 199-227.

<sup>5</sup> A. Carreras, 'La producción industrial'; *idem*, 'Gasto nacional bruto'.

<sup>6</sup> L. Prados, *De Imperio a nación*.

<sup>7</sup> L. Prados, *Spain's Gross Domestic Product, 1850-1990: a new series*. Working Paper D-93002. Ministerio de Economía y Hacienda. Dirección General de Planificación (Madrid, 1993).

data. The estimates are derived from a small number of production series. This weakness makes any comparison between Spain's macroeconomic variables and those of other countries difficult. Two recent papers that have tried to make such comparisons have obtained very different results.<sup>8</sup>

<b>Table 1</b>			
Alternative estimates of Spanish economic performance (annual growth rates)			
Gross Domestic Product per head			
	Carreras	Prados 1988	Prados 1993
1800-1830	n.a	-0.06	n.a
1830-1860	n.a	0.34	n.a
1860-1890	0.71	1.48	0.86
1890-1910	1.52	0.68	0.68
Industrial production			
1800-1830	n.a	-0.33	n.a
1830-1860	4.67	2.68	n.a
1860-1890	2.34	2.67	2.31
1890-1910	2.01	1.54	1.39
Sources: A. Carreras, 'Gasto nacional bruto'; <i>Idem</i> , 'La producción industrial española'. Prados, <i>De Imperio a nación</i> ; <i>Idem</i> , Spain's Gross Domestic Product'.			

In spite of these problems, some stylized facts can be derived from both the quantitative assessments and the qualitative approaches:

<sup>8</sup> L. Prados, T. Dabán, and J. Sanz, *De Fabula Narratur? Growth, Structural Change and Convergence in Europe, 19th-20th Centuries*. Working Paper D-93009. Ministerio de Economía y Hacienda. Dirección General de Planificación. (Madrid, 1993); G. Tortella, 'Patterns of economic retardation and recovery in south-western Europe in the nineteenth and twentieth centuries'. *Economic History Review*, XLVII, n.1, 1994, pp. 1-21.

- 1) about 1850, Spain had a GDP per head well below that of the United Kingdom, France, Belgium, and other countries which were among the first to industrialise;
- 2) the evolution of GDP per head from 1850 to 1913 shows, at least four different phases (see Figure 1):

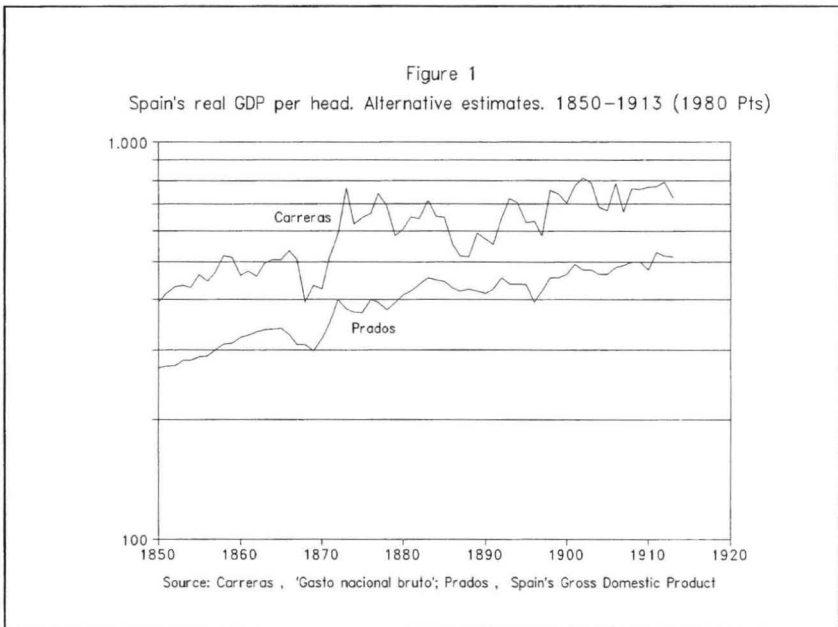
(the annual growth rates derived from each estimate cited above);

1850-1866: rapid growth (Carreras: 1.91; Prados: 1.21)

1866-1870: deep recession (C.: -5.46; P.: -0.72)

1870-1883: rapid growth (C.: 4.01; P.: 2.76)

1883-1913: slower growth (C.: 0.07; P.: 0.42)



- 3) these phases coincide with the phases of convergence and divergence with respect to other countries. After 1883, Spain seems to follow the slow-growing



path of Great Britain instead of the faster path of Italy, Germany or France. It is hardly surprising that this period should have been the centre of the debate.

- 4) Around 1913, in spite of growth the experienced during the previous fifty years, Spanish GDP per capita was below the relative level of 1850 with respect to most Western European countries. According to Prados and associates, and Tortella, only Italy and, perhaps, Great Britain lost ground compared to Spain

Those conclusions are accepted by most historians of the nineteenth century Spanish economy. In fact, the terms 'failure' or 'backwardness' were still used by the early analysts of the issue. The quantitative approaches had reasserted a previously held general conviction.

#### **The first stage of modern Spanish backwardness: the loss of empire**

There is general agreement among historians that the Spanish economy suffered a serious setback during the period that began in the last decade of the eighteenth century and continued until 1840. Some political events were decisive, for example, wars against France (1793-1795), Britain (1796-1802 and 1804-1808), and France again (1808-1814); the loss of most of the American colonies between 1804 and 1824; and a destructive civil war from 1833 to 1840. The consequences of wars were a fall in population, devastated land, and a large increase in public debt.

The loss of empire had more complex economic effects and has been the subject of a separate interesting debate. Some historians had argued that the loss of protected colonial markets and the disappearance of private and public transfers of money from the colonies caused a very serious recession in the Spanish economy. A crisis that might be seen as the origin of modern Spanish economic backwardness.<sup>9</sup> Leandro

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<sup>9</sup> J. Vicens, *Manual de historia económica de España*. (Barcelona, 1959), p. 555; A. Milward and S.B. Saul, *The Development of the Economies of Continental Europe, 1850-1914*. (London, 1977), pp. 220-221; S. Pollard, *Peaceful Conquest. The*

Prados tried to test this hypothesis by building up an estimate of the impact of the loss of the colonies. His conclusion was that this loss can only account for a maximum of 5.6 per cent decline of GDP.<sup>10</sup>

Arguably, this figure underestimates the economic effects of colonial failure. Prados only took into account the loss of colonial markets and the interruption of public transfers. He did not account, however, for the monetary effects of loosing the colonies. Between 1792 and 1804 Spain received from her colonies one-way transfers amounting to 360 million reales annually. In addition, the balance of trade showed a surplus of 5 million reales.<sup>11</sup> That means an annual net inflow of coined silver of 365 million from the American colonies.<sup>12</sup> Spain was probably the largest recipient of precious metals in Europe. As a consequence, prices were higher in Spain than in other European countries. Only when this difference accounted for transport costs did European merchandise flow to Spain and silver coins flow to Europe. When these transfers ceased, the Spanish economy had to adjust. The huge trade deficit with European countries continued until the loss of hard currency forced a deeper fall in prices in Spain than in other countries. Deflation carried with it higher real interest rates and a fall in business expectations. It is not yet possible to build up an estimate of the costs of deflation, but they may be higher than the direct costs calculated by Prados. The cost of the deflation may be suggested by a fall in investment between

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*industrialization of Europe, 1760-1970.* (Oxford,1982), p. 244.

<sup>10</sup> Prados, *De Imperio a nación*, ch. 2.

<sup>11</sup> Figures from J.P. Merino, J. Cuenca and L. Prados. See P. Pascual and C. Sudrià, 'Quiebra colonial y ajuste monetario en España'. *Estudis d'Història Econòmica* (Palma de Mallorca), n. 2, 1992, p. 128.

<sup>12</sup> As a point of comparison, it has been estimated that all hard currency in circulation in Spain in 1814 was around 3,500 million reales.

1820 and 1830.<sup>13</sup> These were decisive years for the introduction of new industrial revolution technologies: a decade of depression due to the loss of empire and the effects of wars delayed the beginning of industrialization in Spain.<sup>14</sup>

### **The backwardness in the second half of the nineteenth century: some alternative explanations**

As indicated above, the first articulate explanation of the reasons for Spanish economic backwardness was presented by Jordi Nadal in 1973 in his contribution to the Fontana Economic History of Europe.<sup>15</sup> He developed these ideas in his book *El fracaso de la Revolución industrial en España*. Essentially, Nadal offers a study of the evolution of the industrial sector during the nineteenth century, but his work also included a hypothesis about the causes of the ‘failure’ of the industrial revolution in Spain. His main proposal was that the determining factor in this failure was the weakness of domestic demand, a weakness caused in turn by the poor performance of Spanish agriculture. Very low productivity and unequal income distribution in the primary sector kept most of the Spanish population near to subsistence level, with a very low purchasing power for manufactured goods. A modern industrial sector developed after 1840 mainly by substituting domestic craft products and imports. In the 1880s, when the domestic market was fully conquered and an agricultural crisis lowered peasants income, the expansion of industrial production slowed down. The slack domestic demand also explains why Spanish industry concentrated on consumer goods, and, in particular, textiles.

The State contributed to this backwardness by building up an unfair and inefficient fiscal system that worsened the unequal distribution of income and caused a chronic

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<sup>13</sup> C. Sudrià; P. Pascual; Ll. Castañeda, ‘Oferta monetaria y financiación industrial en Cataluña’. *Revista de Historia Industrial*, n. 1, 1992, pp. 189-201.

<sup>14</sup> Pascual and Sudrià, ‘Quiebra colonial’.

<sup>15</sup> Nadal, ‘The failure of the industrial revolution’.

public deficit. To finance this deficit the State got into debt with nationals and foreigners. This produced a crowding out effect in the domestic financial market and by shut down most international markets to Spanish securities after 1851.

The Nadal thesis was not inconsistent with the argument set out, almost simultaneously, by Gabriel Tortella about the building of the railway network and its financing.<sup>16</sup> According to Tortella, a set of specific laws biased the rules of the financial market in favour of railways. The financial effort devoted to them and to the State made industrial financing more difficult. Using Hirschman's terminology, Tortella argued that the Spanish authorities chose a policy of 'development via excess capacity of social overhead capital' rather than supporting 'direct productive activities'. Hopes that the manufacturing sector would be stimulated by the availability of transportation services proved to be groundless. Traffic barely covered operating costs and railway companies were unable to pay interest and dividends. The financial system built up around railways collapsed in 1866. Obviously, the railway network was useful to manufacturers, but it did not remove the other obstacles that lay in the way of industrialization.

The weak-demand view of Spanish economic backwardness received some criticism in the following years,<sup>17</sup> but a global alternative explanation was not provided until 1988, when Leandro Prados published his book *'De Imperio a nación'*. Prados built up estimates of most macroeconomic indicators and proposed a new interpretation of Spanish backwardness in the nineteenth century. Prados's reasoning began with a new estimate of agricultural production. According to this estimate, agricultural productivity would have grown at a very impressive rate between 1857 and 1910, faster than in Britain or France. If sustained, these estimates would make the

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<sup>16</sup> Tortella, 'Spain, 1829-1874'; *idem*, *Banking, railroads, and industry*.

<sup>17</sup> See the special issue of *Información Comercial Española* devoted to Nadal work (n.623, 1985).

hypothesis of a stagnant market for manufactured goods untenable. Furthermore, Prados's estimate of industrial production showed far more modest growth than Carreras' prior calculation. An international comparison also showed that exports accounted for a smaller proportion of industrial production in Spain than in other European countries. Accordingly, Prados concluded that the causes of slow industrialization were to be found mainly in the industrial sector itself -the supply side- and not in the demand side.

The most convincing section of Prados's work was that devoted to the study of external trade. He built up seemingly accurate estimates of exports, imports and the terms of trade. He defended the view of a positive contribution of external trade to Spanish economic development against the sceptical opinion of Jordi Nadal. The coincidence of the more protectionist phase of Spanish commercial policy with the slowing down of economic growth permitted Prados to set out a cause-and-effect relationship between the two variables. The closure of the Spanish economy brought about by the return to high tariff barriers in 1891 after a moderately free-trading period produced a deceleration in growth. The structure of Spanish external trade at the end of nineteenth century was typical of a backward country. Around 1890, Spain's major exports were agricultural products (53%) and minerals (21%). Major imports were manufactured goods (51%) and raw materials (29%). Agricultural exports were mostly produced in the maritime regions. Industrial production was also concentrated in some of these regions.

The Prados hypothesis was reinforced by a set of proposals presented by Pedro Fraile in a book about the political economy of protectionism in Spain.<sup>18</sup> According to Fraile, Spanish industrialists present a perfect example of rent-seekers. Thus, to take advantage of a quasi monopolistic situation they would have invested in seeking

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<sup>18</sup> P. Fraile, *Industrialización y grupos de presión. La economía política de la protección en España 1900-1950*. (Madrid, 1991).

protection from the State instead of spending resources on technical innovation. They voluntarily would have given up exports in order to profit from higher domestic prices. Spanish industrialists would have forced the country to follow a highly original strategy: 'export-substituting deindustrialization'.

The explanation of Spanish economic backwardness during the nineteenth century presented by Prados and Fraile shows very serious shortcomings. These will be analysed in the following section of this paper.

### **The evidence revisited: a restatement of the causes of Spanish economic retardation**

Any consideration of the evolution of the Spanish economy during the nineteenth century has to begin with agriculture. The optimistic view held by Leandro Prados about the performance of Spanish agriculture has come in for heavy criticism. The statistical information that he used to estimate agricultural production has been considered unreliable by a number of scholars.<sup>19</sup> Figures for productivity growth derived from his estimates seem very unlikely. In an article with Patrick O'Brien, Prados himself has included a new calculation of Spanish agricultural productivity in 1910 that shows a very low level (a third of that of the U.K.).<sup>20</sup> An increase similar to that which he defends in his book surely suggests unacceptable levels of productivity for 1857 or even 1800. In his more recent calculation of GDP he includes a more moderate estimate of the growth of agricultural production.<sup>21</sup> The rate of growth of output per male worker derived from this new estimate is half that which

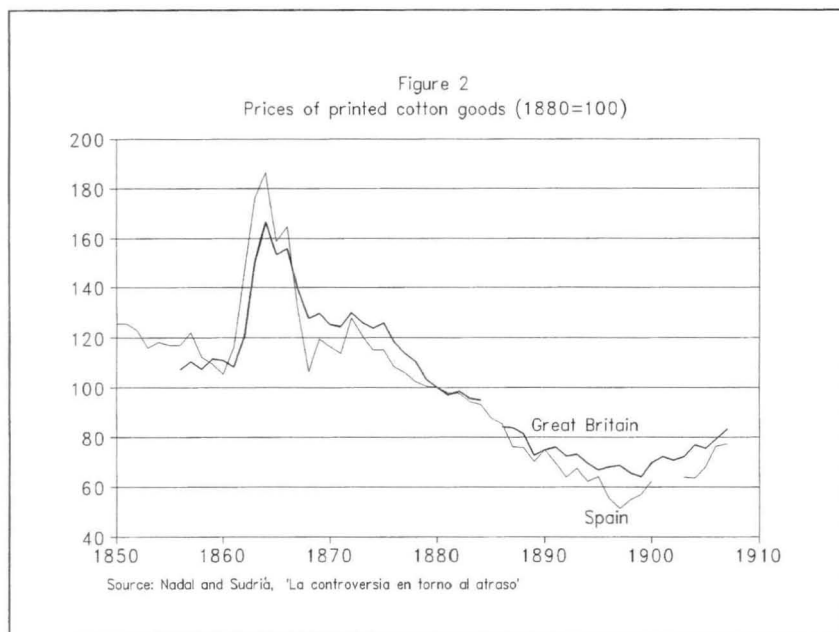
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<sup>19</sup> See, for instance, J. Simpson, 'La producción agraria y el consumo español en el siglo XIX'. *Revista de Historia Económica*, vol VII, 1989, n.2, pp. 355-388.

<sup>20</sup> P. O'Brien and L. Prados, 'Agricultural productivity and European Industrialization, 1890-1980'. *Economic History Review*, XLV, 1992, n.3, pp. 514-536.

<sup>21</sup> Prados, *Spain's Gross Domestic Product*.

he presented in 1988. Despite this, it is still considered too high by some agricultural historians.



In either case, it has to be accepted that there was no substantial increase in the average income of the agrarian population measured in agricultural products before 1914. It must be remembered that agriculture accounted for approximately two-thirds of the Spanish labour force throughout the nineteenth century.<sup>22</sup> Contrary to what Prados believes, the fact that most of the Spanish population could not increase their income is not inconsistent with some rise in the demand for manufactured goods.<sup>23</sup> The reason for that is quite simple: prices of these goods decreased in real terms as a consequence of mechanization. Between 1850 and 1900 the price of cotton goods

<sup>22</sup> Tortella, 'Patterns of economic retardation', p. 5.

<sup>23</sup> Nadal and Sudrià, 'La controversia en torno al atraso', p. 204.

diminished by 55 per cent, roughly the same percentage as in Great Britain (see Figure 2). If this were the case for all manufactured consumer goods, the demand for them could have doubled in the same period.<sup>24</sup> The industrial sector increased its own demand through technical innovation. The stagnation of agricultural productivity set a slow pace of industrialization but did not prevent it.

Spanish industry conquered the domestic market thanks to protection. Most manufactured goods could not compete in foreign markets. There was not, in any case, a voluntary retreat from exports.<sup>25</sup> Instead, there were several reasons that can explain the difficulties Spanish industry had in competing. First the problem of coal: coal was not in short supply in Spain, but it was very costly to mine. The coalfields were located in mountainous regions. The seams were thin and tortuous, and transport was very difficult. Despite protection, most of the coal consumed during the nineteenth century was imported from Britain. It arrived at Spanish seaports at a price that was double or triple the British export price.<sup>26</sup> This situation stimulated some industrialists to use direct drive hydraulic energy. Obviously, this option was only possible for the production of particular goods (textiles, paper, etc.). It was cheaper than steam power, but not cheap enough to bring energy costs down to a level similar

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<sup>24</sup> Prices of wheat and other food products were approximately the same in 1850 and 1900. I assume that consumers only demanded consumer goods and elasticities were equal to one.

<sup>25</sup> Most of Fraile's proposals have been conclusively refuted by Nadal and Sudrià ('La controversia en torno al atraso'). In the textile industry there was neither a situation of monopoly nor oligopoly that made price control possible; nor was there ever a real possibility of competing beyond the colonies. In the iron and steel industry the loss of foreign markets was a consequence of the disappearance of the comparative advantage of Basque iron ore due to the introduction of the new basic methods.

<sup>26</sup> S. Coll, 'Primera parte, 1770-1935' in S. Coll and C. Sudrià, *El carbón en España, 1770-1961. Una historia económica*. (Madrid, 1987); C. Sudrià, 'Un factor determinante: la energía' in J. Nadal, A. Carreras, C. Sudrià, eds., *La economía española en el siglo XX. Una perspectiva histórica*. (Barcelona, 1987), pp. 313-363.



to those in England or France.<sup>27</sup> Secondly, the characteristics of the Spanish domestic market: customers dependence on agricultural productivity brought extreme instability in the demand for manufactured goods. Any climatic variation led to a fluctuation in harvests and each of these fluctuations affected peasants' income and consequently the demand for manufactured goods. To fight against instability, industrialists adopted a series of strategies. The structure of production became pyramidal. The larger companies had a number of smaller dependent enterprises and domestic producers that worked for them. This structure allowed larger enterprises to adapt to fluctuations in demand, but also led to less efficiency in the industrial sector as a whole. Furthermore, each company tried to produce a wide range of products to diminish the risk of a fall in sales of one particular item. Excessive diversification increased production costs and prevented the adoption of technologies that required mass production.<sup>28</sup>

Demand instability had financial consequences for industrial companies. Department stores and dealers refused to accept bills of exchange to pay for their purchases. They did not want to run the risk of changes in demand and preferred to pay when products were sold. As a consequence, industrialists had to finance sales with their own capital, and without the help of commercial banks. As sales were usually seasonal, industrialists often had a lot of cash in hand without being able to put it to good use.<sup>29</sup> For the same reason, the development of discount banks came late and was weak, even in the more industrialized regions.

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<sup>27</sup> A. Carreras, 'El aprovechamiento de la energía hidráulica en Cataluña, 1840-1920. Un ensayo de interpretación'. *Revista de Historia Económica*, vol. I, 1983, n. 2, pp. 31-63.

<sup>28</sup> Nadal and Sudrià, 'La controversia en torno al atraso', pp. 218-220.

<sup>29</sup> Nadal and Sudrià, 'La controversia en torno al atraso', p. 220.

Poor resource endowment and a weak and unstable domestic market had a negative effect on industrial productivity. Furthermore, it should be remembered that after 1891 corn and coal were heavily protected, and as a consequence, costs of manufacturing increased compared to other countries. Yet all of these circumstances do not account entirely for the inability of Spanish industry to compete abroad. Control of colonial markets in Cuba, Puerto Rico and The Philippines until 1898 also had some bearing on the situation. In the 1880's, when the domestic market began to show growing demand inelasticity for manufactured goods, Spanish entrepreneurs pressed the Government to force the colonies to consume goods from the mother country. In the case of cotton goods, exports to the colonies grew from 2% to 17% of overall production between 1880 and 1897. The availability of this reserve market discouraged Spanish industry from competing in more open international markets. During those years, other countries like Italy or Germany, began to build commercial networks to sell their manufactured goods in fast growing economies like the Argentine Republic. When Spanish industrialists tried to do the same after the loss of the colonies (1898), they had to face a number of well-established competitors. Without a substantial competitive advantage this proved to be almost impossible.

A further argument in the debate, the effects of trade policy, also needs to be reassessed. The first question is whether a policy devoted to supporting the industrial sector was justified. Specific reasons account for official support for manufacturing. There was a big productivity gap between agriculture and industry, and this difference was far greater than in other countries.<sup>30</sup> Probably, the gap between industrial wages and agricultural wages was also greater. This meant that the labour market was not working well. Redundant agricultural workers did not migrate to urban areas or overseas to the same degree in Spain as in other countries in similar circumstances.<sup>31</sup>

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<sup>30</sup> Accordingly to Prados estimates. See Nadal and Sudrià, 'La controversia en torno al atraso', p. 223.

<sup>31</sup> D. Baines, *Emigration from Europe, 1815-1930*. (Basingstoke, 1991), p. 10.

The reasons for this might have been illiteracy or the poverty of the peasants themselves. Whatever the causes, the consequences were higher industrial wages and lower industrial production. Intervention designed to offset this distortion would have increased GDP and economic growth. Another reason for intervention can be found in the availability of industrial skills. Spain was a country that adopted innovations from abroad. The implementation of foreign technical innovation and the formation of human capital were of prime importance for her industrialization. Both would generate externalities. Each technical innovation had to be imported and adapted. Innovative enterprises that accomplished this goal favoured the spread of innovations in the industrial sector, thereby making it easier for other enterprises to adopt innovations at lower cost. Furthermore, enterprises that trained their workers in technical skills helped to encourage the adoption of more productive techniques not only in the same sector but also in others. Intervention aimed at compensating innovative enterprises for those externalities would also have increased GDP and economic growth.<sup>32</sup>

Given these circumstances, the best policy would have been to set up a system of direct subsidies to innovative companies. But would that have been possible in nineteenth century Spain? As has been noted above, the Spanish government was incapable of meeting even its normal expenses. To introduce tariffs to protect more innovative industrial production was economically less efficient (a 'second best policy') but was probably the only form of intervention available to correct distortions. The question that new researchers will have to answer is whether the costs of industrial protection were greater or less than the profits obtained from it. Obviously, the results of such an inquiry will be different for each industrial product and it is not easy to predict them in advance. Possibly, protection would have been more costly in the production of goods controlled by a small number of companies that were able to influence output and prices. But, in the other hand, protection could have provided

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<sup>32</sup> Nadal and Sudrià, 'La controversia en torno al atraso', p. 223-224.

greater positive external effects in those sectors of production where companies were able to import technical innovations and to train a large number of unskilled workers. These considerations do not apply to tariffs imposed on agricultural products and raw materials. No externalities of any type can be found in their production, and conversely protection would have harmed all other sectors of the economy. In the case of wheat, some calculations are available. Between 1880 and 1900, the price of wheat diminished by 40 % in Great Britain, 35 % in France, 30 % in Germany, 20 % in Italy, and only by 8-10 % in Spain. It has been estimated that if the fall of the price of wheat would had been similar in Spain to that in Italy, domestic demand for textiles would have been 50 % larger than it actually was.<sup>33</sup>

In my opinion, a more moderate view of the consequences of Spanish trade policy emerges from these considerations. Industrial protection - despite having been excessive and not sufficiently discriminatory - could have had a positive effect on economic growth, whereas tariffs on other goods would have been very harmful. In any case, industrial protectionism would not provide an explanation for differences in the growth rate between Spain and other countries during the three decades preceding the First World War. It is well known that changes in commercial policies were adopted by most European countries. Only in the case of agricultural products could the greater level of protection with respect to other countries partly explain differences in growth rates.

Evidence seems to suggest that in some ways the industrial sector recovered from its retardation during the last half of the nineteenth century. Around the middle of the century, technical innovations reached Spain with a delay of 30 or 40 years. At the

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<sup>33</sup> J. Palafox, *Atraso económico y democracia*. (Barcelona, 1991), ch. 1, and note II.

beginning of the twentieth century, retardation was minimal.<sup>34</sup> This points to the beneficial effects of the protection of industrial activities. At the beginning of the twentieth century, the main problem was no longer the technical backwardness of industry but the slow rate of industrial growth and the difficulties that Spanish industrial goods had in competing abroad.

One of most outstanding consequences of the budget deficit run by the State during the second half of the nineteenth century was monetary instability. In 1883, the convertibility of the peseta was suspended. Difficulties in preventing the outflow of gold, the budget deficit, and the reluctance to reduce the stock of paper currency have been suggested as reasons for this decision. A fiduciary system lasted until 1914 and beyond. The peseta depreciated until 1898 as a consequence of the growing budget deficit and recovered slightly later.<sup>35</sup> There is some disagreement as to the consequences of this situation. It seems that monetary depreciation was offset by the increase in prices and therefore did not imply an additional form of protection and nor did it make exports more competitive.<sup>36</sup> The effect on capital imports could have been more important. After 1880, inflows of foreign capital were scarce. It can be argued that a slow growing Spanish economy had little appeal for foreign investors but it is also true that some new activities - like hydroelectricity or fertilizer production - were developed mostly by national entrepreneurs unlike in Italy and other countries.

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<sup>34</sup> Coal gas, the mechanical loom and the use of coke in the iron industry are good examples of innovations which reached Spain with substantial delay, in the middle of the nineteenth century; electricity, the electric engine, the motor car and some chemical products are examples of the recovery at the beginning of the twentieth century. See J. Nadal, 'España durante la 1ª Revolución Tecnológica', and A. Carreras, 'España durante la 2ª Revolución Tecnológica', both in Ministerio de Industria y Energía, *España: 200 años de tecnología*. (Madrid, 1988).

<sup>35</sup> P. Martín-Aceña, 'Spain during the classical gold standard years, 1880-1914', in M.D. Bordo and F. Capie, *Monetary regimes in transition*. (Cambridge, 1993), pp. 135-172.

<sup>36</sup> M. Sabaté, 'Tipo de cambio y protección en la economía española de principios de siglo'. *Revista de Economía Aplicada*, vol 1, 1993, n. 1, pp. 67-86.

Uncertainty about the exchange rate of the peseta could have been a cause of restraint on foreign investment. As a consequence of the lack of capital inflows and the budget deficit, monetary flexibility did not allow for lower interest rates. Between 1880 and 1914, Spanish interest rates were the highest in Western Europe.<sup>37</sup>

### **Conclusion**

Any assessment of Spanish economic backwardness has to take account of the serious setback that the country suffered for almost fifty years, from 1793 to 1840. Wars against Great Britain and France, the loss of most of the empire and civil war isolated Spain from Europe and in themselves imposed a heavy economic burden. As indicated above, recent calculations have underestimated the cost of the loss of the colonies. The adjustment to the new situation implied an intense deflation that delayed the economic recovery at least a decade between 1820 and 1830. Until 1840 Spain was not in situation to begin a normal process of development. This development, however, was not strong enough to reduce the economic gap which had opened up during the previous period.

The main cause of the slowness of Spanish development in the second half of the nineteenth century was poor agricultural productivity. This view is supported by Gabriel Tortella's recent paper.<sup>38</sup> The most important reason for the poor productivity of Spanish agriculture was the physical environment: scarce rainfall, altitude and rocky and thin soils. As Tortella pointed out, citing Pounds, agricultural conditions were poorer in Spain than in other Mediterranean countries like Italy.<sup>39</sup>

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<sup>37</sup> X. Tafunell, 'Asociación mercantil y Bolsa' in A. Carreras, ed., *Estadísticas Históricas de España. Siglos XIX y XX*. (Madrid, 1989), p. 473; P. Martín-Aceña, 'Spain during the classical gold standard years'.

<sup>38</sup> Tortella, 'Patterns of economic retardation'.

<sup>39</sup> Tortella, 'Patterns of economic retardation', p. 8; N. Pounds, *An historical and political geography of Europe*. (1947), p. 217-219.

Poor productivity in agriculture produced a weak and unstable market for manufactured goods. To adapt to this situation most industrial enterprises adopted strategies of diversification that damaged their own productivity and thus prevented them from competing abroad. Market instability also had pervasive effects on the financial costs for producers of manufactured goods.

Tortella has also pointed out social stratification and illiteracy as causes of retardation. The effects of social stratification were a very unequal distribution of income and a concentration of profits in the hands of a stratum of aristocratic landowners unwilling to invest in innovative sectors. Illiteracy was a consequence of the low income level of most peasants and, this in turn, prevented them from learning new techniques and hindered migration. Such situations were more common in areas of lower productivity and worse physical conditions, so we can consider these obstacles to development as social aspects of agricultural conditions.

Trade policy has often been cited as one of the major reasons for Spanish backwardness. The importance of this factor has been grossly exaggerated. Some trade protection to industry was justifiable as a second best policy designed to encourage innovative activities. Tariffs applied to agricultural products and raw materials were unjustifiable, but were only relevant from 1890 onwards. Other policies adopted by the authorities in the second half of the nineteenth century probably had worse consequences. Preferential finance conditions granted to railways, budget deficits and monetary disturbances affected interest rates and obstructed the flow of capital to more innovative sectors.

As mentioned at the beginning of the paper, the relative degree of Spanish retardation increased during the three decades preceding World War I. This has to be seen in terms of both the structural problems of Spanish economy, outlined immediately above, and changes in the international economic environment during these years. The most critical factors determining the slowdown are as follows:

- a) the exhaustion of the domestic market for manufactured goods after some decades of expansion (an expansion based on the substitution of imports and craft goods);
- b) the loss of the last few colonies and the inability of Spanish industry to compete in open international markets;
- c) the cost of colonial wars and the fiscal policy of the Government that caused the budget deficit and the national debt to grow and produced an increase in interest rates;
- d) the inconvertibility of Spanish paper money after 1883 that created uncertainty about the exchange rate which in turn could have depressed imports of capital

Most Spanish economic historians agree that there are no simple explanations for the economic backwardness of the country. The task of historians should be to assess each factor and attach to it the weight that it deserves.



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