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Number: 36/97
July 1997

Working Paper No. 36/97

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RE-ESTIMATING AUSTRIAN GDP, 1870-1913: METHODS AND SOURCES

I. Introduction

The Habsburg Empire, one of the largest economies on the European Continent before 1918, rarely features in comparative studies of long-run growth for, it seems, two major reasons. First, the empire was dissolved in the aftermath of the First World War and gave way to a multitude of successor states. Consequently, the 'Habsburg' economy cannot be readily included in comparative data sets that encompass the twentieth century. Secondly, much of Central and Eastern Europe lies in a 'statistical dark age' compared to Western Europe (Good, 1994).

However, as Williamson (1996) argued recently, the late nineteenth century witnessed a process of rapid growth and convergence in living standards, at least among those countries that now form the OECD. Poor countries at the European periphery tended to grow faster than the developed economies at the centre 'and often even faster than the richer countries overseas in the New World', while most of the Third World and Eastern Europe did not share in this experience. Placed somewhere midrange on the west-east developmental gradient in Europe and displaying a similar pattern of regional disparities within its own boundaries (Good, 1984), where does the Habsburg Empire fit in?

The first attempt at a systematic estimation of national income in the Habsburg Empire and its two major subunits, imperial Austria (Cisleithania) and imperial Hungary (Transleithania), was made during the First World War (Fellner, 1916). Subsequently, the dissolution of the empire stimulated Fellner (1923) and Waizner (1928) to determine pre-war income levels in the successor state units. These early calculations were concerned solely with income levels in 1911-13 and no attempt was made to derive estimates for the 19th century. It was only in the 1960s that their findings were taken up again, re-worked and complemented by an estimate for an earlier benchmark year in Nachum Gross' doctoral thesis on Austria's industrialization (1966). This

marked the shift in emphasis from predominantly qualitative and descriptive work to quantitative-analytical research in Habsburg economic history.

Much of the initial work in the new vain reflected the search for a major *Rostovian* or *Gerschenkronian* economic discontinuity and has led to new estimates of sectoral production. For the western part of the empire (Austria), the most significant quantitative contributions are the industrial production indices of Komlos (1983), which are on both methodological and empirical grounds generally recognized as the best produced so far, and the detailed account of agricultural production by Sandgruber (1978). Rudolph's (1976) earlier calculations of industrial output are important in this context primarily because they form an integral part of the one *annual* estimate of Austrian national income that has been produced so far (Kausel, 1979). Its derivative, which refers to the territories of modern-day Austria, is included in the much used Maddison data sets (e.g. Maddison, 1995).

The present paper offers a revision of Kausel's estimates; more specifically, it is concerned with the outcome of re-estimating output in the secondary sector and its impact on national product. However, for comparative purposes the new, preliminary results will also be contrasted with David Good's recent income estimates and their subsequent revisions (Good, 1991, 1994, 1997). He adopts a Crafts-type structural equation approach to estimate per capita income levels for five benchmark years in the Habsburg Empire, its regions and successor-state territories, as a function of several proxy variables. The appropriateness of using proxy data (such as crude death rates, the share of the agricultural labour force in the total, and letters posted per capita) to generate income estimates for the Habsburg Empire has recently been questioned by Pammer (1997). He argues that Good's (1994) procedure yields statistical artifacts in terms of both absolute income levels and rates of income growth over time[1].

[1] Pammer makes three criticisms: First, the income estimates are biased as a result of inappropriate functional specification of the estimation equation and the application to relatively backward regions of coefficients which were estimated on the basis of data for relatively advanced economies. Second, individual country effects alter or offset the impact of variables generally associated with income; hence they severely restrict the validity of using these proxy variables for predicting income in other

The new estimates of Austrian GDP (in absolute and per capita terms) presented here differ significantly from the results of both Kausel and Good. First, they suggest that the extent of Austria's relative economic backwardness by 1870 has probably been overestimated. The levels of per capita income in the economically most advanced part of the Habsburg Empire were much closer to those in Western economies than has been thought so far. Secondly, they imply a timing of economic expansion in the late 19th century which is more in tune with interpretations that postulate a marked slow-down in economic activity during the 1870s and 1880s, the *Great Depression* (Komlos, 1983; März, 1985; Schulze, 1997), than with the 'revisionist' argument of almost uninterrupted growth between 1870 and 1913 (Good, 1984). Finally, the new estimates call for a re-valuation of Austria's economic performance in comparative perspective: economic growth in the Western half of the Habsburg Monarchy failed by a significant margin to keep pace with rates achieved in most other European economies - in terms of income growth, the Austrian economy was not catching up, but falling behind in the late nineteenth century.

II. Earlier estimates of GDP per capita: Kausel/Maddison

Kausel draws on Waizner's estimate of net national income for 1911/13 which he projected backwards after rebasing them to 1913 and conversion into gross value added format. The main data sources for extrapolation are Sandgruber (1978) for agricultural production, an index of industrial output compiled by Rudolph (1976), estimates of industrial production for several census years and an approximation of national income for 1841 made by Gross (1966). Estimates for the tertiary sector are made largely on the basis of material published in Brusatti (1973). However, virtually all of the substantial difference between Kausel's results and the new GDP calculations is due to the different data and methods used in estimating output in the mining and secondary sectors (see Section III below). The following discussion is, therefore,

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economies. Finally, he questions the validity of using proxy variables that are not theoretically linked to GDP. See Good (1997) for a response to Pammer and revised estimates.

largely concerned with 'industry'.

Gross (1966) has produced estimates of industrial output in current prices for 1841, 1865, 1880, 1885 and 1911/13, and deflated these using a German wholesale price index. Rudolph (1976), in contrast, compiled a weighted annual index based on volume indicators for five branches (mining, metal-making, machine-building, food processing, textiles). For 1870 to 1913, Kausel 'joined' these two series in a not altogether transparent way such that their mean rate of growth was taken to reflect the long-run rate of growth of industrial production. Rudolph's annual values were then incorporated into this 'frame', using interpolation. The series so obtained was then used to project backwards *total* value added in mining, manufacturing, handicrafts production and construction.

This procedure and the underlying estimates entail several problems which severely impede the quality of Kausel's results. First, Gross' observations do not lend themselves to any measurement over time since the underlying original (census and survey) data were generated by using different methods and gathered unsystematically relative to the business cycle (Komlos, 1983; cf. Huertas, 1977). Some of the dates of the estimates are closer to troughs while others are closer to peaks and, therefore, growth rates cannot be calculated properly. Secondly, the examination of the composite's subseries reveals that Rudolph's index is biased in a different way. The main problem here is that the Hungarian trade statistics have not been used to isolate Austria's share in the Habsburg Empire's foreign trade and constant coefficients have been used instead. Moreover, the substantial internal trade between the two halves of the empire is not taken into account. As a result, the actual consumption of industrial input materials is seriously misrepresented by most of the subseries. Rudolph's index and Kausel's derivative, first, overestimate the rate of industrial growth between 1870 and 1913, and, second, mask important variations over the business cycles. This is what a comparison with Komlos' (1983) indices would suggest.

III. Deriving the new GDP estimates: methods and sources

The new estimates of Austrian GDP in constant 1913 prices are based on eight sectoral series (agriculture, mining, manufacturing, construction, handicrafts, trade and communications, services, rental income from housing). These series and their constituent sub-series are combined using constant 1913 value added shares as weights.[2]

1. Agriculture

According to Waizner (1928), gross value added in the production of *fieldcrops and wine* was 2,434 million crowns on annual average for 1911/13. This figure was extrapolated using an index of fieldcrop and wine production which is based on 22 agricultural commodities (Sandgruber, 1978: Tab. 50). Note that for the years with overlap (1911-13), the underlying data used in the index (cf. Sandgruber, 1978: Tab. 139) are virtually identical to those used by Waizner (1928).

Gross value added in *livestock* production was 1,319 million crowns in 1911/13 (Waizner, 1928)). Value added in meat, milk, wool and silk production, which accounted for 95 per cent of total livestock output, was extrapolated using indices which are based on Sandgruber's benchmark estimates of the volume of production in these four categories (Sandgruber, 1978: Tabs. 39, 40, 41). Volume indices for meat, milk and wool production were computed by interpolation between the 1869, 1880, 1890, 1900, and 1910 observations, and either extrapolated to 1913 or amended by additional data given in Fellner (1916) and Waizner (1928). The volume index of silk production is based on Sandgruber's period averages and, for 1911 to 1913, on

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[2] There are some minor exceptions to this rule. First, Sandgruber's (1978) index of output of fieldcrops and wine, which forms the core of the estimate of agricultural production, draws on average 1911/13 quantities and prices as weights. Secondly, the new estimate of construction output rests on a composite index which uses 1907 weights derived from Hoffmann (1965). Thirdly, the value-added estimates for steel refining and electricity generation are measured in 1911 prices, and the estimate for petroleum output is given in 1912 prices. I am currently exploring the use of alternative weight and price data for earlier years to ascertain the extent to which the choice of 1913 as the base year introduces index number problems in the present GDP calculation.

Fellner (1916). An index composed of the four series, with 1913 value added shares as weights, was then used to estimate total livestock production.

Market gardening: It was assumed that value added in the production of *vegetables* grew in line with that of fieldcrops, while changes of value added in *fruit* production were approximated on the basis of a three year moving average of wine production. Note that vegetables and fruit combined accounted for less than 9 per cent of total value added in agriculture in 1911/13. Due to the lack of adequate data, no attempt was made to estimate value added in lumber production, game, and fisheries. However, the combined total of these was less than 4 per cent of primary production (including agriculture, but excluding the mining sector). Total agricultural output was then obtained by combining the series for fieldcrops, livestock, vegetables and fruit, using their 1913 value added shares as weights.

2. Mining

A comprehensive calculation of gross value added in *mining* is offered by Komlos (1983). His estimates encompass eight mining products (anthracite, lignite, iron ore, silver, mercury, copper, lead, zinc), which account for 99 per cent of the gross value of total mining output in 1913 (*Statistisches Handbuch 1913*), plus the output of crude oil and salt. A constant gross value added proportion of 82 per cent was used. For the years with overlap, the estimates match almost exactly with those of Fellner (1916) and Waizner (1928) and no further adjustments were made.

3. Manufacturing

For most branches in *manufacturing* value added was, as a first step, calculated on the basis of Fellner's (1916) estimates rather than Waizner's (1928) subsequent revisions.[3] Fellner computed the 1911 level of value added for 13 branches of industry which were not subject to government regulation. His estimates for individual branches were

[3] Good (1984) has shown in a detailed examination and comparison of the two estimates, that Fellner's data are generally preferable for the non-regulated industries, while Waizner's revisions are useful when establishing value added in the five state regulated branches of manufacturing.

deflated and then projected using branch-specific indices of output (1913=100)[4]. A similar procedure was used in the estimation of value added in the five state regulated sectors (beer, sugar, spirits, tobacco, petroleum). For these cases, however, Waizner's estimates for 1911/13 provide the 'starting point'. In addition, a new value added series was computed for the iron and steel industry.

(a) State regulated industries. Output in these sectors is well documented in the official statistics. *Beer*: Komlos (1983) has calculated net value added in beer production, drawing on Fellner's (1916) coefficients for depreciation, fuel and material inputs. This series has been adjusted on the basis of Waizner's (1928) revisions and converted into gross value added terms, using a proportion of 65 per cent. *Sugar*: As for beer, Komlos' (1983) series has been adjusted and converted into gross value added terms, using a constant proportion of 29 per cent. *Tobacco*: The volume and value of output of tobacco products is given in the official statistics. Thus a series of gross output in constant 1913 prices was readily available and converted into value added, using a proportion of 34 per cent (Fellner, 1916; Waizner, 1928). *Spirits*: Komlos (1983) has calculated net value added in this branch. As for beer and sugar, his series has been adjusted and converted into gross value added terms. The value added proportion is 35 per cent (Fellner, 1916; Waizner, 1928). *Petroleum*: In 1912, gross value added was 147 million crowns (data from Fellner, 1916; adjusted on the basis of Waizner, 1928). This figure was extrapolated using a volume index of Austrian crude oil production derived from the official statistics. Domestically produced crude oil accounted for between 90 and 100 per cent of crude oil input in Austrian refineries.

(b) Non-regulated industries. *Iron and steel*. The volume and value of cast iron and pig iron production is well documented in the official statistics. Drawing on input cost coefficients from Waizner (1928) and Burnham & Hoskins (1943), a value added

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[4] For five of the 18 manufacturing branches only summary estimates are possible because of the lack of sufficient data. However, their combined value added in 1911 accounted for less than 20 per cent of the total for manufacturing. These branches include *fuel and light; wood-working; paper-making; printing;* and *chemicals*. The estimates for *construction materials* and *leather and rubber goods* rest on weighted indices calculated for construction and the textiles industry, respectively.

proportion of 37 per cent was used for *smelting*. The 1913 price of pig iron was 79.4 crowns per ton and that of cast iron 93.7 crowns. The volume of steel production is reported in Kupelwieser (1900) and Schuster (1910-1913), while an estimate of wrought iron output was taken from Schulze (1996). Value added in *refining* was then computed by, first, converting steel and wrought iron output into value terms (using the 1911 mean of plate and bar iron prices, i.e. 211 crowns per ton; a 1913 price is not available) and, second, applying a constant value added proportion of 53 per cent (Komlos, 1983). Note that neither Fellner (1916) nor Waizner (1928) account for value added in refining. The estimation equation for value added in iron smelting and refining was

$[.37*(79.4*Q_1 + 93.7*Q_2)] + [.53*211*(Q_3 + Q_4)]$

where Q_1 is the volume of pig iron output, Q_2 the volume of cast iron output, Q_3 the volume of steel output and Q_4 the volume of wrought iron production.

Engineering. An annual estimate of output in *mechanical engineering* is presented in Schulze (1996). This estimate builds on wage-sums paid in the machine-building industry (1889-1911), on wage-bill/gross output ratios (Fellner, 1916), and on the volume of iron and steel inputs in this branch (1870-1913). Hence, for 1889-1911, output was estimated directly on the basis of wage-sums, and for 1870-1888 and 1912-13 it was approximated using estimated input/output ratios and the input series. Hoffmann's steam engine price index for Germany was revised so as to account for Austrian rather than German input prices (cf. Hoffmann, 1965). This revised price index was used for deflating output in all four engineering series. The production of *transport means* was estimated in identical fashion. For both branches, the value added proportion was 55 per cent. For *electrical engineering*, wage-bill data are available only for 1897 to 1911 and for these years, value added was calculated as for mechanical engineering. An initial attempt to approximate value added in this 'new' industry by use of a series of the number of telephones (cf. Komlos, 1983) was abandoned, as the growth in this series outstripped that of the electrical engineering series by a very large margin during the years with overlap. Using iron and steel inputs for extrapolation did not seem sensible either as a considerable proportion of

output is not iron and steel intensive. Instead, a log-linear trend was fitted to obtain values for the missing years. The 1911 level of value added in the production of miscellaneous *instruments and apparatus* was extrapolated using a weighted index which comprises the series for mechanical, transport and electrical engineering. The 1913 shares in combined value added of these branches were used as weights.

Metal-working. Output in this branch was calculated as for mechanical engineering and transport engineering. The price index used is a composite of several iron and steel input prices. The value added proportion is 45 per cent. Value added in the non-ferrous metal-working branch of this sector is assumed to have grown in line with that in the iron and steel using branches.

Brick, clay, glass (construction materials). According to Fellner (1916), value added was 333.71 million crowns in 1911. For want of a more suitable price index, this figure was deflated using the general price index computed by Mühlpeck et al. (1979) and then extrapolated, using the weighted index derived for construction (see below).

Food processing. According to Fellner (1916), value added in food processing in 1911 was 793 million crowns in current prices. This figure was deflated with the price index for food and beverages provided by Mühlpeck et al. (1979) and then extrapolated, using Komlos' (1983) series for value added in flour milling.

Textiles and clothing. Value added in textiles production and in the manufacture of clothing was 1,076 million crowns in current prices in 1911 (Fellner, 1916). This figure was deflated with the price index for clothing provided in Mühlpeck et al. (1979) and then extrapolated, using a weighted index of value added in woollen, cotton and linen textiles production. The two indices for woollen and cotton textiles are taken from Komlos (1983). These have been combined with linen production using their respective 1913 shares in total value added as weights. Linen textiles production was estimated in a two stage process (spinning, weaving) on the basis of domestic flax production, net imports of flax and net imports of linen yarn. Given the high rate of non-marketed output (Sandgruber, 1982), it was assumed that only half of domestically produced flax was used for commercial linen production. The value added proportions were 46 per cent for both spinning and weaving (cf. Fellner, 1916; Gross, 1966).

Rates of conversion from flax to yarn (73 per cent for domestically produced flax fibre and 60 per cent for imported flax) and from yarn to cloth (88 per cent) are taken from Hoffmann (1965). According to the official export statistics, the average 1913 price of yarn was 2.56 crowns per kilogram; the price of cloth was 7.78 crowns. The estimation equation for value added in linen spinning and weaving was

$$[.46*2.56*(.73*.50*Q_1+.60*Q_2)]+[.46*7.78*.88*((.73*.50*Q_1+.60*Q_2)+Q_3)]$$

where Q_1 is the volume of domestic flax production, Q_2 is the volume of net imports of flax and Q_3 the volume of net imports of yarn.

Leather and rubber. Value added in this branch was 24 million crowns in 1911 (Fellner, 1916). For want of a better price index, this figure was converted in 1913 prices by using the clothing price index of Mühlpeck et al. (1979). It was assumed that value added in this branch grew in line with value added in textiles and clothing, i.e. the weighted textile index was used to extrapolate output in this branch.

Electricity generation. Value added in electricity generation of central power stations was 45 million crowns in 1911 (Fellner, 1916). Output was approximated in four stages. The number of central power stations is available for 1886, when the first station was built in Austria, to 1890 (Matis & Bachinger, 1973) and for 1906 to 1913 (Handelsmuseum, 1916). For the years between 1890 and 1906, the number of generating plants was approximated by linear interpolation. Total electricity output (in kw) and output per power station is available only for 1906 to 1913 (Handelsmuseum, 1916). It was assumed that electricity output per unit rose between 1886 and 1905 at the same rate as for 1906 to 1913. Multiplying estimated unit output by the actual (1886-90) and estimated (1891-1905) number of power stations yielded annual estimates of total electricity output for the years with missing data, which were then combined with the original data for 1906 to 1913. Finally, the output series so obtained was used to calculate value added for 1886 to 1913 on the basis of the 1911 value added/physical output ratio. Note that this series is measured in 1911 prices.

Fuel and light. In 1911, value added in this branch (excluding electricty generation and briquette production) amounted to 98 million crowns (Fellner, 1916). This figure was deflated using a price index for domestic fuel and light compiled by Mühlpeck et

al. (1979). It was assumed that value added grew in line with manufacturing as a whole.

Wood-working; paper-making; printing; chemicals. In 1911, value added in these manufacturing branches amounted to 707 million crowns (Fellner, 1916). This figure was deflated using the general consumer price index of Mühlpeck et al. (1979). Again, it was assumed that value added in these branches expanded in line with the manufacturing sector as a whole.

4. Construction

Gross value added in *construction* was approximated by starting from Waizner's (1928) estimate for 1911/13. His figure was converted into 1913 prices using the general price index of Mühlpeck et al. (1979) and then extrapolated on the basis of a weighted index that includes an infrastructure series, a series for residential building, and a series for commercial investment in buildings (machinery production as a proxy). The infrastructure series is composed of Komlos' (1983) index for value added in railway construction, and two new indices for road construction and inland waterway construction which draw on official data (annual issues of *Statistisches Jahrbuch* and *Statistisches Handbuch*). Using a proportion of 35 per cent, value added in road construction was estimated for new construction and for maintenance on the basis of road length and expenditure data. The cost of constructing one kilometre of new road in 1913 was approximately 57,562 crowns per year; that of maintaining one kilometre of road was 1,477 crowns[5]. The incomplete and inconsistent data on the length of inland waterways necessitated to estimate value added in the construction of waterways solely on the basis of public expenditure data[6]. A new series was obtained

[5] These figures are based on the average 1913 expenditure on state roads (1,921 crowns per kilometre) and the assumption that the *ratio* between the costs of new construction and the costs of maintenance approximated to that which applied in railway construction (cf. Komlos, 1983).

[6] Note, however, that in 1913 state expenditure on inland waterways accounted for less than half of expenditure on state roads which, in turn, made up only about 13 per cent of the total road network.

by deflating total annual outlays for new construction and maintenance (using the general price index of Mühlpeck et al. (1979)) and applying a value added proportion of 35 per cent. The three indices for railway, road and waterway construction are combined using 1913 shares in joint value added as weights. The new series for residential construction is based on additions to the housing stock as recorded in the censuses and adjusted for population growth to correct for the effects of unrecorded changes in the average size of residential dwellings (annual issues of *Statistisches Jahrbuch* and *Statistisches Handbuch*). Finally, the infrastructure, residential and commercial building indices are combined using 1907 weights derived from Hoffmann (1965).

5. Handicrafts

The share of *handicrafts* production in commodity output remained more or less constant throughout the late 19th century (Gross, 1966; Fellner, 1916). The official census data would suggest, moreover, that the handicrafts sector did not lose out to industry in terms of employment. In short, there is little evidence that the handicrafts sector declined in absolute or relative terms. This 'resilience' can be explained, at leat partly, by this sector's shift into custom production, components making and repair work. It was, therefore, assumed that value added in handicrafts production (1,470 mill. crowns in 1911 before deflation with the general consumer price index of Mühlpeck et al. (1979)) expanded in line with manufacturing and construction, i.e. a weighted index of manufacturing and construction was used for extrapolation. The respective 1913 shares of manufacturing and construction in combined output were used as weights.

6. Trade and communications

The value added series for *trade and communications* is taken from Kausel (1979) without further adjustment. He assumed, first, that trade moved in line with primary and secondary production and, second, that only half of agricultural output was traded. Kausel used data from Bachinger (1973) to approximate output of rail and road transport, of shipping and of the postal system.

7. Services

Value added in 'productive' (private and public) and 'personal' *services* has been estimated by Kausel (1979) on the basis of official employment statistics. His series is incorporated into the GDP estimates without further adjustment.

8. Housing

Kausel (1979) estimated *rental income from housing* for 1870 to 1913 using the total number of residents' parties and assuming a constant size and quality of the dwellings, while taking account of owner-occupation. Again, no attempt at further adjustment has been made before integrating this series into the GDP estimates.

IV. Results and implications

The new estimates suggest that Austrian economic development in the late nineteenth century took a course distinctly different from that implied in earlier estimates of GDP and GDP per capita.

First, at 1 per cent per annum, income per capita grew between 1870 and 1913 at a rate that is well below previous estimates (Table 1) - a result which, however, confirms the 'tendency' towards downward adjustment of the Austrian growth rate during the last twenty or so years of research. This rate of expansion would place Austria (both imperial and modern) near the bottom of the European growth league for the period under review. The unweighted average growth rate of the other 13 countries listed in Table 3 is 1.29 per cent.

Secondly, at the beginning of the period under review, imperial Austria's GDP per capita was between 5 and 19 per cent higher than Kausel's and Good's figures indicate (Table 2)[7]. Though the remaining income gap is still substantial, the Western half of the Habsburg Empire appears as having been economically markedly less backward in 1870 relative to, for instance, France or Germany, than thought so far (Table 3). In fact, the tentative approximations for the territories of modern-day Austria show

[7] The new estimates and Kausel's data have been converted from 1913 crowns into 1990 Geary-Khamis dollars at a rate of $3.36 per crown, while Good's estimates were converted from 1980 international dollars at a rate of $1.58 per 1980 intl. dollar.

Table 1: Growth of GDP per capita, imperial Austria (% p.a.)

	1870-1890	1890-1910	1870-1910
Good (1978)	-	-	1.80*
Kausel (1979)	1.24	1.38	1.31
Crafts (1983)	2.00	0.95	1.48
Good (1991)	0.91	2.06	1.48
Good (1994)	1.28	1.61	1.44
Good (1997)	1.08	1.28	1.18
New estimate	**0.63**	**1.39**	**1.01**

* 1873/75-1911/13

Sources: See text for new estimates; references.

that, at this time, per capita incomes there were above those of other European countries with the exception of Britain, Belgium, the Netherlands and Switzerland.[8] Thirdly, the new estimates reflect a pattern of growth which was far from uniform over time. Compared to the 1870-1890 period, there was a pronounced increase in the growth rate of Austrian per capita income for the post-1890 period and this result is broadly in line with most earlier estimates. However, the comparative growth rates presented in Table 1 indicate that growth in the two decades after 1870 proceded at a rate only half that suggested by Kausel and half a percentage point below Good's most recent estimate. Moreover, the increase in the rate of growth of Austrian per capita incomes after 1890 was not on a par with that achieved elsewhere. The post-

[8] Given the lack of relevant data, there are no obvious alternatives to Good's proxy approach and Kausel's derivative method of isolating incomes in the territories of modern Austria and to using their 'imperial Austria/modern Austria' ratios. However, I prefer the ratios implied in Good's (1994) results for reasons of plausibility. Moreover, they fall roughly mid-range of the alternative ratios implied in the income estimates of Kausel and the three proxy estimates by Good (1991, 1994, 1997). According to Kausel, between 1870 and 1913 per capita income in modern Austria was up to twice as high as in the rest of imperial Austria. This would leave the rest of imperial Austria (which included not only 'backward' regions but also highly industrialized, rich and populous parts such as the Bohemian lands) with improbably and implausibly low average per capita incomes.

Table 2: Levels of GDP per capita (1990 Geary-Khamis $)

	1870	1880	1890	1900	1910
Imperial Austria					
Kausel (1979)	1223	1351	1569	1771	2063
Good (1994)	1198	1348	1544	1868	2127
Good (1997)	1358	1483	1685	1980	2174
New estimate	**1428**	**1473**	**1618**	**1804**	**2134**
Modern Austria					
Kausel (1979)	1875	2093	2460	2901	3312
Good (1994)	1650	1833	2106	2563	2863
Good (1997)	1789	1941	2171	2602	2852
New estimate [a]	**1971**	**2003**	**2200**	**2471**	**2881**

[a] based on Good's (1994) 'imperial Austria/modern Austria' ratios

Sources: See text for new estimates; references.

1890 period was one of incomes generally rising at higher rates than before. The unweighted average growth rate for twelve European countries rose from 0.99 per cent per annum for 1870-1890 to 1.50 per cent for 1890-1913 (Table 3, excluding Switzerland).

These results have major implications for the interpretation of Austria's growth process in its international context.

The pace of growth. The literature stresses the eighteenth century antecedents of nineteenth century economic expansion in Austria (Good, 1984; Komlos, 1983). John Komlos (1989) went even further and argued that the industrial revolution in Austria began at about the same time as in Britain, though without implying that it spread at even nearly the same rate as there. Viewed against this background, it seems little surprising that the late nineteenth century Austrian economy did not display the growth characteristics of a typical *Gerschenkronian* latecomer to industrialization.

However, the comparatively low rate of Austrian per capita income growth is equivalent to that achieved in advanced economies such as Britain and Belgium which,

Table 3: Levels of GDP per capita (1990 Geary-Khamis $)

	1870	1890	1913	Δ (% p.a.) 1870-1913
Imperial Austria	**1428**	**1618**	**2212**	**1.02**
Modern Austria[a]	**1971**	**2200**	**2986**	**0.97**
Belgium	2640	3355	4130	1.05
Denmark	1927	2427	3764	1.57
Finland	1107	1341	2050	1.44
France	1858	2354	3452	1.45
West Germany	1913	2539	3833	1.63
Italy	1467	1631	2507	1.25
Netherlands	2640	3228	3950	0.94
Norway	1303	1617	2275	1.30
Spain	1376	1847	2255	1.16
Sweden	1644	2086	3096	1.48
Switzerland	2172	n/a	4207	1.55
UK	3263	4099	5032	1.01
USSR	1023	925	1488	0.88

[a] new estimate using Good's 'imperial Austria/modern Austria' ratios

Sources: See text for Austria; Maddison (1995)

by 1870, had per capita incomes about twice the level of imperial Austria. If initially low levels of per capita output (or labour productivity) entail the potential for faster growth than in the more advanced economies (Gerschenkron, 1962; Abramovitz, 1986), then the question arises why the Western half of the empire failed to expand at a pace broadly commensurate with its relative income position. For example, the economies of three other European countries with roughly comparable income levels in 1870, i.e. Italy, Spain and Norway, grew markedly faster during the period up to 1913 (Table 3). By the same token we might ask why the economically most advanced part of the Habsburg Empire, the territories of modern-day Austria, failed to keep

pace with the expansion achieved in countries such as Denmark, France and Germany, all of whom had similar per capita income levels in 1870. With regards to Austria, at least, the evidence presented here does not corroborate the view that, in the late nineteenth century, the empire's economy grew relatively fast and began to 'catch-up' (Good, 1991, 1997).

The periodicity of growth. The very low rates of per capita income growth between 1870 and 1890, both relative to rates of expansion achieved elsewhere in Europe during this period and relative to Austria's post-1890 record, lend support to the notion of a Great Depression after 1873 in the Western part of the Habsburg Empire (März, 1968, 1985). This prolonged stagnation unfolded in the aftermath of the 1873 Vienna stockmarket crash. It was associated with an outflow of capital from the Western to the Eastern half of the empire (i.e. to Hungary) and a dramatic contraction in industrial machinery investment. These trends were only reversed in the late 1880s/early 1890s when capital was repatriated to Austria and industrial investment activity there picked up again (Komlos, 1983; Schulze, 1997). The revisionist view that the Great Depression was as much a myth in Austria as it was in Britain (Good, 1974, 1978, 1984) does not match with the evidence on output growth presented here. However, the new estimates speak not only to the problem of whether or not there was a drawn-out period of economic stagnation and slow growth that can be described adequately as one of *depression*. They also raise the question about the longer-term impact of this depression on the pace of growth. For instance, to what extent were the institutional and structural changes which emerged in Austria during this period detrimental to more rapid growth subsequently? For what looked like a relatively favourable income position in 1870 was to be eroded during the protracted stagnation of the 1870s and '80s and, most importantly, was not to be regained in the following decades to 1913, despite a marked acceleration in per capita income growth. By the time of the First World War, imperial Austria's relative income position had deteriorated against 10 of the 13 other countries in Table 3 when compared with 1870. Per capita incomes in the territories of modern Austria fared even worse in international comparison, falling from fifth rank in 1870 to nineth in 1913.

These findings on the pace and periodicity of Austrian economic growth can be summarized as follows: First, over the period under review (1870-1913), the Austrian economy failed to catch up with the leaders. By 1913 the income gap to the most advanced economies such as Belgium, Britain and the Netherlands, was about the same in percentage terms as it was in 1870. This was an outcome of more rapid rates of growth after 1890 which by and large made up for the substantial relative income losses sustained during the depression. But, secondly, even during this period of its most rapid expansion, the Austrian economy continued to fall behind most other European economies in terms of income growth.

Appendix

Table A.1: Austrian GDP in constant 1913 prices (mill. crowns)

	Primary Sector[a]	Secondary Sector[b]	Tertiary Sector[c]	GDP	GDP per capita	
					crowns	1913=100
1870	2329.3	2515.0	3892.0	8736.3	424.9	64.5
1871	2377.0	2887.6	3983.0	9247.6	447.8	68.0
1872	2361.8	2809.0	4008.0	9178.8	442.8	67.3
1873	2306.7	2475.9	4001.0	8783.6	423.5	64.3
1874	2588.5	2588.7	4067.0	9244.2	442.3	67.2
1875	2539.7	2629.3	4092.0	9261.0	438.7	66.6
1876	2554.9	2525.2	4129.0	9209.1	431.9	65.6
1877	2707.9	2699.9	4180.0	9587.8	446.6	67.8
1878	2914.4	2740.4	4233.0	9887.8	457.6	69.5
1879	2547.1	2707.7	4239.0	9493.8	435.3	66.1
1880	2622.9	2744.0	4271.0	9637.9	438.5	66.6
1881	2755.1	2920.5	4341.0	10016.6	453.0	68.8
1882	2709.0	3013.6	4373.0	10095.6	453.1	68.8
1883	2766.2	3103.8	4445.0	10315.0	459.7	69.8
1884	2899.0	3171.6	4503.0	10573.6	467.2	71.0
1885	2975.0	2996.6	4516.0	10487.6	460.4	69.9
1886	2990.5	3025.4	4587.0	10602.9	462.0	70.2
1887	3135.8	3248.6	4649.0	11033.4	476.6	72.4
1888	3133.5	3258.3	4675.0	11066.8	474.4	72.0
1889	2981.8	3207.2	4766.0	10954.9	465.0	70.6
1890	3197.8	3368.5	4848.0	11414.3	481.4	73.1
1891	3138.1	3712.4	4958.0	11808.5	494.3	75.1
1892	3318.4	3633.6	5047.0	11999.0	498.3	75.7
1893	3103.8	3771.2	5112.0	11987.0	494.1	75.0
1894	3409.7	3984.2	5262.0	12655.9	517.8	78.7
1895	3366.8	4050.3	5368.0	12785.1	518.7	78.8
1896	3318.5	4063.0	5462.0	12843.5	515.8	78.3
1897	3271.5	4191.3	5544.0	13006.8	517.2	78.6
1898	3594.0	4399.9	5710.0	13703.9	539.5	81.9
1899	3743.4	4509.7	5808.0	14061.1	548.0	83.2
1900	3591.4	4445.9	5883.0	13920.3	537.1	81.6

1901	3752.0	4566.2	6020.0	14338.2	547.7	83.2
1902	3778.0	4840.8	6120.0	14738.8	557.7	84.7
1903	3706.1	4976.4	6216.0	14898.5	558.6	84.8
1904	3707.6	5080.9	6329.0	15117.5	561.6	85.3
1905	4174.6	5385.8	6533.0	16093.4	594.3	90.3
1906	4310.2	5701.8	6704.0	16716.0	611.0	92.8
1907	4347.3	6171.9	6931.0	17450.2	632.3	96.0
1908	4482.1	6283.3	7022.0	17787.4	638.9	97.0
1909	4499.1	6484.7	7124.0	18107.8	645.1	98.0
1910	4370.5	6366.1	7247.0	17983.6	635.0	96.5
1911	4265.9	6656.9	7416.0	18338.8	643.0	97.7
1912	4519.2	7288.9	7644.0	19452.0	676.6	102.8
1913	4509.1	6830.2	7721.0	19060.3	658.4	100.0

[a] agriculture, mining

[b] manufacturing, handicrafts, construction

[c] trade and communications, services, rental income from housing

Sources: see text.

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