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Interregional and International Telephone Communication

Aggregate Traffic Model and Empirical Evidence for Austria

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1. Introduction

The explosion of activities and requirements associated with the production, processing and transfer of information is increasingly being matched by a profileration and diversification of new telecommunication media for transmitting information, including text processing and transmission services such as facsimile transmission, videotex, teleconference services, electronic mail etc. Nevertheless, the telephone is still - by far - the most important telecommunication service. The paper results from ESF-research undertaken within the Network on European Communication and Transport Activity Research (NECTAR) and relates to telephone communication undertaken for the Netherlands by Rietveld and Jansen (1990) and Switzerland by Rossera (1990). The current study focuses on the Austrian case and relies on data measured by the Austrian PTT in 1991, in terms of erlangs, an internationally widely used and reliable measure of telecommunication contact intensity. The data refer to the total telecommunication traffic on the public network. Due to technical reasons oral communication can not be distinguished from other services such as data transmission, transfer of documents and text (facsimile) etc. But the demand for such new telecommunication services is still at a very modest level in Austria.

The paper addresses two major issues. First an attempt is made to explore the factors influencing the spatial pattern of domestic telephone traffic in Austria. The econometric approach applied to this problem belongs to the class of spatial interaction models explaining a telephone communication flow from a region i to a region j by three types of factors, factors associated with the region of origin, factors associated with the region of destination and factors associated with origin-destination pairs (separation factors). In using the spatial interaction modelling approach in telephone traffic analysis various choices need to be made about how the above mentioned factors should be defined. To have confidence in the model results it is desirable that its interpretation is insensitive to the particular choices made. Whether this is so, will be investigated for several potential sources of variation in model performance.

Barriers to communication may considerably affect telephone communication patterns, especially in the case of international telecommunication. National borders are not only lines in space with separate different national states, but often also coincide with differences in language, culture, value systems, etc. The barrier effects of a border - conceived as obstacles in space and time impeding the continuous flow pattern - may lead to a reduction in telephone traffic across the border (see Nijkamp et al. 1990). The paper aims to determine the barrier effects of borders on international telephone traffic originating from Austria. This is done by using a spatial interaction modelling approach where barrier effects are modelled as discrete steps in the separation function. Finally, attention will be paid to the derived nature of the need for telephone calls which are often a complement of other spatial interaction phenomena such as international trade and tourism.

2. Modelling Interregional Domestic Telephone Traffic in Austria

In order to cope with telephone traffic, Austria has been divided into 32 telephone districts, termed regions (see figure 1). Telephone traffic from region i to region j (i,j = 1,...,n) is called intraregional traffic. In this study intraregional traffic, i.e. telephone traffic within region i, is left out of consideration due to measurement problems.

The Econometric Approach

The econometric approach used to model interregional domestic telephone traffic belongs to the class of spatial interaction models explaining a traffic flow from a region i to a region j by three types of variables (see Fotheringham and O'Kelly 1989, Alonso 1978, Wilson 1970):

- a factor A_i associated with the region i of origin,
- a factor B_j associated with the region j of destination, and
- a separation factor F_{ij} associated with origin-destination pairs (i,j) which is assumed to be a function of some measure D_{ij} of separation between i and j.

Let T_{ij} denote the volume of telephone communication from region i to region j (i,j = 1,...,n, $i \neq j$) measured in terms of erlangs or minutes, and A_i and B_j measures of the potential pool of calls in region i and of the potential draw of calls in region j, respectively. Then the basic interregional telephone traffic model is given by

$$T_{ij} = K \; A_i^{\alpha_1} \; B_j^{\alpha_2} \; F_{ij}(D_{ij}) \tag{1}$$

where the origin and destination specific variables are represented as power functions with α_1 and α_2 denoting the parameters, respectively.

In using models such as that defined by equation (1) a number of choices need to be made about how its various components (A_i, B_j, and F_{ij}) should be defined. To have confidence in the results of using the model it is desirable that the interpretations are insensitive to the particular choices adopted. Whether this is so was investigated for two potential sources of variation in model performance. These were the separation factor and the A_i - and B_j - terms.

All the separation factors used new special cases of

$$F_{ij}(D_{ij}) = D_{ij}^{\beta_1} \; \exp(\beta_2 \; D_{ij}^{\beta_3}) \tag{2}$$

including the exponential function ($\beta_1 = 0$, $\beta_3 = 1$), the power function ($\beta_2 = 0$) and Tanner's function ($\beta_3 = 1$). Particular attention focused on the relative merits using the simpler exponential or power functions, in preference to the more flexible, but more complex Tanner function. Two different univariate measures of of separation, ${}_1D_{ij}$ and ${}_2D_{ij}$, were used to specify the exponential and power functions. ${}_1D_{ij}$ represents distance from i to j. ${}_2D_{ij}$ is a discrete-valued measure representing the two levels in the system of domestic telephone charges in Austria: a short distance tariff (up to 100 km) of about 33 cents per minute and a long distance tariff (more than 100 km) of about 55 cents per minute. These four specifications of the separation function were compared with two more flexible, but complex Tanner functions

$$F_{ij}(D_{ij}) \; = \; {}_rD_{ij}^{\beta_1} \; \exp\,(\beta_2 \; {}_sD_{ij}^{\beta_3}) \qquad \text{for } r \neq s;\, r, s = 1, 2 \tag{3}$$

using vector-valued measure (${}_1D_{ij}$, ${}_2D_{ij}$) or (${}_2D_{ij}$, ${}_1D_{ij}$) rather than univariate measures. In general, different measures can be used to represent the

Figure 1: The 32-Zone System Used for Modelling Domestic Telephone Communication

respectively. In this paper we have decided to compare two alternative measures: the number of telephone subscribers (TS) in i and j, and the gross regional product (GRP) in i and j, as a proxy of economic activities and of income so that this measure is relevant for both business and private telephone calls.

Model Calibration and Goodness of Fit

Let us assume a multiplicative disturbance specification of the model, then the model defined by equation (1) and (2) can be transformed into a log-normal version:

$$\ln T_{ij} = \ln K + \alpha_1 \ln A_i + \alpha_2 \ln B_j + \beta_1 \ln {}_1D_{ij} + \beta_2 \, {}_2D_{ij}^{\beta_3} + \ln u_{ij} \qquad (4)$$

where $\ln u_{ij} \sim N(0,\sigma)$ independently of $\ln A_i$, $\ln B_j$, $\ln {}_1D_{ij}$ and ${}_2D_{ij}$. For $\beta_3 = 1$ equation (4) is suitable for ordinary least squares (OLS) estimation of the parameters ln K, α_1. α_2, β_1 and β_2.

By adopting the usual OLS assumptions for $\ln u_{ij}$ we are assuming that u_{ij} is distributed log-normally with mean $\exp(\frac{1}{2}\sigma^2)$ and variance $\exp(\sigma^2)\exp(\sigma^2\text{-}1)$. To justify the assumption of log-normality one may call upon the Multivariate Central Limit Theorem which states that the distribution of the product of N independent random variables tends to the log-normal distribution as N approaches ∞. If one thinks of u_{ij} as representing the net effect of a large number of independent multiplicative factors, it is reasonable to assume that it is log-normally distributed (Haworth and Vincent 1979).

OLS estimation leads to unbiased and consistant estimates $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\beta}_1$,and $\hat{\beta}_2$, respectively. But $\exp(\widehat{\ln K})$ is biased. The parameter K will be always underestimated when obtained by OLS unless the model fit is perfect. The underestimation of K results into

$$\sum_{i,j} \hat{T}_{ij} \leq \sum_{i,j} T_{ij} \qquad (5)$$

Following Fotheringham and O'Kelly (1989, p. 44) a more accurate estimate of K, termed $\hat{K}$(new) may be obtained after the regression in the following way:

$$\hat{K}(new) = \hat{K}(old) \sum_{i,j} T_{ij} / \sum_{i,j} \hat{T}_{ij} \tag{6}$$

Results from fitting the model under different conditions were assessed by employing the well-known R^2 whose significance can be examined through a t-test.

Empirical results

The results of the six model versions using gross regional product for the mass terms are presented in Table 1 and those using telephone subscribers are summarized in Table 2. Tables 1 and 2 show the coefficient estimates and the goodness of fit statistics. The models perform reasonably well in terms of R^2. All the coefficients are significantly different from zero (0.05 level of significance) and have the anticipated sign.

A comparison of Tables 1 and 2 suggests that the results of calibration are not sensitive to the choice of the mass terms. There is strong stability in the parameter estimates. The goodness-of-fit statistics show that there is little to choose between the two alternative measures of gross regional product and telephone subscribers as proxies for the A_i- and B_j-terms even though the model versions using gross regional product tend to perform slightly better than those using telephone subscribers.

Table 1 and 2 clearly indicate that the estimation results are affected by the choice of the separation factor. This conclusion is borne out by the considerable differences in the β-estimates rather than by those in the goodness-of-fit statistics. Differences in R^2 occur which point to the superiority of the Tanner and the power functions (independently of the choice of the separation measure), but these differences are relatively small. Figure 2 suggests a close similarity between the Tanner function and the power

Table 1: Comparison of Different Interregional Domestic Telephone Traffic Models Using Gross Domestic Product for the Mass Terms and Different Separation Functions: Parameter Estimates and Goodness-of-Fit Statistics

	Model Versions Using the Exponential Function		Model Versions Using the Power Function		Model Versions Using Tanner's Function	
	$_1D_{ij}$	$_2D_{ij}$	$_1D_{ij}$	$_2D_{ij}$	$(_1D_{ij}, _2D_{ij})$	$(_2D_{ij}, _1D_{ij})$
Constant (x 10^{-5})	0.86	33.73	6.58	293.81	0.00	7.34
	(-37.13)[a]	(-20.23)[a]	(-19.25)[a]	(-11.67)[a]	(-11.04)[a]	(-14.67)[a]
α_1	0.94	0.94	0.93	0.94	0.93	0.94
	(30.97)[a]	(31.65)[a]	(32.52)[a]	(31.65)[a]	(33.15)[a]	(33.09)[a]
α_2	0.92	0.93	0.91	0.93	0.92	0.93
	(30.58)[a]	(31.26)[a]	(32.09)[a]	(31.26)[a]	(32.72)[a]	(32.66)[a]
β_1			-0.98	-4.12	-0.72	-2.87
			(-21.16)[a]	(-18.09)[a]	(-11.05)[a]	(-11.33)[a]
β_2	-0.004	-0.84			-0.34	-0.002
	(-16.94)[a]	(-18.09)[a]			(-5.38)[a]	(-9.70)[a]
R^2adjusted	0.68	0.69	0.72	0.69	0.72	0.72

[a] t-values

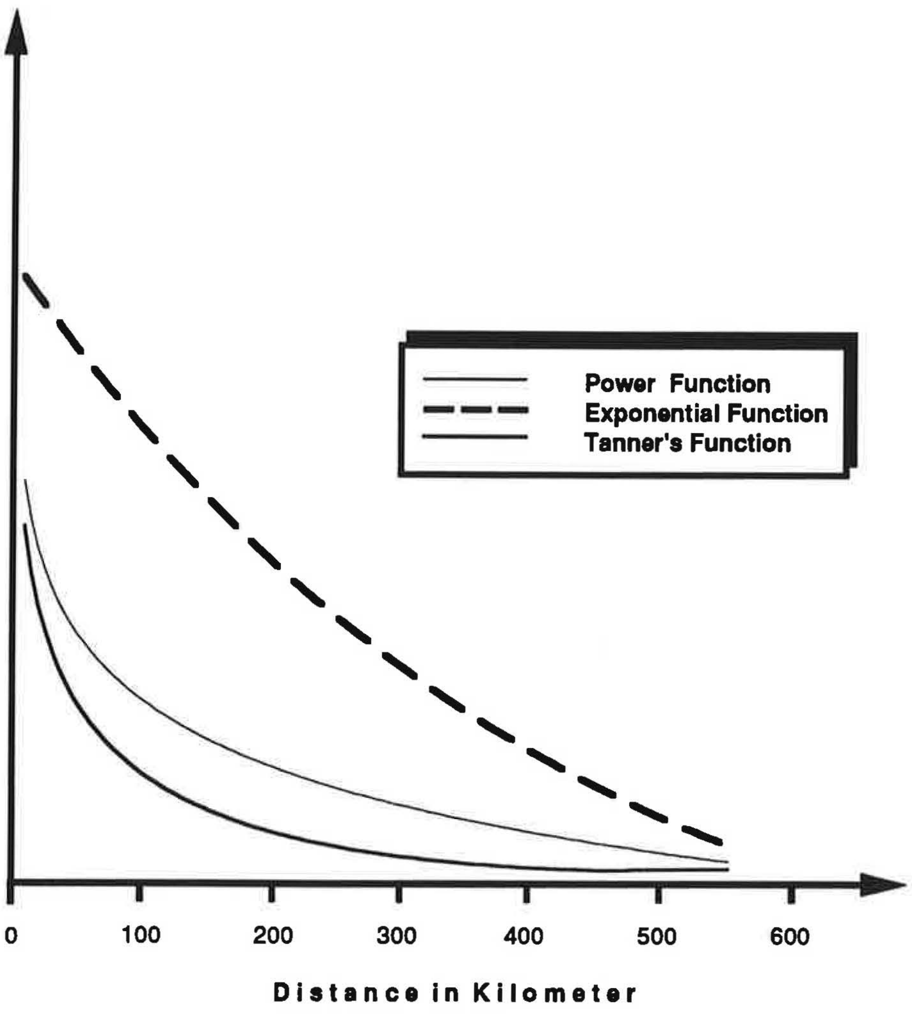
Table 2: Comparison of Different Interregional Domestic Telephone Traffic Models Using Telephone Subscribers for the Mass Terms and Different Separation Functions: Parameter Estimates and Goodness-of-Fit Statistics

	Model Versions Using the Exponential Function		Model Versions Using the Power Function		Model Versions Using Tanner's Function	
	${}_1D_{ij}$	${}_2D_{ij}$	${}_1D_{ij}$	${}_2D_{ij}$	$({}_1D_{ij},{}_2D_{ij})$	$({}_2D_{ij},{}_1D_{ij})$
Constant (x 10^{-5})	0.02	0.53	1.06	0.54	1.65	1.57
	(-36.93)[a]	(-25.91)[a]	(-24.07)[a]	(-17.58)[a]	(-23.08)[a]	(-19.61)[a]
α_1	0.92	0.93	0.91	0.93	0.92	0.93
	(29.99)[a]	(31.43)[a]	(31.41)[a]	(31.43)[a]	(32.22)[a]	(32.20)[a]
α_2	0.90	0.91	0.89	0.91	0.90	0.93
	(29.31)[a]	(30.75)[a]	(30.69)[a]	(30.75)[a]	(31.49)[a]	(31.48)[a]
β_1			-0.92	-4.05	-0.63	-2.99
			(-19.45)[a]	(-17.65)[a]	(-9.42)[a]	(-11.56)[a]
β_2	-0.003	-0.82			-0.39	-0.002
	(-15.20)[a]	(-17.65)[a]			(-6.01)[a]	(-8.01)[a]
R^2adjusted	0.66	0.69	0.70	0.69	0.71	0.70

[a] t-values

functions while the exponential function differs noticeably from the other two in overestimating long distance telephone communication. Moreover, the experiments reveal a tendency that the exponential function provides a poorer fit to the data. Therefore, the choice lies between the Tanner function and the simpler power function. Theoretically, Tanner's function may be preferred because a vector-valued measure of separation representing different aspects of separation may be taken into account. In practice, however, this theoretical superiority may be compromised by zoning system effects as well as by the specific measures of separation used. In the context of this paper there are no grounds for preferring the Tanner function to the simpler power function.

Figure 2: Estimated Separation Functions for $_1D_{ij}$ (functions are normalized over the range 1-600 km so that they are comparable; the vertical scale is arbitrary)



Independently of the specification of the functional form of the separation factor, the measure of separation affects the results of calibration. Considerable variation in β-estimates is evident and it is clear that the choice of the separation measure leads to different conclusions concerning the relative importance of the separation factor. In the model versions with the power function ${}_1D_{ij}$ (distance) and ${}_2D_{ij}$ (costs) belong to the most important explaining variables, while in the model versions with the exponential function ${}_1D_{ij}$ in contrast to ${}_2D_{ij}$ is a negligible explanatory variable. In summary, the results clearly indicate that testing of specification of F_{ij} is a key issue which deserves more attention than it usually receives.

3. Barriers to International Telephone Traffic

International telephone traffic is only a small component of total telephone traffic. Even in relatively small countries the share of calls for foreign countries is usually not greater than 2.5 percent, except Switzerland with a rather strong international orientation (6.6 percent). In the Austrian case the international calls do not exceed 1.2 percent (Rietveld and Janssen 1990). Germany is the country most frequently called from Austria. About every second international call is going to Germany. The German language as well as strong cultural and economic relationships probably reduce the barriers to cross-border communications with Germany.

The barrier effects considered in this section deal with the relationship between Austrian regions (see figure 1) and foreign countries, and may be termed link barriers to international telephone communication. A link barrier exists when telephone traffic on a certain link in the network is lower that the reference value which holds for that link (Rietveld et al. 1991). Examples of link barriers include

- tariff related barriers to international telephone communication,
- capacity related barriers resulting in bottlenecks in international communication with certain countries (especially Eastern European countries) and thus leading to higher user costs compared with domestic communtication,

- demand related barriers due to language, historical and cultural differences which often coincide with national borders and tend to reduce opportunity and utility of communication.

Such barrier effects may be concerned as obstacles in space and time which impede the continuous flow pattern (Nijkamp et al. 1990) and may lead to a reduction in telephone traffic across the border. Formally, barrier effects can be modelled as discrete steps in the separation function.

The Econometric Approach

To model interregional domestic telephone traffic within Austria and international traffic originating from one of the Austrian telephone districts simultaneously within one framework and with a reasonable degree of spatial detail, the spatial framework of the study has been designed to include

- an internal zoning system I consisting of 32 regions (telephone districts) covering the whole of Austria, and
- an external zoning system J consisting of 125 countries and 9 German, 9 Italian and 9 Swiss regions.

The major difference between internal zones $i \in I$ and external zones $j^* \in J$ is that external zones serve as destinations of (international) traffic only.

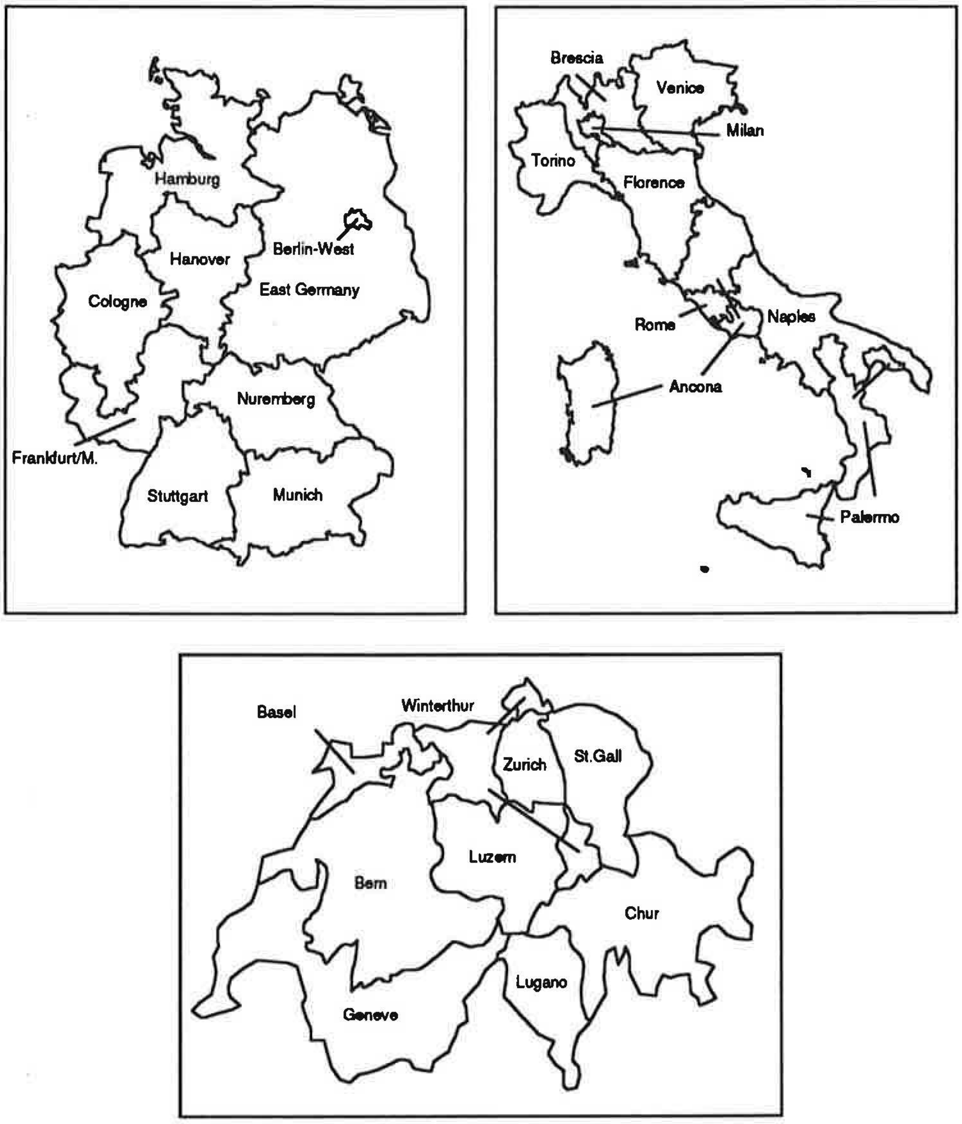
The interregional-international telephone traffic model may be written as follows

$$T_{ij} = K\ A_i^{\alpha_1}\ B_j^{\alpha_2}\ D_{ij}^{\beta} \exp(\gamma_1\ B_{ij} + \gamma_2\ L_{ij} + \gamma_3\ H_{ij} + \gamma_4\ {}_1E_{ij} + \gamma_5\ {}_2E_{ij} + \gamma_6\ DC_{ij}) \qquad i \in I, j \in I \cup J \qquad (7)$$

There are nine explaining variables, three metric ones (A, B and D) and six dummies. In the formulation of the dummies we largely follow Bröcker and Rohwedder (1990) who used them in analysing barriers to international trade. The nine variables will be described in the sequel:

- The number of telephone subscribers have been used as measure for the A_i-terms and the, B_j-terms,

Figure 3: The Spatial Disaggregation of Germany, Italy and Switzerland used for Modelling Interregional-International Telephone Communication



- Geographical distance, D_{ij}, between regions of origin and regions (countries) of destination measured as the crow flies, in kilometers. There are strong indications that distance is a more important variable than tariffs (see Rietveld and Janssen 1990). This is due to the complementarity between telecommunication and physical types of spatial interaction (international trade, migration and tourism).

- Border dummy, B_{ij}, with value one for links to foreign regions and countries j and zero otherwise.

- Language dummy, L_{ij}, attaining the value one for links to regions/countries j with the official language German (i.e., German, and German speaking Swiss regions) and zero otherwise.

- Dummy for historical relations, H_{ij}, having the value one for links to countries j with strong historical relations (CSFR, Hungary and Yugoslavia), and zero otherwise.

- Dummies for economic relations, ${}_1E_{ij}$ and ${}_2E_{ij}$, representing relations to two trading areas EC and EFTA, respectively. The dummies equal one for links to regions/countries belonging to the respective trading areas in Europe, and zero otherwise.

- Dummy for developing countries, DC_{ij}, attaining the value one for links to developing countries j, and zero otherwise.

By simply taking logarithms of both sides of equation (7) and assuming that a normally distributed multiplicative error term applies as discussed in section 3, the log-normal version of the interregional-international telephone traffic model with border dummies is obtained

$$\ln T_{ij} = \ln K + \alpha_1 \ln A_i + \alpha_2 \ln B_j + \beta \ln D_{ij} + \gamma_1 B_{ij} + \gamma_2 L_{ij} + \gamma_3 H_{ij} + \gamma_4 \, {}_1E_{ij} + \gamma_5 \, {}_2E_{ij} + \gamma_6 DC_{ij} \quad (8)$$

which is suitable to ordinary least squares estimation of the parameters K, α_1, α_2, β, γ_1, γ_2, γ_3, γ_4, γ_5 and γ_6.

Empirical Results

Table 3 presents the parameter estimates and the goodness-of-fit statistics for two model versions: one with the dummies described above and one without the dummies (base model). All the variables included in the model versions have the right sign and are significantly different from zero. In the base model distance is the most important explaining variable, accounting for about 60 percent of the explanatory power of the total model.

Table 3: Results of the Interregional and International Telephone Communication Models: Parameter Estimates and Goodness-of-Fit Statistics

	Model Versions without Dummies	Model Versions with Dummies
Constant (x 10^{-3})	45.71	0.01
	(-6.40)[a]	(-21.44)[a]
ln TS_i	1.10	1.09
	(28.35)[a]	(30.53)[a]
ln TS_j	0.54	0.65
	(30.12)[a]	(28.55)[a]
ln ${}_1D_{ij}$	-2.65	-0.98
	(-103.65)[a]	(-15.43)[a]
Dummies		
Border (γ_1)		-7.12
		(-26.45)[a]
Language (γ_2)		3.25
		(18.43)[a]
Historical Relations (γ_3)		5.10
		(14.57)[a]
EC (γ_4)		2.19
		(11.43)[a]
EFTA (γ_5)		1.63
		(7.22)[a]
Developing Countries (γ_6)		-0.37
		(-2.54)[a]
R^2adjusted	0.68	0.73

[a] t-values

The results obtained from the model version with dummies clearly indicate the importance to account for barriers effects. All the dummies considered are highly significant and rather important. The estimated coefficient of the border dummy, B_{ij}, shows that, other things being equal, telephone communication crossing the political border leads to a reduction of 99.92 percent. Communication with Germany is least affected. But even in this case the intensity of telephone communication is only about one fifth of what it would be without national border. A very strong communication barrier exists between Austria and Eastern Europe (Commonwealth of Independent States, Baltic States, Poland, Bulgaria, Romania, Albania). The intensity of telephone communication is only about 0.5 percent of what it would be without national borders. Obviously, economic, cultural and institutional differences are rather great between Austria and Eastern European countries. Moreover, there are severe bottlenecks in the Eastern European telephone network infrastructure leading to congestion on telephone lines and many unsuccessful attempts to establish a telephone connection with these countries.

Identity of Language has obviously an important communication stimulating effect. Telephone communication with German speaking regions/countries is more than 2500 percent higher than with those with a different language, ceteris paribus. The respective estimate is highly significant. Historical relations with countries of destination have an even higher positive influence on international telephone communication. Telephone communication is about 164 times as high as would be expected without Historical relations, taking all other variables into account. Both EC- and EFTA-regions/countries generate a significant and important influence on telephone communication originating from Austrian regions. As expected, EFTA has left less trace on the pattern of international communication. The dummy variable, DC_{ij}, turns out to have a communication impeding effect.

4. Other Explanations of International Telecommunication

International telephone communication is clearly related to other types of spatial interaction, such as cross-border commuting, international migration and tourism, trade, etc. Consequently, barriers to interaction in one field will be reflected by barriers in interaction in other fields (see Rietveld and Janssen 1990).

In order to analyse the interdependence of spatial interaction phenomena, a simple model linking international telephone data with data on trade and tourism may be measured. The model reads as follows:

$$T_{AJ} = \alpha_0 + \alpha_1 A_{AJ} + \alpha_2 B_{AJ} + u_{AJ} \qquad (9)$$

where A_{AJ} denotes trade (imports and exports, 1989) between Austria and country j (measured in 10 Billions of Austrian Shilling), B_{AJ} tourism (incoming) between Austria and country j (measured in one hundred thousand of overnight stays, 1989) and u_{AJ} disturbancies with $u_{AJ} \sim N(0,\sigma^2)$ independently of A and B.

Table 4: Regression Results for International Telephone Communication Explained by Trade and Tourism

	Version A		Version B	
Constant	-5.55	(-1.11)[a]	14.37	(0.98)[a]
Trade	5.03	(34.84)[a]	1.18	(1.82)[a]
Tourism			3.33	(6.40)[a]
R^2adjusted	0.90		0.95	

[a] t-values

The results of OLS estimation of the parameters are summarised in Table 4 for two versions of the model. Trade alone (model version A) explains as much as 95 percent of the total variance in international telephone communication. The gain in R^2 as a result of the inclusion of tourism is only modest.

6. Summary and Conclusions

Several different models of interregional domestic telephone traffic in Austria have been investigated, especially with respect to their performance as the components of the basic model vary. An important conclusion is that parameter estimates and their interpretation depend to a certain degree on the way in which the separation between the regions is defined. Qualitatively there is some stability of performance in the sense that the rank ordering of the estimation of the explanatory variables is similar across different specifications of the separation factor, even though the quantitative estimates vary. The results emphasize the prominent role of distance (cost) as a determinant of telephone traffic.

The analysis of barrier effects on international telephone traffic originating from Austrian regions shows that barrier effects of the national border leads to a reduction in telephone communication of about 99.92 percent compared to what would be expected without the border. Linguistic identity and historical and economic relationships have a clear promoting effect on communication.

In addition the study provides evidence of the derived nature of international traffic from other types of spatial interaction, predominantly trade and tourism. This indicates that observed spatial barriers to communication largely reflect barriers to trade, tourism etc. (Rietveld and Jansson 1990). In order to arrive at a deeper understanding of the nature of barriers to telephone communication, it seems to be necessary to look closer to barriers of trade, migration etc.

Appendix

External zones of the interregional-international telphone communication model: Belgium, Bulgaria, Commonwealth of Independent States, CSFR, Cyprus, Denmark, France, Federal Republic of Germany (regions: Berlin-West, Cologne, East Germany, Frankfurt, Hamburg, Hanover, Munich, Nuremberg, Stuttgart), Finland, Great Britain, Greece, Hungary, Iceland, Ireland, Italy (regions: Ancona, Brescia, Florence, Milan, Naples, Palermo, Rome, Torino, Venice), Luxemburg, Malta, The Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland (regions: Basel, Bern, Chur, Geneva, Zurich, Lugano, Luzerne, Saint.Gall, Winterthur), Turkey, Yugoslavia, Algeria, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cap Verde, Central African Republic, Chad, Djibouti, Egypt, Ethiopia, Gabun, Ghana, Gambia, Ivoiry Coast, Kenya, Kongo, Lesotho, Madagascar, Malawi, Marocco, Mauretania, Mauritius, Mocambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Seychelles, South Africa, Sudan, Swaziland, Togo, Tanzania, Tunesia, Uganda, Zaire, Zambia, Zimbabwe, Canada, USA, Argentinia, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, French Guyana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Uruguay, Venezuela, Australia, New Zealand, Afganistan, Bahrein, Brunei, People's Republic of China, Fiji, India, Indonesia, Irac, Iran, Israel, Japan, Katar, Kuwait, Laos, Malaysia, Maledives, Nauru, Oman, Papua-New Guinea, Pakistan, Philippines, Salomon Islands, Saudi Arabia, Singapore, South-Korea, Sri Lanka, Syria, Thailand, Tonga, Tuvalu, Vanuatu, United Arab Emirates, Vietnam

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