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THE AUSTRIAN MIRACLE - REVISITED: TESTING EIGHT EXPLANATIONS FOR HIGH GROWTH AND MAYBE A NINTH

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by

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Abstract

This paper is a first attempt to empirically evaluate some competing hypotheses for the Austrian growth performance. We find that the real appreciations, gross investment, a low duration of unemployment and high youth employment exhibit a significant influence on economic growth. This validates the hard currency policy hypothesis, the macroeconomic management hypothesis, and the microinstitutions hypothesis, whilst all other fail according to this exercise. In particular, we find the Schulmeister-thesis of loose money and the deficit spending hypothesis are even counterfactual. Summarizing, we find that economic policy had its share in promoting growth in the Austrian economy. As a byproduct from our analysis, we find that low levels of unemployment have a significant and positive impact on the growth rate of real GDP, which calls for further theoretical research in this direction.

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Keywords

Economic Growth, Growth Determinants, Extreme Bounds Test, CDF-Test.

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Introduction

Back in 1960, Austria had a GDP per capita of 23 110,- ATS, ranking 14th in the world. Today, Austria exhibits a GDP per capita of 311 492,- ATS, improving its position in the world to the seventh place. In real terms, the Austrian GDP has increased by an average of 3.2 % per annum. As shown in a previous paper, it cannot have been a mere convergence process, as the underlying Solow model fails to fit Austrian data. (Ragacs, Zagler, Steinberger, 1998) This paper attempts to investigate and empirically verify several explanations for the Austrian growth performance, which have been raised throughout the literature, and eventually proposes yet another.

With a lack of exploitable natural resources or a past exclusion from major world markets, and assuming that on average managers here are no better or worse then elsewhere, the underlying argument for all explanations of the growth experience of the Austrian economy is that economic policy has performed better here than elsewhere.

Austrian Economists have established a vast list of theories for the high growth performance in Austria' past. This paper presents and tests the major ten hypothesis for their empirical validity. As all theories are based in intensive growth, that is growth through factors other than capital and labor inputs, the first step is to derive total factor productivity for Austria from a growth accounting method. Rather surprisingly, we find that from all the theories tested, only hard currency policy, the macroeconomic management hypothesis and the microinstitutions cannot be rejected, whilst all other fail according to this exercise. As a byproduct from our analysis, we find that low levels of unemployment have a significant and positive impact on the growth rate of real GDP, which calls for further theoretical research in this direction.

Deriving Intensive Growth of Austrian GDP

Goods are produced by wo/men and machines. Evidently, if an economy exhibits more of either workers or machines, it will produce more output. All other, and previously mentioned arguments, may only operate through the residual, the so called total factor productivity (tfp), to influence the growth performance of the economy. In order to obtain a measure of total factor productivity, one usually starts from a production function, , assumed here to exhibit constant returns to scale and constant factor elasticities of output as follows,

(1) $Y_t = A_t K_t^b L_t^{1-b}$,

where Y_t is output, K_t is capital inputs, L_t is labor inputs, and A_t is a measure of total factor productivity. Over time, capital changes as existing capital depreciates and new investment adds to the capital stock. The accumulation equation reads,

(2) $\dot{K}_t = I_t - dK_t$,

where I_t is gross investment, and d is the constant exponential rate of capital depreciation. Assuming that along a balanced extensive growth path, the growth rate of capital is constant and given by g, equation (2) reduces to,

(3) $K_t = I_t / (g + d)$.

Substituting equation (3) into equation (1), dividing both sides by labor, taking logs and time derivatives one finds that the growth rate of output per capita, y_t, depends on the growth rate of total factor productivity a_t and the b-multiple the growth rate of gross investment per worker i_t,

(4) $y_t = a_t + bi_t$.

Given output and gross investment per worker, a simple ordinary least squares regression will yield both the parameter b and the growth rate of total factor productivity.

The estimation was based upon a several data sources. Output (real GDP), investment and employment, were taken from the Austrian statistical office (OeSTAT). The capital stock data have been calibrated from investment data using the perpetual investment method, where the constant exponential rate of depreciation was taken from Boehm et al. (1998). Table 1 shows

the results for the growth rate of output, capital and the four variants of total factor productivity.

TABLE 1: GROWTH ACCOUNTING	Growth in Output per Capita	Growth in Output per Capita	Growth in Total Factor Productivity
1971 - 1977	3.32	6.68	0.91
1978 - 1984	1.87	4.38	0.47
1985 - 1991	2.14	2.74	-0.36
1992 - 1998	1.78	3.46	-0.26
1971 - 1998	2,28	4,30	0,19

Whilst per capita output (column 2) has grown at an average of approximately two percent, with the exception of the early 70ies fairly equally distributed over the entire time span, the growth rate of capital has declined from an average of 6.7 % in the first interval, to 2.7 % in the late 80ies. We find that there is a large portion of Austrian economic growth can be explained by extensive factors, labor and capital. In the first half of the observation period, total factor productivity has increased by a total of 10,1 %, whilst it has subsequently declined by 4,3 %. The following chapters will therefore investigate, which intensive factors, that operate through the total factor productivity, have driven economic growth and slowdown in Austria.

Explanations of the Austrian Economic Performance

The first hypothesis to explain the Austrian growth performance is that Austria has simply managed to attract those industries which had a high growth potential. The prime example is the project to create an „Austro-Porsche“, a car built entirely in Austria. Whilst Austria still does not produce automobiles, the structural program has installed a significant car supply industry, which achieved high growth rates in the past, and, as shown in Styrian automobile

cluster, still does. Measures of industrial policy are hard to obtain. However, if industrial policy has indeed been a significant source of economic growth, one should observe a positive correlation between sectoral shifts, which are naturally brought about as one sector expands at the cost of another, and an indicator of economic growth. (cf. Aiginger, 1989, 280ff)

Several authors argue, however, that structural shifts are not due to intentional policy intervention, but are the result of economic forces. This should drastically reduce the explanatory power of a structural change variable, once other time series are added. Marin (1992) introduced the concept of export-led growth in Austria, stating that sectors which face international competition are bound to foster innovations that increase productivity and reduce prices on world markets. Evidently, this should lead to a change in domestic relative prices, yielding a sectoral shift as well. Policy can of course alter the composition of exposed sectors using sector specific tariffs.

It has been widely argued that the unilateral exchange rate targeting of the Austrian Schilling to the Deutschmark has fostered economic growth. Given tight money in Germany, Austria should have appreciated its currency as well, leading to a permanent deterioration of relative import prices. Evidently, only very productive companies and industries should be able to remain in the market. This structural whip is said to have eliminated several low-growth industries, while strengthening expanding sectors. (Frisch, 1976)

By contrast, Schulmeister (1997) stresses the fact that tight monetary policy is the prime source for current stagnation, implying that loose money has led to the good growth performance in earlier days. The argument is that tight monetary policy leads to high interest rates and hence to a reduction in effective demand. Assuming that supply is simply accommodating, output may decline or grow at a slower pace. The question then arises how to

define tight and loose monetary policy, or the stance of monetary policy. Blinder (1998) defines as the benchmark (or neutral) real interest rate one where the current IS-curve of an economy intersects with „natural“ output. Monetary policy is tight if it sets interest rates above the benchmark rate, and loose otherwise. Evidently, the ratio of actual to benchmark interest rates should, according to Schulmeister, exhibit a significant influence on economic growth.

Whilst the Schulmeister thesis is more along the lines of „American“ Keynesianism, the Austrian variant, so called Austro-Keynesianism, stressed the importance of fiscal policy to bring output to its desired level. In that sense, deficit spending, and in particular cyclical deficits, should have a significant impact on the performance of the Austrian economy (Tichy, 1994)

Along these Keynesian lines, the argument that Austria had a good investment climate, supported by low real rates interest which resulted from efficient macroeconomic policy, and thus was able to manufacture on the basis of very recent vintages, enabling high rates of productivity, received some prominence. In that sense, high investment shares should yield a significant influence on economic growth. (Nowotny, 1999)

The third variant of Keynesian policies, income policy, has also received some attention. In the case of business downswings, outside flexibility (Mühlberger, 1998) should achieve relatively low spells of unemployment. Indeed, the Austrian real wages are known to be quite flexible (Hofer, 1996) Whilst this should mainly affect the labor market, under the assumption of hysteresis (Pichelmann and Schuh, 1997) low unemployment may have effects on the growth performance.

Finally, Unger (1998) argues that more important than particular programs is the institutional arrangement to carry out necessary policy prescriptions. In that sense, Austria’s regulated

institutional setting is bound to yield better results, as the welfare costs of failing to reach agreement can be reduced. Whilst theoretically appealing, Unger does not provide a historical time series, hence union density, or the potential of trade unions to control the social conflict on labor markets, is adopted as an indicator of institutional stance.

Whilst all concepts help in explaining the previous growth process, they shed a very pessimistic picture on the future evolution. Union density declines, implying less social peace, alongside with a decentralization of the bargaining process, macroeconomic wage flexibility may decline, all implying a weaker growth performance. The European Monetary Union eliminates the option of a hard currency, at least against Austria's major trading partners, and enforces tight budgets, destroying potential for cyclical deficits and scope for structural policy programs alongside. Left alone the export-led growth hypothesis with some degree of optimism.

In attempting to evaluate the proceeding proposition for recent periods, this paper attempts to judge their significance for the present days. Beyond this, an additional hypothesis, the influence of 'microinstitutions' is being tested. Microinstitutions are institutions working in a very limited environment. Examples are shop stewards, or local job market offices. Efficient microinstitutions can reduce the dependence effect, the idea that the duration of unemployment reduces productivity of a respective worker, and the marginalisation effect, the concept that if young workers are not integrated into the job market, they may be out of an important part of the labor market for their entire life. As an indicator for the quality of microinstitutions, both the duration of unemployment, and the share of young unemployed in total unemployment have been tested. (Blanchard, 1998)

The Data

Total factor productivity is really productivity beyond what the respective production factors produce. The parameter may represent technological innovations, the efficiency of the market or institutional setting, or any type of production externality, such as threshold externalities or strategic complements. In that sense, any of the parameters suggested in the introduction of this paper should operate through total factor productivity in influencing output growth. A total of ten different explanatory variables has been adopted as suggested by the theories in the introduction.

In the following empirical exercise, structural change is measured as weighted average of the change in the share in value added over all 14 sectors, additionally splitting manufacturing (the largest) into 14 subgroups. According to Landesmann and Székely (1995), the index is defined as

$$(5) \qquad S_t = [\sum_i (s_t^i - s_{t-1}^i)(s_t^i / 100)]^{\frac{1}{2}} .$$

The degree of openness, defined as the sum of export and import shares in GDP, is adopted as an indicator for the potential to benefit from export led growth. The real effective exchange rate is used as a measure of devaluation or reevaluation to measure the impact of the hard currency policy. In accordance with Blinder (1998), the difference between the actual and a 25-year average real discount rate is adopted as an indicator of the stance of monetary policy, „the idea being that lags work themselves out, transitory phenomena fade, and random shocks average to zero over long period of time“, in particular via changes in inflation rates.

In order to estimate the cyclical budget deficit, deviations of actual net lending from the structural deficit as measured by Brandner, Diebalek and Schuberth (1998) have been computed. The share of gross investment in output is used to measure the vintage impact on

total factor productivity. The instantaneous wage elasticity of unemployment is taken as a measure of wage flexibility (Hofer, 1996). Union density, i.e. the number of organized workers in the labor force, is used as a measure of corporatism. As already suggested, the duration of unemployment is used to measure the potential of microinstitutions to increase turnover along the unemployment line, whilst the share of 15 - 25 year olds in the workforce is used as a measure of the potential of microinstitutions in firms to incorporate young workers into the labor force. In addition, a simple linear trend has been introduced to capture elements not covered by the previous discussion. If appropriate, variables were in natural logs. All variables have been differenced in order to ensure stationarity.

Explaining Changes in Total Factor Productivity

With some 20 observations and ten explanatory variables, a general to specific econometric methodology is certainly inappropriate. Instead of going straight into data-mining, this paper adopts the two-million-regression method of Sala-i-Martin (1997), who suggests to estimate all possible regressions of the following form,

(6) $$a_t = a + bx_t + gy_t + dz_t + e_t ,$$

where α, β, γ, and δ, are coefficients, ε_t is an i.i.d. shock, a_t is the growth rate of total factor productivity, x_t is the variable of interest, y_t are variables that should always be significant in the regression, and z_t is a vector of two variables from the pool of explanatories. Each of the ten variables in turn has been taken as x_t. All remaining variables have been used in all possible combinations to form the two-dimensional vector z_t. In contrast to Sala-i-Martin, who uses GDP growth rates as the dependent variable, here the evident influence of labor and capital on output have already been considered. Here, both the capacity utilization rate and the rate of

unemployment have entered every equation, in order to control and eliminate for business cycle influence.

Table 2 summarizes the results. Column one lists the variable of interest x_t in each case. Column two gives the average coefficient, whilst column three shows the average standard deviation. In order to emphasize those regressions which appear to be closest related to the true model, the averages are weighted by the likelihood of the respective regressions. Column four then presents the average t-statistic. If the coefficient β is normally distributed, we obtain a first hint for the significance of the variable on the Austrian growth performance.

Another measure, considered too restrictive in the literature (e.g. Sala-i-Martin, 1997) is the extreme bounds test, first proposed by Leamer (1983). The idea is to compute the minimum of the coefficient minus twice the standard deviation of all regressions for a particular variable of interest, and the maximum of all coefficients plus twice the standard deviation. Should both bounds exhibit the same sign, it can be excluded with at least 95 % significance (but most likely with 100 %) that the coefficient is different from null. Columns five and six show the two extreme bounds respectively.

The last column is the cumulated density function test proposed by Sala-i-Martin (1997). Assuming that the distribution of the coefficient β is unknown, we can use all 99 estimates of the coefficient β to estimate the density function. Column seven lists probability, that a realization of the coefficient β lies to the left or right of zero, whichever is larger. The CDF(0) statistic therefore indicates the probability that the coefficient is significantly different from zero, hence influences the Austrian growth performance.

TABLE 2: SUMMARY STATISTICS	Coefficient	Standard Deviation	t-statistic	Upper Bound	Lower Bound	CDF(0)
Structural Change	-0.053	0.30	-0.18	0.72	-0.75	77.96
Degree of Openness	-2.717	6.06	-0.45	15.18	-18.51	91.08
Real Effective Exchange Rate	13.900	11.31	1.23	45.41	-17.28	99.96
Stance of Monetary Policy	2.007	1.22	1.64	5.84	-1.06	99.99
Cyclical Deficit	-0.582	0.31	-1.86	0.28	-1.51	99.99
Gross Investment	6.988	6.93	-1.01	27.11	-10.42	99.99
Wage Flexibility	-0.037	0.08	-0.48	0.17	-0.25	92.48
Union Density	-2.906	20.65	-0.14	49.52	-61.74	68.90
Youth Unemployment	-5.737	2.65	-2.16	2.16	-12.59	99.99
Duration of Unemployment	-5.786	3.30	-1.75	4.51	-13.05	99.99
Capacity Utilization	0.644	0.23	2.86	1.39	0.01	53.43
Unemployment	-2.476	1.72	-1.44	3.44	-8.93	85.43

First, a number of hypothesis fail to meet any of the three test statistics proposed above. The structural shift index, the degree of openness, wage flexibility and union density do not pass neither the extreme bounds test, under the normality assumption the t-test, nor the CDF(0) test. We find that only the marginalisation hypothesis, and assuming a 10 % significance level the dependence and the cyclical deficit pass the t-test, whilst all of the above, and in addition real appreciations, the stance of monetary policy, and gross investment are significant for total factor productivity growth according to the CDF(0) test. However, both the stance of monetary policy and cyclical deficits exhibit the wrong sign, hence both the deficit spending and loose money hypothesis have to be rejected. The later can be given a flow-of-funds interpretation. Austrian economic policy has not employed deficits actively in order to achieve high growth, but instead incurred high deficits as private investors reduced investment, households reduced savings and the foreign sector reduced net capital investment as long-term growth perspectives declined. Evidently, as the flow-of-funds has to add up to zero, governments were forced to run budget deficits. It can therefore be concluded that only the

hard currency policy, the macroeconomic management hypothesis and the microinstitutions hypothesis help to explain the growth performance of the Austrian economy.

Conclusions and Extensions

This paper was a first attempt to empirically evaluate some competing hypotheses for the Austrian growth performance. We find that the real appreciations, gross investment, a low duration of unemployment and high youth employment exhibit a significant influence on economic growth. This validates the hard currency policy hypothesis, the macroeconomic management hypothesis, and the microinstitutions hypothesis, whilst all other fail according to this exercise. In particular, we find the Schulmeister-thesis of loose money and the deficit spending hypothesis are even counterfactual. Summarizing, we find that economic policy had its share in promoting growth in the Austrian economy. As a byproduct from our analysis, we find that low levels of unemployment have a significant and positive impact on the growth rate of real GDP, which calls for further theoretical research in this direction.

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