New Primary Road Transport Infrastructure and the Development of Spatial Distribution of Growth: A SCGE Analysis for an Eastern Austrian Border Region

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ABSTRACT: In mature economies new transport infrastructure (beyond bottle-neck elimination) is considered to hardly influence overall growth, but well so its spatial distribution. In a sectorally diversified spatial computable general equilibrium (SCGE) model of the Lower Austrian – Burgenland new highway (opened in 1991) to the now new member state Hungary, we analyse land use development. Sufficiently regionally footloose activities (such as shopping malls or distribution centres) react to the change in cross-region transport costs by relocation. We find that even overall growth is expanded, however, part of this growth is consumed by the increasing use of transport resources. Empirically we build on our new spatial database for economic and transport data which was developed out of the Austrian long-term transport forecast in state of publishing.

KEYWORDS: infrastructure and growth, spatial CGE, empirical new economic geography, regional location of production

JEL: C68, D58, R12

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1 INTRODUCTION

Substantial increases in transport infrastructure supply and transport flows in many countries over the last decades, both in freight and passenger transport, have enabled crucial growth in consumer benefits. But, as a recent OECD (2000, 13-15) report put it, “there have been costs – mostly environmental costs – that are eroding the benefits. […] The challenge for the 21st century is to maintain and even enhance transport's benefits while reducing its impacts to sustainable levels.”

While transport services are crucial to economic activities, the transport sector in its current shape is connected to a range of substantial detrimental impacts. For example, mobility activities currently trigger the fastest increasing segment in fossil fuel emissions in many countries. In Austria, for example, while total CO_2 emissions increased by 14.4% between 1990 and 2002, emissions from road transport increased by 62% over this period. If Austria is to comply with its commitments within the European Union with respect to the Kyoto agreement, effective measures need to be prepared and implemented in due time. Similar demands for transport reorganisation arise from current noise and health impacts (e.g. respiratory illnesses triggered by particulate matter emitted or recirculated by transport).

In the set of instruments to govern environmental impacts of transport, both volume and mode, policy discussion focuses most often on the “narrow” transport sector, both on technological and management instruments. Long-term impacts on transport emissions, however, are much stronger governed by the way transport interacts within the broader social and economic system. In particular land use patterns, and transport infrastructure interacting with them, determine transport emission patterns for decades. In this paper we thus focus on the interaction of new transport infrastructure and land use patterns.

Choices in land-use and in transport are mutually dependent. Any given pattern of activity location induces a specific trip pattern, and, reversely, the location choice for each activity is dependent on the transport system and the opportunities it offers, since it is the transport system which defines the cost associated with all future activities at any specific location.

Most modelling has chosen one of the above approaches of primary causation. Only few efforts at integration have been made, e.g. Martinez (2000). The developments within new economic geography, triggered by Krugman (1991, 1995), however, have provided a number of new theoretical modelling devices and possibilities for simulation which need to be employed in suitable areas of empirical application beyond illustrative modelling (probably best presented in the work of Krugman himself).

We will proceed as follows. In section 2 the methodological device used, spatial computable general equilibrium modelling (SCGE), is argued for. Section 3 discusses the interaction between new transport infrastructure, economic growth and environmental quality. Section 4 presents the model and its implementation for an Austrian region, while simulation results of the impacts of new infrastructure in this region within an imperfect competition setting are presented in the following section. A final section concludes by summarising the main results. This version of the paper does present model structure and simulation results, sensitivity analysis is still ongoing and will be presented both in a later version and at the conference slot.

2 SPATIAL COMPUTABLE GENERAL EQUILIBRIUM MODELING

For modelling the interlinkage of land-use and transport, spatial computable general equilibrium (SCGE) models serve as basic starting point, as they

(i) inherently depict the simultaneous decision on both producer-producer and producer-customer distances, output levels, and structure and level of production input demands, each of which by sector.

(ii) inherently acknowledge transport costs (fixed and variable components), varying across locations

(iii) inherently depict production cost dependency on output levels (variable returns to scale)

(iv) respect budget constraints in the consumer, public and firm sectors

(v) include an initial spatial allocation of households (and thus spatial distribution of both labour and consumption potential), which is necessary to fix – in combination with explicit transport cost modelling – an efficient spatial distribution of production (without transport costs in models of variable returns to scale we can conclude that certain agglomerations will occur, but their location would be ambiguous, as we know from stylised models)

Implementing the monopolistic competition models of the Dixit-Stiglitz (1977) type into multi-region CGE-models, the few empirical examples of SCGE models available so far start from one of two ends: broad regional coverage with few economic sectors (Bröcker, 1998); or from a fully fledged sectoral structure, with regional diversity restricted to within a single country (Knaap et al., 2001, or in a later state of progress of the same model Tavasszy et al., 2003). In both cases the transport cost component is exogenously given by (separate) companion-models. The future issue, therefore, which the current project is seeking to contribute to, is to transfer transport cost to an inherently endogenous variable.

The CGE approach lends itself to transport analysis because of its focus on

- the long term
- the analysis of substantial policy changes with economywide feedback effects
- the analysis of pricing instruments

The extension of the long tradition in CGE to spatial CGE modeling for transport analysis involves two core issues to be solved

- the identification of transport costs by sector
- the specification of the type of transport costs

The simultaneity of modal choice and production-location/transport decisions requires a common set of indicators, in an SCGE model basically the so-called price of service indicator.

In supplying methods to solve these problems this paper is meant to contribute to also empirically overcome the basic neglect of spatial aspects we found in mainstream economics prior to 1990 even on the theoretical side, that for Mark Blaug (1985, 629) "remains one of the great puzzles about the historical development of economics".

3 TRANSPORT INFRASTRUCTURE AND ECONOMIC GROWTH

GDP and transport volumes have generally developed in parallel in the past. This has been true for both developing and developed economies. Over the last two decades passenger transport (in terms of passenger-km) has grown at a rate slightly higher than income (GDP), freight transport (in terms of tonne-km) roughly at the same rate as output. Looking at this in slightly more detail, we find a roughly constant number of trips for passenger transport and a roughly constant time budget for travelling, but a significant increase in trip distance. In freight transport we find on the one hand that goods are transported further as market areas have grown in order to exploit economies of scale, but that the average weight of goods has declined, with the latter basically just offsetting the former in terms of transport volume (tonne-km).

This observation of parallel growth of GDP and transport in combination with the "strong belief among decision makers, transportation planners and economists, that transportation plays a vital role in enhancing economic growth" often leads to the conclusion that enabling growth in transportation unambiguously fosters economic growth, or even is a necessary prerequisite for it. Such a conclusion is, however, likely to be far too premature. Improvements in transportation can indeed improve productivity of labour and capital and thus enhance growth – but whether this is the case in any particular situation is a matter requiring much closer inspection (see below). The observation of parallel growth alone of course also does not reveal the direction of causality. Do increased transport volumes (and a growth in transport infrastructure) trigger economic growth, or does economic growth lead to a higher demand for and supply of transport? If the latter was true in the past, transport growth may still not need to be a necessary consequence of economic growth in the future.

To answer these questions let us look at historical experience first. The importance of transport and transport innovations for economic growth has been analysed for different transport systems focusing on different centuries. The result of many studies in this vein is that economic growth that has normally been attributed to a particular form of transport development has in fact generally had many sources. For example, de Vries (1981) looked at the economic impact of the development of the horse drawn barge and the canal network in the Netherlands, foremost in the 17th century. In spite of a tremendous growth in the canal network during this period, the author concluded that it may only have affected the level of economic performance at some locations, but not the overall rate of economic growth. Similarly, Fogel (1964), in his study on the impact of railroad development on American growth in the 19th century found that there was a multiplicity of innovations responsible for growth, and railroad development only shaped economic growth in a particular direction, but was not the prerequisite for it. There are more affirmative historical references in the literature indicating the relevance of transport investments for economic growth, which are then often directly contradicted by more critical research. In an overall evaluation Berechman (2002), for example, judges that as "[a] review of historical studies shows, it is difficult to conclude explicitly that transportation development necessarily induces economic growth even when the economy is in the developing stage."

When analysing the present situation many authors point out the importance of looking at the specific characteristics of the transport investment before concluding that transport development has a positive impact on economic growth. For example, there is the need to take account of the impact of different stages of economic development (advanced or low-income economy). Next, peculiarities of the project are crucial, such as whether the investment involves an elimination of a network bottleneck or simply an addition to capacity. Further, we need to consider the structure of the market of transport-using industries, in particular the prevailing degree of competition. When transport improvements lead to more intense competition, their potential contribution to growth is more relevant.

With respect to advanced economies, several major changes have been pointed out that make their growth less susceptible to transportation improvements. Berechman (2002) lists five of these: (a) a decline in the share of work related trips – transport improvements thus benefit leisure activity rather than labour productivity; (b) employment patterns become spatially more dispersed, making, for example, cross-commuting more important than commuting to city centres, resulting in fewer clear candidates for commuting transport improvements; (c) in postindustrial society the main source of profits and power has become knowledge and information, most of which is unrelated to transportation; (d) the proportion of the elderly in the population is constantly rising, and their use of transport is mostly for non-work trips and at off-peak hours; (e) narrowing limits of land resources and environmental uptake capacities require that transport systems become less resource intensive and thus allow for economic growth to be decoupled from transport growth.

What then are the ways that transport development can have an impact on economic growth? Let us look at the various potential causal relationships in turn.

3.1 Transport infrastructure investment and economic growth

The first and most often cited direct link is that between transport infrastructure investment and productivity. Infrastructure investment is frequently seen as both increasing the level of economic activity (which is true for any public investment in an economy running below full capacity) and enhancing the productivity of private capital (i.e. firms work better with better transport infrastructure). Aschauer (1989) triggered the empirical debate that has been evolving over the last decade by finding output elasticities of public infrastructure investments which implied social rates of return potentially well above 100%. His approach was questioned, however, on statistical and methodological grounds, and more recent studies suggest much smaller figures (see also Table 1).

In a growth accounting approach, Baum and Behnke (1997) and Baum and Kurte (2001) sought with this different methodological device to determine how much of economic growth can be associated with growth in transport. For Germany they found for the period from 1950 to 1990, that as much as half of German economic growth is attributable to transport, half of which in turn is attributable to road transport alone. While, again, this has been interpreted as a causal linkage repeatedly since, the studies themselves did not convincingly claim any such direction of causality. Furthermore, as Vickerman (2002) concludes, "even if there is some linkage of this type, it does not show, either that similar rates of growth could not have been obtained by other types of investment, or that there will be similar [reaction of] output [growth] to continued growth in the road transport sector." With respect to the last point he continues, that at certain stages of growth there is an argument that the expansion of transport capacity is essential, "but once a certain level of provision is reached there is very little overall impact from further growth in the transport sector. Continued increases in transport capacity may lead to activities being relocated, but it does not lead, of itself, to higher aggregate activity."

Table 1: Selected studies on transport infrastructure investment, productivity and economic output

Reference	Method	Selected Conclusions
Aschauer (1989)	Infrastructure is a (public good) additional factor in the aggregate production function, regression	Output elasticity of infrastructure investment is as high as 0.4 to 0.5.
Lau and Sin (1997)	-"-	Output elasticity of infrastructure input around 0.1.
Johansson et al. (1996), cited in ECMT (2000, 17)	Compilation of output elasticity results from studies on 12 different countries	Output elasticity of infrastructure input is found to range from 0.15 to 0.77. "Results from time series analyses […] are notoriously affected by spurious correlation, since many factors will grow fairly smoothly over time, and selecting any two of them always shows a strong statistical link. Time gaps between investments in infrastructure and economic growth also affect the reliability of results." (ECMT 2000, 17)
ECMT (2000)	Survey	"It has been shown consistently that the economic performance due to infrastructure investments varies by transport mode, by industry and by region. These variations are hidden when using highly aggregated data."
Baum and Kurte (2001)	Growth accounting approach	"Without the growth in transport [between 1965 and 1990] the productivity of labour [in Germany] would have been reduced by a fifth, national GDP by about a quarter."
European Commission (1997)	Analysis of the time savings – productivity gain – output growth link, regression	Implementation of the prioritised Trans-European Network (TEN) projects would increase EU GDP by ¼ % by 2025.
Berechman (2001)	Survey	"The results, which are statistically significant, range from very low to relatively high elasticity parameters. This contributes to the difficulty of establishing an acceptable level of transportation impacts to use for policy purposes."
Vickerman (2001)	Survey	"The best that can be said with any confidence is that infrastructure investment will have a modest positive contribution to economic growth, but the more accurately are the opportunity costs measured, the less attractive return infrastructure investment offers than other types of public investment, especially education and training […]."

Next, there are studies pointing out the time saving aspects of transport improvements, implying a gain in productivity – exploited in the form of higher wages or increased output. The European Union Trans-European Network (TEN) projects have been evaluated using such an approach (European Commission, 1997), resulting in estimates of up to a quarter percent extra GDP by 2025 if the priority TEN projects were implemented. These estimates have been questioned on methodological grounds and as a consequence are also considered to be most likely too high by some authors (e.g. Vickerman, 2002).

Finally, transport investment may not only have an impact on the level of GDP, but also on the rate of GDP growth. With reference to results from the trade liberalization literature (e.g. Baldwin, 1989), one may conclude that improvements in transport networks trigger income and efficiency gains that are re-invested, and thus trigger a higher growth rate of the capital stock. Further, the rate of innovation and technology transfer may increase. This reasoning rests on the assumption that the transport-using industries are characterized by monopoly, oligopoly, or monopolistic competition (i.e. that they are not acting in perfectly competitive markets, in which case potential gains would have been exploited already). In such a market structure the cited causal link can be present, but is subject to potential countertendencies. For example, high transport costs may have led to a spatial monopoly, and firms might have a vested interest in not seeking transport improvements. Where such improvements nevertheless occur, the economic impact of these depends on whether or not the firm can maintain entry barriers in the absence of transport cost barriers. There is also the case where a transport cost reduction increases competition and only initially erodes market power. Here, any subsequent development which takes advantage of any new economies of scale and rationalisation could again lead to fewer producers staying in business, thus increasing the market power of those remaining (and reducing growth benefits).

In an article weighing the various aspects of transport infrastructure impact on economic growth in more detail, Vickerman (2002) concludes that “[t]he best that can be said with any confidence is that infrastructure investment will have a modest positive contribution on economic growth, but that the more accurately are the opportunity costs measured, the less attractive return infrastructure investment offers than other types of public investment expenditure, especially education and training to enhance human capital (see also Transportation Research Board, 1997)”.

3.2 Economic integration, transport, and (regional) economic growth

Reduced transport costs (caused by technological improvement or transport infrastructure investment) enhance both exports and imports from and to a region or nation. While the rise in exports tends to raise production, increased imports will lower local production and thus economic growth. The threat of import competition, however, generally will also lead to efficiency increases and the lowering of production costs.

Further, each change in the volume of production has consequences for factor market demand. Changes in transport costs are thus also reflected in changes in factor markets, especially in the labour and land (or housing) markets. In general, factor market impacts will work in the opposite direction to the initial transport improvement. Let us illustrate this link. If the net effect of transport cost change is a rise in output, for example, and thus a rise in labour and land demand occurs, wages and rents will tend to rise, which offsets to some degree the initial production cost reduction triggered by transport improvements. Further, in the transport market itself counterbalancing feedback is also likely. If at the higher output level transport volumes are higher, congestion might be too, which feeds back to higher transport costs.

At the regional level impacts may be more pronounced. Transport cost changes will benefit specific sectors more than others; regions with a high sectoral exposure can thus be affected stronger than the overall economy. Also, the change in transport costs will trigger spatial relocation of industries and may lead to more pronounced agglomerations in some areas. As pointed out by Krugman (1995), three driving forces are at work. On the one hand, there are two agglomeration tendencies (centripetal forces): firms want to move closer towards their input markets (in order to take advantage of local external economies) and closer towards those customers (in the stylised models, employees in manufacturing) concentrated where the increasing returns to scale industries locate. On the other hand, firms want to move away from competitors when selling to those customers that are evenly distributed in space (in stylised models the example of farmers is often used) in order to establish some market power (centrifugal force). For any level of transport costs there is an equilibrium of these forces at a certain degree of concentration. Initially, lower transport costs in general tend to cause geographical concentration of production, while higher transport costs tend to cause geographical diversification (i.e. a more equal spreading of production costs across space).

However, the impact of transport cost reduction also depends on the level of transport costs that we start from. This is shown in the seminal work of Krugman and Venables (1995) where they look at the impact of transport cost reduction on the worldwide distribution of production. Initially, transport costs are taken to be so high that each world region ("North" and "South") produces its own supply of all goods. When transport costs decline sufficiently, inter-industry trade occurs in order to take advantage of increasing returns to scale. If for any reason the North gains a larger share in the increasing returns to scale industry this region becomes more attractive for further location of production. Intermediate production will seek to locate closer to its market (´backward linkage´), thus lowering production costs and raising demand (´forward linkage´). The resulting circular process creates an industrialized North. If transport costs decline further, however, the importance of being close to one´s market declines. At some point the gain of taking advantage of lower real wages in the deindustrialized South outweighs the importance of transport costs. The increasing returns to scale industry then expands in the South and contracts in the North, thus reversing the earlier tendency and giving rise to a more similar structure of production across the world.

Thus we find that a continuous reduction in transport costs (e.g. due to technological improvement) in an economic integration setting may give rise to both increasing and declining economic growth, and may do so in different world regions at different points in time.

4 THE SPATIAL CGE MODEL

4.1 Production and foreign trade

There are two types of commodities produced in each region, goods produced for domestic markets and goods produced for export. In an Armington style modelling these goods are assumed to be imperfect substitutes produced as joint products with a constant elasticity of transformation. For output D_{ir} used domestically and exports X_{ir}, total production Y_{ir} in region r for sector i is

$$Y_{ir} = \left[\alpha_{ir}^{Y} D_{ir}^{1+1/\eta} + \beta_{ir}^{Y} X_{ir}^{1+1/\eta}\right]^{1/(1+1/\eta)} \qquad (1)$$

Inputs to production include primary factors labour L and capital K, as well as intermediate inputs (domestic and imported). Intermediate inputs are proportional to the activity level of the sector.

Intermediate demand ID_{ir} is a composite good of domestic intermediates DI and imported intermediate demand M

$$ID_{ir} = \left[\alpha_{ir}^{I} DI_{ir}^{\rho} + \beta_{ir}^{I} M_{ir}^{\rho}\right]^{1/\rho} \qquad (2)$$

4.2 Transport

Transport costs are only acknowledged in interregional transport. Real transport costs T_{irs} in sector i are assumed proportional to bilateral trade flows between regions r and s

$$T_{irs} = \tau_{irs} M_{irs} \qquad (3)$$

Transport services are supplied by the exporting region.

4.3 Factors of production and increasing returns to scale

The primary factors of production, capital and labour, are taken as region-specific supply, not mobile to migrate.

Following the approach of Dixit and Stiglitz (1977), production is characterised by monopolistic competition: an endogenous variety of n goods is produced in either region r and sector i. Different varieties of goods are imperfect substitutes in consumption. Each firm acts as a monopolist on its output market, taking the actions of the other firms as given. Again, imperfect competition arises due to the assumption of internal economies of scale at the level of the individual firm and the consideration of transport costs.

Based on empirical data for the regional structure presented below, production in either region and sector involves different marginal input requirements of labour

(m) and capital and different fixed factor requirements (F), independently of the quantity manufactured and assumed to comprise labour only: $l = F + m \cdot x$, where l is the labour required to produce any output x. Then, the production of a quantity x of any variety i in region r, with production coefficients γ and δ, involves

$$x_{r,i} = l^{\gamma_r} \cdot k^{\delta_r} \text{ with } \gamma_r + \delta_r > 1 \qquad (4)$$

inducing each firm to produce exactly one variety. Internal scale economies at the level of the individual firm and agglomeration externalities, accordingly, explain where production is located. More specifically, forward and backward linkages create an incentive for workers to be close to the production of consumer goods.

4.4 Implementation

A three-region model is implemented, focusing on the region of core analysis, Parndorf, close to the Austrian south-eastern border, a surrounding region (the remaining of the provinces of Lower Austria and Burgenland) and ROW (rest of Austria and abroad), see Figure 1.

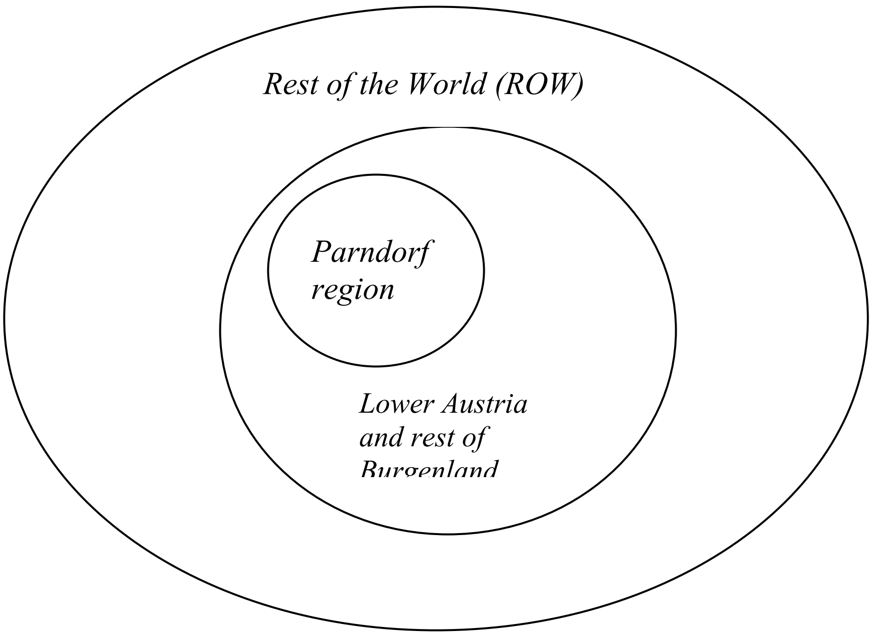

Figure 1: Regional Structure

The model presented above has been implemented within GAMS (Brooke et al, 1998) using the modelling framework MPSGE (Rutherford, 1998) and the solution algorithm PATH (Dirkse and Ferris, 1995) in its – with Todd Munson – expanded version 5.6.04.

Using a three-regional split up of economic data of the provinces of Lower Austria and Burgenland, derived by using the provincial input output structure of these provinces, the focus region of Parndorf has been islolated. The model also requires further assumptions. Most importantly among these are transport cost shares in interregional trade as presented in Table 2, assumed uniform across sectors for the time being.

Table 2: Transport cost shares in interregional trade

	to region		
exports from region	Parndorf	LowerAustria/ Burgenland	ROW
	[% of total interregional trade expenses]		
Parndorf		8	12
Lower Austria/Burgenland	5		10
ROW	13	12	

We calibrate the model to the 2001 data set, including the 2001 reference split up of production in the three regions and interregional trade flows. Interregional trade balances are taken as fixed for the simulation scenarios. Increasing returns to scale are assumed to be present in all but one sector, the latte rbeing "other industries". This supplies us with a reference case for industries closer to the perfect competition assumption.

5 SIMULATION RESULTS

Our interest is in the spatial structure of growth, triggered by new infrastructure supply. Our first simulation thus introduces a reduction in interregional transport costs by a new infrastructure available to the core region of analysis, Parndorf. In fact in 1991 a new highway has been opened, shaping spatial economic growth structures that later will serve as a real world counterfactual to confront to model results.

In Table 3 the results are given for a simulation of a 50% transport cost decline for all transport flows going into region Parndorf and leaving region Parndorf.

We find that sectors with strong dependence on interregional trade, such as Agriculture and Food, experience a significant increase in both domestic production and imports. Import prices decline by up to 7.5%. Also sectoral diversity increases in these sectors. The general equilibrium feedback implies that production factors shift to those sectors, and other sectors with lower dependence on interregional trade (and thus lower benefit of its real cost decrease) loose those production factors. Overall the real price of production factors slightly increases (relative to the production factor imports), and less trade dependent sectors, especially services, decline in output.

Table 3: Macroeconomic and sectoral impacts of a 50% interregional transport cost reduction for region Parndorf

Region Parndorf

Macroeconomic Variables					
Welfare	fixed				
Wage Rate [% change]	0.1				
Capital Price [%change]	0.1				
Sectoral Variables					
	Output	Import	Varieties [% change]	Domestic Prices	Import Prices
Agriculture	2.9	8	1.3	-0.2	-7.4
Other Industry	0.3	0.5	0	0.1	-0.2
Food	1.4	5.2	0.6	-1.4	-5.9
Construction	0.2	0.4	0.1	0.1	-0.3
Commerce	-0.5	1.7	-0.2	0.1	-3.4
Tourism	0.4	5.5	0.2	-0.5	-6.4
Transport	0	0	0	0.1	0
Puplic Administration	0.1	-0.9	0	0.1	1.9
Other Services	-0.1	-0.9	-0.1	0.3	2.3

Overall we do find both an increase in aggregate output and in transport volume.

Table 4, for comparison reports the results for the surrounding region, i.e. Lower Austria and the remaining of Burgenland. Due to this surrounding region performing economic activity at a multiple level of Parndorf, impacts to this region are quite small.

Table 4: Macroeconomic and sectoral impacts of a 50% interregional transport cost reduction for trade to and from Parndorf – results for surrounding region

Surrounding Region

Macroeconomic Variables					
Welfare	-0.2				
Wage Rate [% change]	-0.2				
Capital Price [%change]	-0.2				
Sectoral Variables					
	Output	Import	Varieties [% change]	Domestic Prices	Import Prices
Agriculture	0	-0.1		-0.2	0
Other Industry	0	0		-0.2	-0.2
Food	0	-0.1		-0.2	-0.2
Construction	0	0		-0.2	-0.1
Commerce	0	0		-0.2	-0.2
Tourism	0	0		-0.2	-0.1
Transport	0	0		-0.2	-0.2
Puplic Administration	0	0		-0.2	-0.1
Other Services	0	0.1		-0.2	-0.2

For analysing the counterfactual of real world development after the opening of the new highway in 1991, we also ask the question how sectoral structure and output levels would have been at higher transport costs than those observed in 2001. As an extreme case for a first idea on the type of effects occurring we use a doubling of transport costs for trade flows two and from region Parndorf relative to their actual level in 2001. Results are presented in Table 5.

Table 5: Macroeconomic and sectoral impacts of a doubling of transport costs for trade to and from Parndorf relative to transport costs observed in 2001

Region Parndorf

Macroeconomic Variables	
Welfare	fixed
Wage Rate [% change]	0
Capital Price [%change]	0

Sectoral Variables	Output	Import	Varieties [% change]	Domestic Prices	Import Prices
Agriculture	-4.5	-10.8	-2.1	3.2	12.4
Other Industry	0	-0.6	0	-0.1	0.7
Food	-2.3	-7.3	-1.1	2.2	9.8
Construction	-0.1	-0.5	0	0	0.8
Commerce	0.6	-2.4	0.2	-0.1	5.2
Tourism	-0.8	-7.2	-0.4	0.9	10.5
Transport	0.1	0.1	0	-0.2	-0.1
Puplic Administration	0	1.6	0	-0.2	-3.3
Other Services	0.5	1.9	0.2	-0.6	-4.3

We conclude that it was the sectors of Agriculture, Food and Tourism that benefited most from the new infrastructure (see also Figure 2).

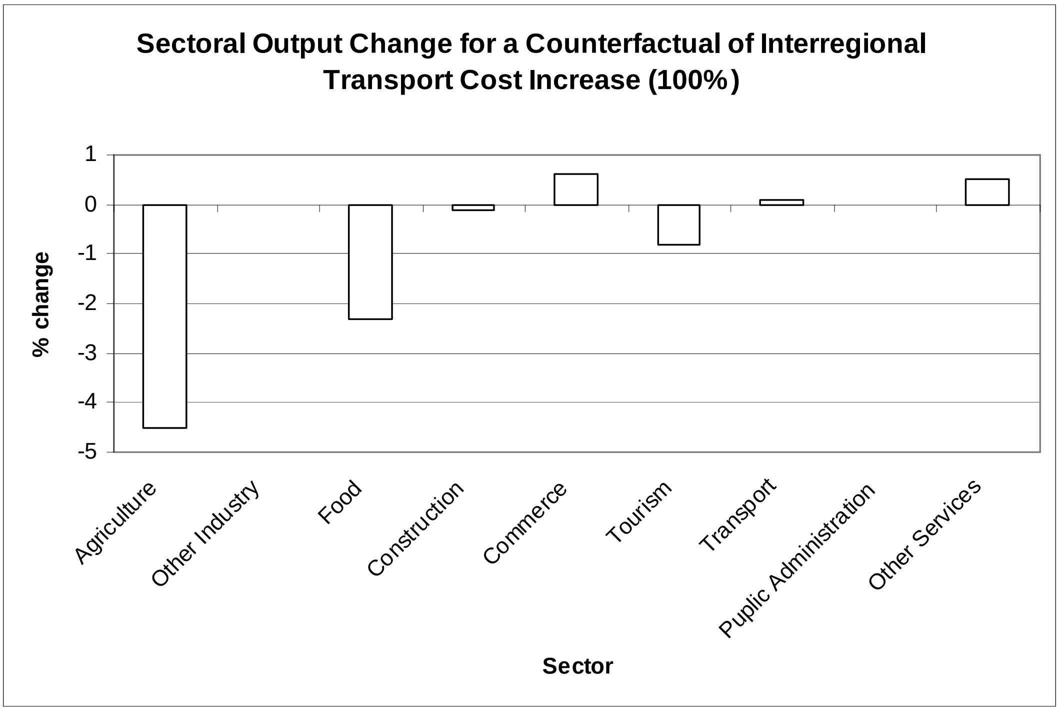

Figure 2: Sectoral output changes for a 100% interregional transport cost increase for region Parndorf

6 CONCLUSIONS

In this paper we started from the assertion that transport infrastructure in mature economies does not really have an impact on overall growth, but does have an impact on both the structure and level of the regional distribution of economic activity. We develop a three-region spatial computable general equilibrium with Dixit-Stiglitz imperfect competition production to test for this assertion empirically. Implementing the model to the Parndorf region in eastern Austria supplies us with a first quantitative result, indicating which sectors benefit from new transport infrastructure, which loose. This serves as the basis for a calibration of the model not only in the economic vein (as completed) but also in terms of sectoral transport cost shares and Dixit-Stiglitz mark-ups differentiated by sector. This will allow a direct confrontation of models results with the empirical actual development of the Parndorf region after its new highway was opened in 1991. It should allow to identify which of the trends observed 1991-2001 are due to this infrastructure investment.

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