CAE Working Paper #04-06

Regional Inflation During the French Revolution

by

Levon Barseghyan

Francesca Molinari

and

François Velde

May 2004

Regional Inflation During The French Revolution

Levon Barseghyan Francesca Molinari François Velde

December 15, 2000

Abstract

Shortly after the Revolution of 1789 France experienced a period of major hyperinflation, which lasted until 1796, when the French government abolished the paper money and returned to the specie. In 1798 the French government ordered the local authorities in all departments to construct the aggregate price index. Even though similar in trend, these price series display striking differences both in level and short run dynamics. Some of these differences are undoubtedly caused by the absence of a uniform rule for constructing the price indices, and possibly are magnified by such distortionary factors as the laws of maximum, the heavy concentration of military contracts in particular locations, and the different taxation schemes. However, level of economic integration in 18th century France had a major impact on the price evolution during the Revolution. In this paper, using different proxies for a measure of economic distance, we show that price formation among "close" departments displayed significantly higher correlation than the one among "distant" departments.

1 Introduction

Shortly after the Revolution of 1789 France experienced a period of major hyperinflation, which lasted until 1796, when the French government abolished the paper money and returned to the specie. In 1798 the French government ordered the local authorities in all

departments to construct the aggregate price index to be used in restructuring the government debt, as well as in recalculating other obligations made in Assignats (paper money). Even though similar in trend, these price series display striking differences both in level and short run dynamics. Some of these differences are undoubtedly caused by the absence of a uniform rule for constructing the price indices, and possibly are magnified by such distortionary factors as the laws of maximum, the heavy concentration of military contracts in particular locations, and the different taxation schemes. However, we think that the main reason behind these variations is the level of economic integration in 18th century France.

This paper is an attempt to show that integration indeed mattered and close economic ties between departments vastly contributed to similar inflation patterns among them. In particular, using different proxies for a measure of economic distance, we show that price formation among "close" departments displayed significantly higher correlation than the one among "distant" departments. This result is robust to different model specifications, including one which endogenizes similarities in industrial structure of departments.

The rest of the paper is organized as follows. In Section 2 we present the overall economic conditions on the eve and during the French Revolution, and the origins of Assignats, while in Section 3 we discuss the avialable data. Section 4 introduces the model we use to study the price series, describes our main findings, and shows their robustness. Section 5 concludes.

departments to construct the aggregate price index to be used in restructuring the government debt, as well as in recalculating other obligations made in Assignats (paper money). Even though similar in trend, these price series display striking di¤erences both in level and short run dynamics. Some of these di¤erences are undoubtedly caused by the absence of a uniform rule for constructing the price indices, and possibly are magni…ed by such distortionary factors as the laws of maximum, the heavy concentration of military contracts in particular locations, and the di¤erent taxation schemes. However, we think that the main reason behind these variations is the level of economic integration in 18th century France.

This paper is an attempt to show that integration indeed mattered, and close economic ties between departments vastly contributed to similar in‡ation patterns among them. In particular, using di¤erent proxies for a measure of economic distance, we show that price formation among "close" departments displayed signi…cantly higher correlation than the one among "distant" departments. This result is robust to di¤erent model speci…cations, including one which endogenizes similarities in industrial structure of departments.

The rest of the paper is organized as follows. In Section 2 we present the overall economic conditions on the eve and during the French Revolution, and the origins of Assignats, while in Section 3 we discuss the avialable data. Section 4 introduces the model we use to study the price series, describes our main …ndings, and shows their robustness. Section 5 concludes.

2 State of the economy: the origins of in‡ation

2.1 Economic Conditions

In 1789, urban population constituted slightly less than one-quarter of the total population (Harris [10], p3). Agriculture still was the main occupation; but at the outbreak of the Revolution, it was in a deplorable condition: undercapitalization, low average crop yields (only 2/3 of the average crop yields in England), absence of well developed small farm infrastructure (Harris [10], p3). Also, a few subsequent years of bad harvests contributed to the unfavorable conditions in the subsistence markets.

Many scholars agree that the main reason for these grave conditions in rural sector seems to be an extremely ill designed tax system. The amount of taille, the heaviest direct tax, to be paid by a particular household was left on the discretion of the tax collectors, and was determined almost solely based on the appearances. In this conditions many peasants found more bene…cial not to appear wealthy in order to avoid the tax burden. The eager to avoid the taille was so high, that many households became indeed poor:

> They [the peasants] did not dare to procure for themselves the number of animals necessary for good farming; they used to cultivate their …elds in a poor way so as to pass as poor, which is what they eventually became; they pretended that it was too hard to pay in order to avoid paying too much: payments that were inevitably slow were made still slower; they took no pleasure or enjoyment in their food, housing or dress; their days passed in deprivation and sorrow (from the cahier de doleances -o¢cial list of grievances- of the Third Estate in the baillage of Nemours, cited in Aftalion [1]).

During the Revolution the situation did not improve signi…cantly. Although most of Church' and emigre's land was expropriated and put on sale, with very little or no down-payment required, the majority of the rural population did not have enough resources to take advantage of this opportunity. Due to in‡ation, controlled prices, and requisitions (especially during the Terror), they were left with essentially no capital to buy out their debts to the landowners and purchase a land. It is true though, that in the beginning of the Revolution the tax burden itself was reduced by the inability of the new authorities to collect taxes, and that afterwards it was reduced through the reorganization of the tax system in a more equitable and simple scheme. However, this was not su¢cient to substantially change the overall economic conditions of the rural sector.

Manufacturing was not in better conditions. The majority of French industries still were in a rudimentary state, with textiles contributing more than 50% of the nation's industrial output (Aftalion [1], p34). Only very few industries, like mining and metalworking, had

advanced forms of organization and a stable work force. The majority of city dwellers was employed in services and textile. Wars and civil unrest alone did not play a major role in the collapse of the manufacturing sector right before and during the French Revolution. As P. Butel ([5] p37) notes:

> [...] though the productive potential of some towns was undermined by military operations or civil disturbances, such destruction was quite limited in time and space.

The core of the problems was rather in the dramatic reduction of the working capital of merchants and manufactures through the sharp rise in costs, obligatory government contracts (payment for which was usually done in depreciating paper money), price controls, loss of export markets, diversion of resources to military purposes and the heavy burden of taxation. With continuing war, sea blockade, and in‡ation, the industrial output fell sharply till 1796. Even though it started to recover after that, by 1799-1800 it was at most 50-60% of the 1789 level.

2.2 Taxes and Circulating Currency on the Eve of the Revolution

One of the most critical problems faced by the Ancien Regime and afterwards by the Estates-General was the constant excess of expenditure over the revenues. In fact budget de…cit and inadequacy of …scal system were so dominant in the pre-Revolutionary France, that some authors consider them "as the Direct cause of French Revolution" (see for example Aftalion [1], p11).

The Fiscal System of the Ancien Regime was both complicated and, more importantly, inequitable. It consisted of numerous royal and seigniorial taxes, along with payments to the Church. As we have mentioned above, the most evil tax, in economic sense, was the taille. It originally was levied to …nance wars, and therefore was imposed only on the civil population. The determination of taille liabilities was left solely on the discretion of the tax collectors, who did not have any accurate measure of the wealth of taxpayers. In these

conditions, nobility was essentially exempt from taille, as the only estimate of their wealth was the amount they declared themselves.

The other direct taxes included capitation tax and vingtieme. These taxes as well were based on the real means of taxpayers. But similarly to the taille payments, nobility was quite able to avoid, or signi…cantly reduce, their obligations by not disclosing their wealth. Clergy was in even better position, since in theory they were determining the amount of "gifts" to the Crown on a voluntary basis. Consequently, the Royal tax burden was put almost solely on the Third Estate. Needless to say, the Third Estate was also responsible for contributions to nobility, clergy, and for the hole system of indirect taxes.

The most painful indirect tax was the gabelle (tax on salt). Its amount varied signi…cantly from region to region, accounting for around 15% of the total Royal taxes. During the Ancien Regime there were several attempts to conduct a …scal reform and bring tax duties to one uni…ed and relatively fair ground. However, nobility and clergy successfully defeated all such proposals, and kept their tax privileges. (Ex post, nobility and clergy could have been better o¤ accepting a …scal system more fair and less painful for the Third Estate, since that may have prevented the Revolution, and therefore loss of essentially all their land and other property.)

The pre-Revolutionary France faced another serious problem: the disappearance of the currency. Political instability, worsening economic conditions, and disparities in exchange rates caused hoarding and exportation of the specie. While the decrease in the amount of circulating currency remains unclear, Harris [10] reports numerous evidence on "partial or even complete loss of metallic money". It is important to mention that prices in this period did not respond to this monetary contraction, putting the real side of the economy even in worse conditions. In August 1788 the Royal Treasury attempted to introduce new interest bearing paper notes. However, because of the general incon…dence in the existing regime and the memories of Law's paper money, the wave of overwhelming disagreement caused the Government to abandon the issuance.

2.3 Revenues of the Revolution and infeasibility of the …scal reform

As Revolution "had been made precisely in order to oppose taxation" (Aftalion [1], p.68), the new Treasury faced exactly the same political opposition to a …scal mechanism which could provide enough revenues for government to operate. In June 14, 1789 a decree declaring all taxes illegal was passed. Although within two months it was reversed, the public opposition to taxes was very high. In March of 1790 the salt tax (gabelle) was abandoned, and in November the Contribution Fonciere, the corner stone of the new tax system, was passed. The latter was based on a unique direct tax, levied on all social groups, and proportional to the wealth of the taxpayers. However the reaction against taxation persisted through 1791. It took almost two years till an improved administration of local municipalities led to signi…cant tax revenues. By the end of 1792, the central authorities received around 175 million livres in taxes, which constituted roughly 16% of total expenditure. From that period on taxes were collected quite stably, but the …scal revenues never constituted more then 25% of the total expenditures. While more dramatic tax schedules and forced contribution were proposed during the later years of the Revolution, they never brought a signi…cant increase in the Treasury funds, both because of political opposition and di¢culties in collection. (see Table Harris1)

Loans, another traditional source of income employed by the Ancien Regime to cover its de…cits, could not provide signi…cant funds due to administrative impotence, decline in savings, and most importantly political and economic instability.

Therefore, the only real source of income for the government to cover its growing expenditures was through seignorage. (Indeed, it is almost uniformly agreed by historians that the Revolution was …nanced almost entirely by Assignats.) Initially, issuance of unbacked paper money was not possible due to a large political resistance and the unpleasant experience of the Law's paper money in the beginning of the century. However, in a situation so di¢cult that some members of the Assembly even proposed the bankruptcy of the State, the remedy was found rather quickly. By October 1789 many in‡uential politicians like Mireabreu

and Talleyrand publicly called upon con…scation of the Church' land in order to …nance the budget. The idea quickly evolved into a plan according to which no interest bearing notes would be issued, later to be used to buy a con…scated land. It is important to note that there were also sound political reasons behind this plan. The members of the Assembly realized that the sale of con…scated land to a large group of population would provide wide public support for the Revolution, since it would create a new class of landowners, whose property rights would be guaranteed only if the Revolution would survive.

On December 19, 1789 the …rst issue of Assignats in the amount of 400 million livres was approved. Originally, Assignats were designed as bonds bearing a 5% interest, to be used in the purchase of nationalized land, and were not legal tender. Emission of another 400 million livres, this time in small nominations to facilitate circulation and trade, was conducted on April 17, 1790. At this time Assignats were declared a form of currency, bearing a 3% interest. In October the interest was abandoned, completing the transformation of Assignats into currency.

On the face of the increasing expenditures, especially caused by the necessity to …nance the war, numerous emissions followed. By 1793 Assignats essentially became …at money, causing a sharp rise in prices and drop in real balances. As the base of in‡ation tax was threatened, a strict price control, the law of Maximum, was introduced. During 1794 successes in the war made impossible the enforcement of restrictions on prices and trade, causing a new wave of depreciation of Assignats. The law of Maximum o¢cially was abandoned on December 1794. In 1795 both prices and amount of circulating Assignats were growing exponentially.

By the February of 1796, when the printing presses for Assignats were broken, the total amount of the Assignats in circulation was about 34-39.000 million, around 85-97 times more than the …rst emission.

3 Data

In 1798, on the request of the Central Government, the local authorities prepared tables of monthly value of the paper money for the period from 1791 till 1796. (For the …nal year, when daily changes in prices were signi…cant, the daily data is available). The objective was to provide a basis for the translation of paper money obligations into metallic equivalents.

The data set used in this paper consists of these price series, collected for all pre-1789 departments. [1] Our analysis spans the period going from January 1791 till February 1796, for which we have monthly data.

3.1 Non-uniformity in the construction of the price index

departments were given the Treasury prices of the gold and silver. Local authorities had to combine this information with prices of goods on the local markets to construct the price of a consumption bundle in terms of Assignats. Goods included in the bundle were precious metals, land, agricultural products, merchandize, and manufacturing goods. It was advised from Paris to include in the bundle land, food, and commodities, prices of which were not controlled during the Maximum period. However, some of the local authorities explicitly used controlled prices to construct the price index. This of course creates asymmetry in assessing the value of Assignats across di¤erent regions, since one may with high degree of certainty expect that inclusion of controlled commodities in the bundle would arti…cially increase the purchasing power of the paper money. On the other hand, almost all necessities at some point were rationed or had controlled prices, so it is not clear whether one would have a representative bundle after excluding these necessities from it.

Also, the price of gold was depressed substantially by the o¢cial propaganda and violence during the Terror, contributing to increase the value of Assignats. Therefore, depending on the weight of gold and silver in the consumption bundle used to construct the price indices,

[1] The data for the 13 Departments which were annexed by France during the war is also available, but there are doubts regarding the comparability of these price series with the data for the pre-1789 Departments.

one may observe substantial di¤erences across the latter. Moreover, prices of goods in di¤erent departments varied substantially even before the Revolution, so it remains unclear to what extent di¤erences in the value of a particular bundle were due to in‡ation and economic turmoil, and not to "true" price di¤erential of elements of the bundle.

A comparison of the price series of the di¤erent departments shows an extremely large variation both in the level and in the short run dynamics of the value of the Assignats. Figure A plots di¤erent percentiles, and the mean of 84 pre 1789 French departments. The di¤erence between the …rst and the nineth deciles at its peak is 32.5% of pre 1790 value, while the di¤erence between the …rst and the third quantiles at the peak of 16.5% is no less striking. As Figure B shows, the same magnitude di¤erences are displayed by the in‡ation rates.

What are the reasons for such diversity? What caused such a wild degree of variation? Are there any testable hypotheses which can help to explain them?

As mentioned above, some of the variation is due to the non-uniformity in the construction of these time series. However, one might expect that non-uniformity would primarily a¤ect the level, but not the growth rate of prices. The other reason for such dramatically di¤erent price behavior is of course given by the di¤erences in economic structure across the departments and the level of economic integration between them.

3.2 Diverse economic environment

There are two key factors which determined the economic role of a particular department. First, we think that location was of particular importance. Geographically closer provinces should have had more similar, inter-dependent economies than distant ones, due to similar climate and natural resources, higher trade volume, and often close socio-political environment. Since agriculture contributed around three quarters of the total GDP, climate was an important determinant in economic position of counties. Also, di¢culties in transportation and existence of tari¤s and rent seekers on the boundaries of the departments made trade

with close locations more advantageous. Then, it seems reasonable to assume[2] that closer departments had more common industries than far ones. To illustrate the importance of geographical location in price formation, we plot in Figure C the value of Assignats for …ve di¤erent regions: North, North-West, North-East, South-West, and South-East. As the …g-ure illustrates, Assignats had the highest value in the North-Western part of the country, while the lowest was in the South-Eastern part. The fact that Assignats were valued the least in the South-Eastern region can be explained by the signi…cant circulation of foreign currency in that area, and by the subsistence crisis that this region experienced from 1790 till essentially 1798.

Second, we believe that industrial specialization plays an important role in de…ning the economic conditions of a particular region. This is especially true for economies which experienced drastic changes over short periods of time. For example, if two di¤erent counties were highly specialized in the same good, demand for which fell sharply all over the nation within a very short period of time, one may safely assume that both of these counties would experience very similar economic changes, including price formation, ‡y of capital and so on.

Indeed, phenomena of such kind were observed. Essentially all cities with ports on the Atlantic coast were experiencing the same kind of di¢culties during the French Revolution. Not only the wealth of these cities was signi…cantly undermined by the loss of colonial trade, but also their economies su¤ered dramatic demand shocks. Industries of ports were developed during the golden years of colonial expansion, and were almost exclusively export oriented. As sea blockade became more and more di¢cult to bypass, the manufactures were shut, leaving more and more city dwellers out of job and means of existence. Francois Crouzet, among the others, has argued that there was a lasting de-individualization or pastoralization of large areas, with de…nite shift of capital from trade and industry towards agriculture. To illustrate the extent of the industrial collapse, Paul Butel considers as an example the town of Tonneins, which had 1000 ropemakers in 1789 and only 200 in 1800, 1200 workers employed at a tobacco factory in 1789 but fewer then 200 in 1800.

[2] Evidence from Table? con…rms that qualitatively this is the case.

Economic conditions of continental cities were not that grave. Since the industries of these cities were mostly oriented to the domestic market, disruption of the foreign trade had smaller impact on them than on portal cities. Based on their geographical location, inland cities experienced di¤erent economic conditions. For the cities of South-West the main factors in‡uencing the economy were civil disorder and military campaign. The cities of the North and East had predominantly textile industries developed during pre 1789 wars. During the Revolution, due to the disappearance of British goods, these industries actually gained new markets. Cotton industry, concentrated mainly around Lille and Paris, was in particularly good shape. Not only cotton output did not collapse, but it managed to increase. The possible reasons are the substitution from more expensive textiles as silk and wool, the increasing military contracts, and the decrease in the previously heavy presence of British cotton products.

There was yet another factor which supported the economies of inland cities during the Revolution. As colonial trade was coming to halt, many merchants and manufacturers were shifting their capital inland. Some of it undoubtedly was used to purchase land, but the rest was moved to buy or build inland manufactures and shops (though there are no ways of assessing this capital movement quantitatively, Butel reports that there is a signi…cant micro level evidence to con…rm this assertion).

To illustrate the dependence of the prices on the presence of particular industries, we plot the average value of Assignats for the departments which had substantial presence of cotton, coal, metalwork industries and ports. As we can see from Figure D, the average devaluation for departments with cotton industry was almost always the lowest, while for coastal departments it was always the highest. This …nding is consistent with the observation above that during the Revolution the cotton industry was in better conditions than all other industries, and portal areas su¤ered heaviest economic crisis.

4 Econometric Model

The analysis carried on in the previous Sections leads to the conclusion that the non-uniform economic conditions across the departments of 1790's France should play a key role in explaining the striking differences in their price levels and inflation rates.

Therefore, to study the relation between the prices of the different departments, ideally one would like to construct and test a model of the following type: $\pi_{t+1} = f(\mu_t; \pi_t; EC_t)$; where π_t is the vector of inflation rates across the departments, μ_t is the growth rate of money, and EC_t is a matrix of variables characterizing the economic conditions of the departments. Although we have data regarding the growth rate of money and an indication of the prevailing industry in a given region, there is no available data to help to quantitatively assess the economic conditions of the French departments during 1789-1796.

However, we can use the information provided by two proxies of the "similarities" of the economic conditions between departments.[3] These proxies are: their geographic distance, and the traveling time that one would have employed to go from the center of one department to the center of another. In the next two Sections we will show the informative power of such proxies, and present evidence that the "closer" (either geographically or in terms of traveling distance) two departments are, the more their inflation rates[4] move similarly.

4.1 Preliminary Analysis of the Data

Given the monthly price levels of the 84 French departments from January 1791 to February 1796, we construct the demeaned inflation rates η_t as follows:

$$\eta_t = \log\left(\frac{P_t}{P_{t-1}}\right) - E\left[\log\left(\frac{P_t}{P_{t-1}}\right)\right] \quad (1)$$

Those inflation rates display a strong correlation across departments. As Table 1 reports, the maximum correlation coefficient between η_t^j and η_t^i, $i; j = 1; ...; 84$ (i.e. across all departments) is 0.977, the minimum is 0.035, and the mean is 0.724. This correlation

[3] Using a technique that we will describe in Section 4.2.

[4] As well as price levels, but we will concentrate on the former.

decreases as we compare $¼_t^j$ and $¼_{t\,i\,1}^i$, and $¼_t^j$ and $¼_{t\,i\,2}^i$: Table 2 shows that with 1 time lag the maximum correlation coe¢cient across all departments is 0.910, the minimum is 0.041, and the mean is 0.579. With 2 time lags, as we can see from Table 3, the maximum correlation coe¢cient across all departments is 0.860, the minimum is -0.038, and the mean is 0.461.

In Figure 1 and Figure 2 we plot a kernel[5] regression of the correlation coe¢cients on the geographic and traveling distance, respectively;[6] as the pictures show, the resulting functions have a downward sloping trend.[7]. Although their shape is quite similar, we can observe that the kernel regression using traveling distance displays a slightly sharper decrease than the one using geographic distance.

Another preliminary check of the relevance of our measures of "economic distance" uses a di¤erent approach. We …rst run an AR(1) regression of the in‡ation rate of each department on the in‡ation rate of the same department one period before, using the following relation:

$$¼_t^i = ½^i ¼_{t\,i\,1}^i + u_t^i \tag{2}$$

Once we estimate $½^i$, we calculate the residuals $û_t^i$ and the correlation coe¢cients between $û_t^i$ and $û_t^j$, $û_t^i$ and $û_{t\,i\,1}^j$, $û_t^i$ and $û_{t\,i\,2}^j$ (which are reported in Table 4-6 and display a similar pattern as the correlation coe¢cients between the in‡ation rates with 0, 1, and 2 time lags). The reason why we run this regression is to separate the e¤ect of a department's own in‡ation from the in‡uence of the other departments. We then run (using 0, 1, and 2 time lags) two di¤erent regressions: a linear regression of the form

[5] The kernel used here (and in all what follows) is a Gaussian kernel with standard deviation 0.025. The choice of the bandwidth is motivated by an attempt to "undersmooth" the estimate, and therefore not to bias the analysis.

[6] In all the analysis that follows we use a standardized measure of distance, de…ned as follows: $d(i;j) = d(i;j) = \max[d(i;j);\ i;j = 1;:::;N]$. This implies that $d(i;j) \in [0;1]\ \forall\ i;j = 1;:::;N$.

[7] In running this and the following kernel regressions we omitted from the regression the correlation coe¢cients of a department with itself, and the corresponding zero distance. This was done in order not to bias the analysis by considering correlation one at distance zero.

$$corr\left(\hat{\alpha}_t^i, \hat{\alpha}_t^j\right) = \circ + \acute{}\, d(i,j) + \text{»}_t \tag{3}$$

where $d(i,j)$ represents the distance between department i and j, $i,j = 1,\ldots,84$, and a kernel regression of the residuals on the distance. The estimated coe¢cients of equation (3) are reported in Table 7 (along with their 95% con…dence interval), while graphs for the regressions are shown, respectively, in Figures 3-10. As we can see, with no time lag there is a signi…cant negative relation between correlation of residuals and economic distance; adding time lags this relation moves to the positive region, but it is much weaker. This trend is robust to the use of the kernel regression instead of the linear speci…cation.

Thus, the results of this analysis support the conjecture that economic distance plays an important role in explaining the correlation between in‡ation rates. To study this inter-dependence and correlation patterns we employ spatial econometrics tools.

4.2 Spatial VAR: Model and Results

We use a model (similar to the one in Chen and Conley [6]) that characterizes the relationship between departments' in‡ation rates by the economic distance between them. As already mentioned, we use as a proxy for economic distance the geographic and the traveling distance; the basic idea is that if there are two groups of departments with the same position relative to each other, then there is a replication in the cross section component of our panel data that can be exploited in order to infer the relationship between the departments.

We denote by $\mathbf{¦}_t = \left(\text{¼}_t^1, \text{¼}_t^2, \ldots, \text{¼}_t^N\right)'$ the vector collecting the in‡ation rates at time t for the $N = 49$ departments for which we have a measure of traveling distance[8], by $D = \left(D(1,2), \ldots, D(1,N), D(2,3), \ldots, D(2,N), \ldots, D(N-1,N)\right)'$ the (geographic or traveling) distance between departments, by ¹_t the growth rate of money, and by IND

[8] We restrict our attention to these 49 departments in order to be able to compare the results obtained using geographic distance with those obtained using traveling distance. These departments are evenly spread across the French territory.

the prevailing industry[9] in each department; we assume that Δ_t evolves according to the following basic nonlinear VAR model:

$$\Delta_{t+1} = A(D)\,\Delta_t + \varepsilon_{t+1}; \qquad \varepsilon_{t+1} \equiv Q(D)\,\tilde{A}_{t+1} \tag{4}$$

where $\tilde{A}_{t+1}$ is an IID sequence with $E\tilde{A}_{t+1} = 0$ and $E\tilde{A}_{t+1}\tilde{A}'_{t+1} = I_N$. The $N \times N$ matrix $A(D)$ is defined as follows:

$$A(D) = \begin{bmatrix} \alpha_1 & g(D(1;2)) & \cdots & g(D(1;N)) \\ g(D(2;1)) & \alpha_2 & \cdots & g(D(2;N)) \\ \cdots & \cdots & \cdots & \cdots \\ g(D(N;1)) & g(D(N;2)) & \cdots & \alpha_N \end{bmatrix} \tag{5}$$

where the coefficients α_i, $i = 1;\ldots;N$, represent the effect of π^i_{t-1} on π^i_t, while the off-diagonal elements represent the effect of department j's inflation rate on department i's next period inflation rate as a function of the distance between the two departments.

We consider as well two other specifications of this basic model:

$$\Delta_{t+1} = A(D)\,\Delta_t + \bar{\beta}\,\Delta^1_t + \varepsilon_{t+1}; \qquad \varepsilon_{t+1} \equiv Q(D)\,\tilde{A}_{t+1} \tag{4'}$$

$$\Delta_{t+1} = A(D)\,\Delta_t + IND' + \varepsilon_{t+1}; \qquad \varepsilon_{t+1} \equiv Q(D)\,\tilde{A}_{t+1} \tag{4''}$$

in order to account in the first case for the growth rate of money, and in the second case (by means of dummy variables) for the prevailing industry (IND) in each department.

Finally, we model the conditional covariance matrix of Δ_{t+1}, given by $\Sigma(D) \equiv Q(D)\,Q(D)'$ as follows:

[9] The industries are calicoes, ceramics, coal, cotton, metalwork, ports, silk and textiles. The source of our data is Jones [12].

$$\Sigma(D) = \begin{bmatrix} \sigma_1^2 + C(0) & C(D(1;2)) & \cdots & C(D(1;N)) \\ C(D(2;1)) & \sigma_2^2 + C(0) & \cdots & C(D(2;N)) \\ \cdots & \cdots & \cdots & \cdots \\ C(D(N;1)) & C(D(N;2)) & \cdots & \sigma_N^2 + C(0) \end{bmatrix} \tag{6}$$

where $C(\cdot)$ is assumed to be continuous at zero and is an isotropic[10] covariance function.

We then use the semiparametric method[11] described in Chen and Conley [6] to estimate the parameters α_i and σ_i^2, $i = 1;...;N$, and the functions $g(\cdot)$ and $C(\cdot)$, as well as the parameters β_i and θ under the model specifications (4') and (4").

The estimated values of α_i and σ_i^2, $i = 1;...;N$, together with a 95% bootstrap confidence interval (constructed as described in Section 3.3 of Chen and Conley [6]), are reported in Table 8 and Table 9 under specification (4), and in Table 10 and Table 11 under specification (4'), along with the estimates of β_i. Table 12 and Table 13 report these estimates under specification (4") (in each case, the two tables report respectively the values obtained using as a matrix of economic distance the geographic distance and the traveling one), while Table 14 reports the estimates of θ, under specification (4"), both for geographic and traveling distance.

As we can see in all tables, the estimates of α_i are significantly different from zero in the majority of the cases (approximately 60%). The conditional variances are described by the idiosyncratic components σ_i^2 and the function $C(\cdot)$ that governs the covariances. As shown in Table 8-13, the department specific variance estimates differ between each other with the largest being about 7 times the smallest, due to relevant idiosyncratic shocks. Note that the

[10] In other words, C is assumed to be a covariance function for stationary random fields with indices in $\mathbb{R}^2$ whose covariance depends only on distance, not direction.

[11] The method can be summarized as a two step procedure. In the first step, we approximate the function $g(\cdot)$ by a sum of splines (with an unknown coefficient multiplying each of the splines included in the sum) and estimate by ordinary least squares the diagonal elements of the matrix $A(D)$ and the coefficients of the splines. We then construct the residuals of this regression, and estimate the covariance function $C(D)$ using again the method of splines (under the constraint that the estimated matrix $\Sigma(D)$ has to be positive definite). In our case we use 5 splines both to estimate the $g(\cdot)$ function and the $C(\cdot)$ function.

estimates of α_i and $\sigma_i^2 + C(0)$ obtained by using geographic distance and traveling distance are very similar, suggesting that these two measures of distance capture similar features of the economic conditions of the French departments.

At the same time, we can observe that these estimates do not change significantly if we include in the basic VAR regression the growth rate of money, or a dummy for the prevailing industry. Looking at Table 10 and Table 11, we can see that it's not possible to reject the null hypothesis that $\bar{\gamma}_i = 0 \ \forall i$; although this result is surprising, we believe that the non significance of the growth rate of money can be explained by the strong multicollinearity of our time series of money supply with the price levels across departments. Looking at Table 14, we can see as well that we can't reject the null hypothesis that $\phi = 0$ for all industrial sectors (even though in this case the non rejection of the null is not as strong as in the case of the money growth rate). Regarding this result, we believe that it is due to the fact that the measure we are using is still too inaccurate. In order to get better results we would need a measure of the amount of production of each single department for each single product, and of the type of trades between departments.

Figure 11 and Figure 12 plot respectively the $g(\cdot)$ function and the $C(\cdot)$ function, together with their 95% bootstrap confidence interval, obtained by using geographic distance under specification (4); Figure 13 and Figure 14 plot the same functions and bootstrap confidence interval, this time using traveling distance, again under specification (4). The same functions obtained under specification (4') and (4") are plotted, respectively, in Figure 27-34. In all what follows we will comment Figure 11-14, since, as we can see from the pictures and as we already discussed, the inclusion of money growth rate or of dummies for the prevailing industries does not significantly impact our results.

The solid lines with circles in Figure 11 and Figure 13 are our estimates of $g(\cdot)$ plotted against the distances in our sample; the solid lines with pluses are the 95% bootstrap confidence intervals (200 draws). The point estimates, both using geographic distance and traveling distance, are relatively small in absolute magnitude (while $\frac{1}{N}\sum_i \alpha_i$ is equal to $-0{:}211$ using geographic distance and $-0{:}217$ using traveling distance, the maximum value reached

by the g function is approximately 0:038 with geographic distance, and 0:025 with traveling distance), but they are positive and signi…cantly di¤erent from zero.[12] Using geographic distance, the g function is slightly decreasing for distances up to 0:5 (i.e. approximately the 70th percentile of the non-zero distances), and then it is slightly increasing. Using the traveling distance we get a g function increasing for almost all distances.

Thus there is evidence of signi…cant (even if maybe small) dynamic spatial correlation for most distances (both geographic and traveling ones), although the sign is not clear. In the next Section we will present a series of test to check the robustness of this conclusion.

The solid lines with circles in Figure 12 and Figure 14 are our estimates of C (¢), normalized by the average of the departments variances: $\frac{1}{N}\sum_i [\sigma_i^2 + C(0)]$. The solid lines with pluses are the 95% bootstrap con…dence intervals (200 draws). If all departments variances were the same, this normalized estimate of C (¢) would be the spatial correlation. Even if, due to idiosyncratic shocks, this is not the case here, we still get a sense of whether C (¢) is large relative to the departments variances. As we can see from the pictures, using both measures of economic distance the magnitude of the estimates of C is rather large relative to the departments variances, even when we consider the lower bound of the con…dence interval.

As we can infer, there is strong evidence that correlation of the shocks in the VAR model we used is a decreasing function of both geographic and traveling distance. In the next Section we will present a series of test to check the robustness of this conclusion.

4.3 Robustness of the Results

Given the results we showed in the previous Section, two questions remain opened. The …rst one regards the problem of whether the g function is in reality a function of the economic distance, or not simply a constant. The second regards the problem of whether in reality there is spatial independence across the series, and the results of the previous Section are

[12] The con…dence intervals do not contain the zero for distances between 0:1 and 0:8, i.e. approximately between the 5th and the 90th percentile of non-zero geographic distances, and between the 5th and the 95th percentile of nonzero traveling distances.

simply driven by the model. In order to answer these questions we run two types of test.

In the …rst one we test, in separate experiments, two null hypotheses:

1. H_0 : $g(d) = 0 \ 8 \ d > 0$;

2. H_0 : $g(d) = \pm \mathbf{6} \ 0 \ 8 \ d > 0$:

In order to test those hypotheses we proceed as follows[13]. We run a VAR regression similar to the one in equation (4), in which we specify, respectively, $A(D)$ to be …rst a diagonal matrix, and then a matrix whose o¤ diagonal elements are all equal to a constant. We then calculate the residuals under these two speci…cation, and generate bootstrap samples by drawing independently from the empirical distribution of the residuals and using the VAR estimates as a data generating model. At this point we use Chen and Conley's [6] Spatial VAR method to estimate the g function for each bootstrap sample. We plot in Figure 15-18, respectively, the results of the two test using …rst geographic and then traveling distance. As we can see, in both cases we can reject the null hypothesis that $g(d) = 0 \ 8 \ d > 0$, but we can't reject the null of g being a costant across all distances. This result is consistent with the conclusions we drew in the previous Section.

We then test the two following joint hypotheses:

1. H_0 : $C(d) = 0$ and $g(d) = 0 \ 8 \ d > 0$;

2. H_0 : $C(d) = 0$ and $g(d) = \pm \mathbf{6} \ 0 \ 8 \ d > 0$:

In words, the …rst null hypothesis is meant to test the complete spatial independence of our data; the second is meant to test whether there is an e¤ect of other departments in‡ation rates on the in‡ation rate of a given department, but there is independence in the VAR shocks.

The procedure adopted to test these hypotheses is similar to the one described above.[14] In Figure 19-26 we plot, respectively, the g and the C function with the 95% acceptance

[13] The procedures described here are inspired by the one in Section 3.3 of Chen and Conley [6].

[14] The main di¤erence is in the construction of the bootstrap samples. In order to have independent shocks, we sample independently from the empirical distribution of shocks for each series separately.

region of the null hypotheses, calculated using geographic and traveling distance. As we can see, we can reject the null of spatial independence. The g function, using both types of distance, is mainly outside the 95% acceptance region of the null; the C function, again for both types of distance, is de…nitely far from the 95% acceptance region. Regarding the second null we are testing, we can again reject the independence of the shocks (again, the C function is far away from the 95% acceptance region, for both types of distances), but we can't reject the hypothesis that the g function is a constant. Therefore also these test are consistent with the conclusion we reached in the previous Section.

5 Conclusions

During the Revolution France su¤ered a major hyperin‡ation, with the stock of money growing almost hundred times within …ve years. In an attempt to provide a basis for the translation of paper money obligations made during this period into metallic equivalents, all French departments estimated the local value of the Assignats. While in a fully integrated economy one may expect that the resulting price indices would be very close, if not identical, between each other, this was not the case in the Revolutionary France: price indices strike with their wild di¤erences both in levels and growth rates.

Even though some of these di¤erences are undoubtedly due to noise and to non uniformities in the construction of the series, we showed that the rest can be explained by the non homogeneous level of economic integration among the French departments of the late 17th century.

The evidence we found is supported by two facts. First, regions which were closer in terms of geographic or traveling distance had more similar and integrated economies[15]. Second, level of depreciation of the Assignats depended also on local economic conditions. (For

[15] We can support this fact by means of two observations. First, Jones's [12] data indicates that closer departments had more common industries than far ones. Second, traveling distance is in a sense endogenous to the level of economic integration, since departments with more interactions between each other had probably better communication ways, and in particular better roads.

example, authors like Harris [10] and Aftalion [1] claim, areas with worse economic conditions had higher depreciation of the paper money.)

Using the tools of spatial econometrics to estimate the nonlinear, distance dependent, VAR model

$$¦_{t+1} = A(D)¦_t + "_{t+1}; \qquad "_{t+1} ´ Q(D)Ã_{t+1} \tag{4}$$

we did not …nd evidence that the impact of past in‡ation in other departments on current in‡ation in a particular department depends on our measure of economic distance, although we found evidence of a signi…cant (even if maybe small) dynamic correlation. But we found strong evidence that the correlation of the shoks in the VAR model is a decreasing function of both geographic and traveling distance. A shock to the in‡ation in one department had higher impact on the in‡ation of close departments than on that of far ones. If these shocks are attributable to a change in the underlying economic conditions of the departments, we can conclude that the economic conditions in closer regions were far more important for the price evolution in a particular department than those in distant regions.

Therefore some of the di¤erences in the value of paper money across departments of the late 17th century France are attributable to the diverse economic conditions faced by the di¤erent departments, and to the absence of full economic intergration in the country.

References

[1] Aftalion F., The French Revolution, An Economic Interpretation, Cambridge University Press.

[2] P. Bairoch, J. Batou and P. Chevre, The Population of the European Cities 800-1850, Librarie Droz, Geneve 1988,Cambridge (translation).

[3] Bordo M. D.and E. N. White, “A Tale of Two Currencies: British and French Finance During the Napolenonic Wars”, Journal of Economic History, 1991.

[4] Brezis E. S. and F. H. Crouzet, "The Role of Assignats during The French Revolution: An Evil or A Rescuer?"

[5] Butel P., "Revolution and The Urban Economy: Maritime Cities and Continental Cities", in Reshaping The France, Ed's A. Forrest and P. Jones, Manchester University Press, New York, 1991.

[6] Chen X. and T. G. Conley, "A New Semiparametric Spatial Model for Panel Time Series", forthcoming Journal of Econometrics, 2000.

[7] Crouzet F., Britain Ascendant: Comparative Studies in Franco-British Economic History, Cambridge University Press, Cambridge, 1985.

[8] Crouzet F., Britain, France and International Commerce, VARIORUM, Aldershot, 1996.

[9] Le Go¤ T. F. A., "The Revolution and The Rural Economy", in Reshaping The France, Ed's A. Forrest and P. Jones, Manchester University Press, New York, 1991.

[10] Harris S. E., The Assignats, Harvard University Press, Cambridge, 1930.

[11] Fischer D. H. The Great Wave, Oxford University Press, Oxford, 1996.

[12] Jones C., The Longman Companion to The French Revolution, Longman 1990.

[13] Sargent T. J. and F. R. Velde, "Macroeconomic Features of the French Revolution", Journal of Political Economy, 1995.

[14] White E. N., "Was There A Solution to the Ancien Regime's Financial Dilemma", Journal of Economic History, 1989.

[15] White E. N., "The French Revolution and The Politics of Government Finance, 1770-1815", Journal of Economic History, 1995.

6 Appendix

Figure A. Different Statistics for the Local Value of Assignats

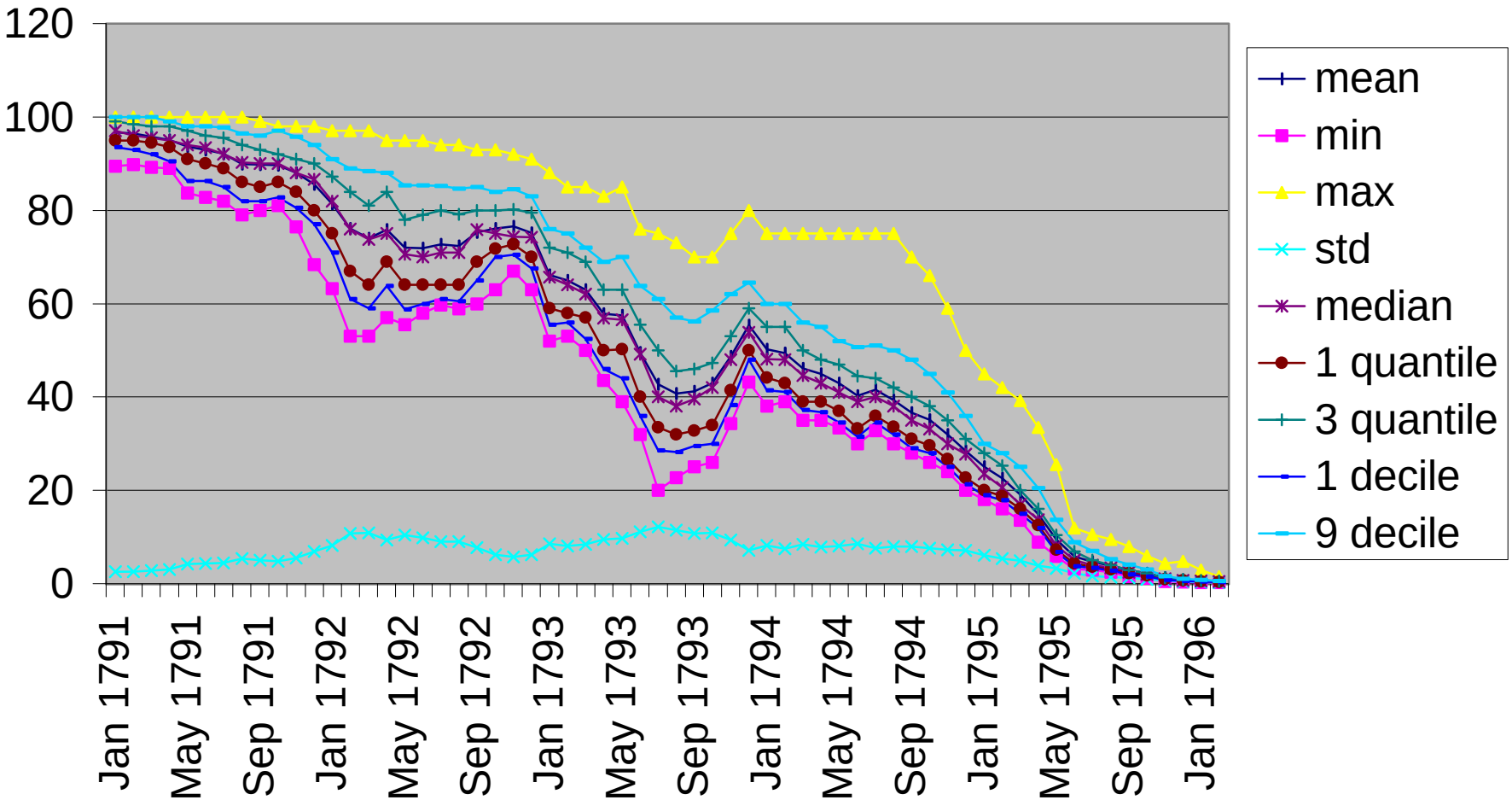


Figure B. Different Statistics for the Local Inflation

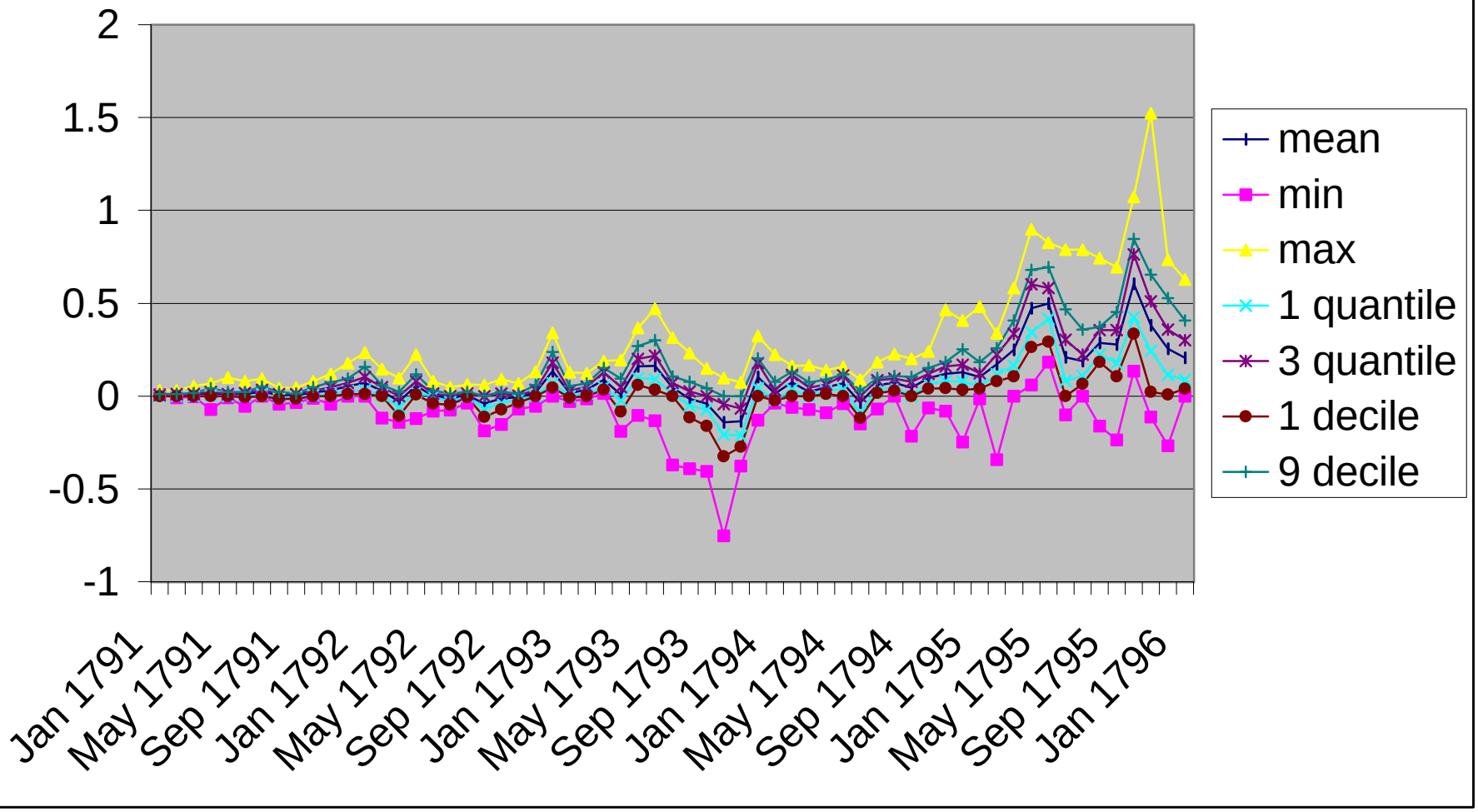


Figure C. Value of Assignats by Geographical Location

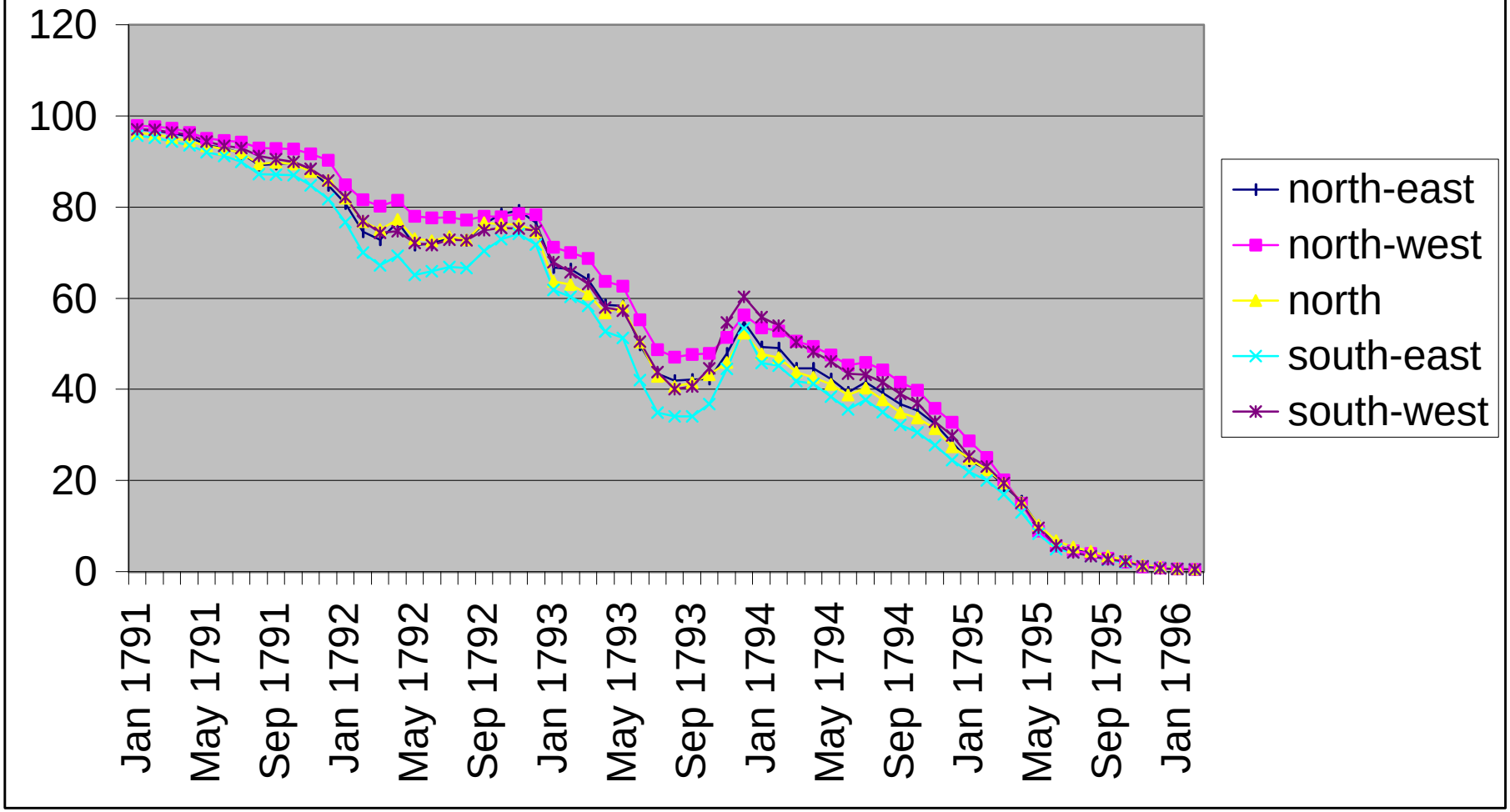
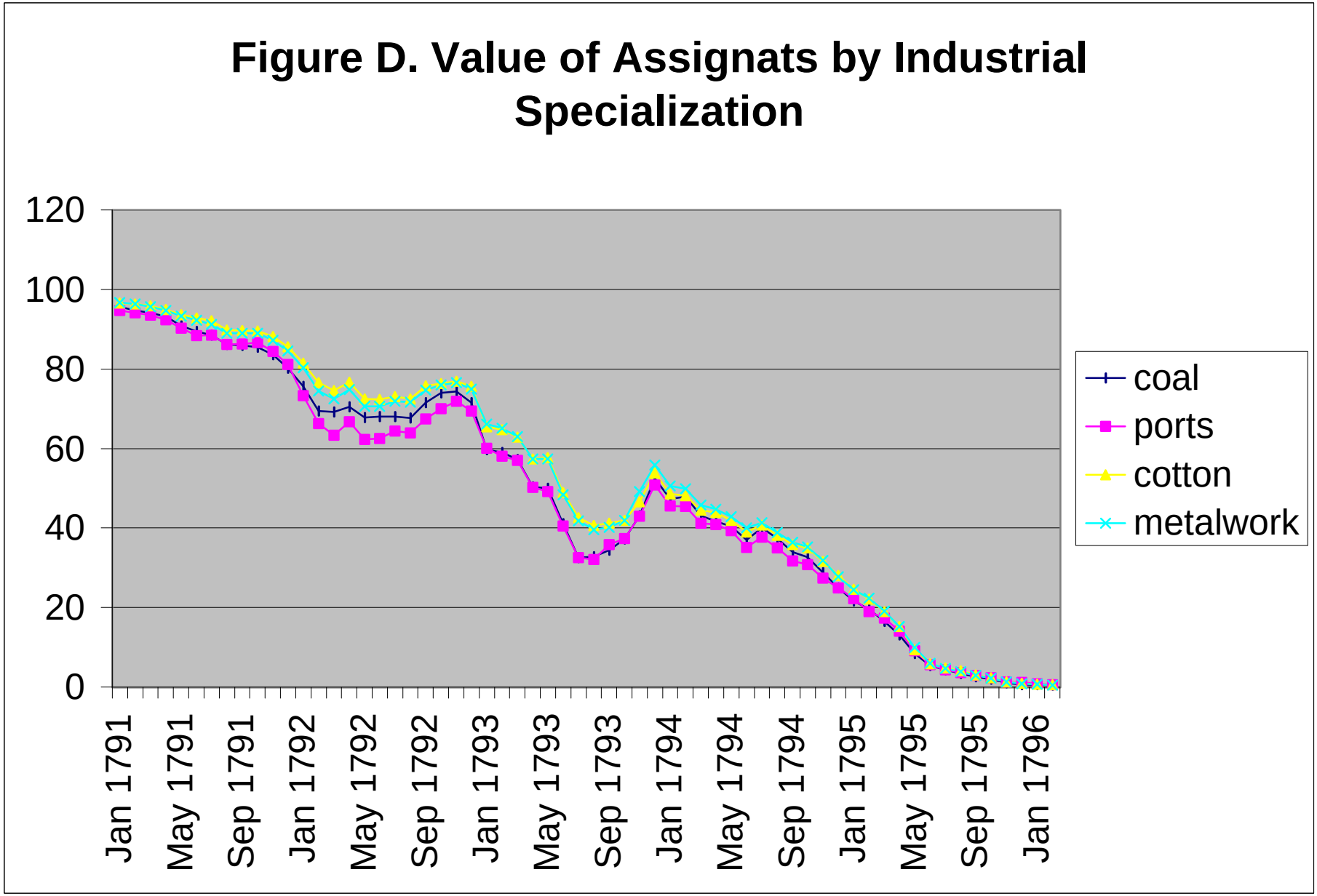


Figure D. Value of Assignats by Industrial Specialization



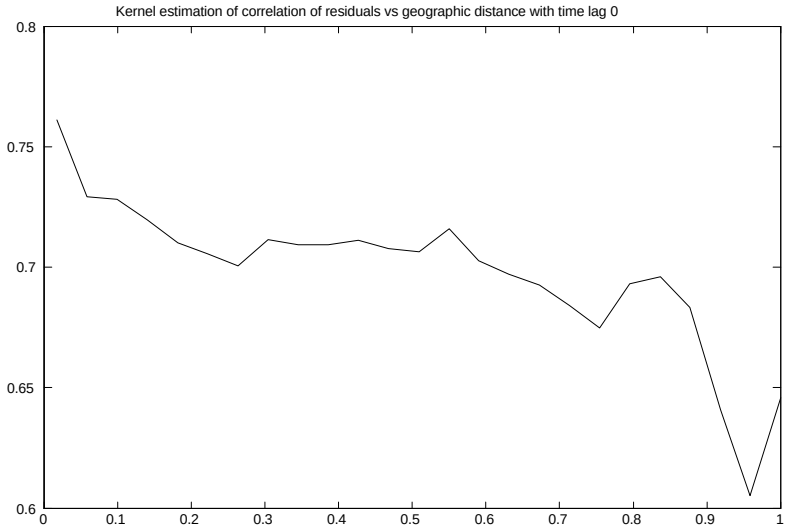


Figure 1:

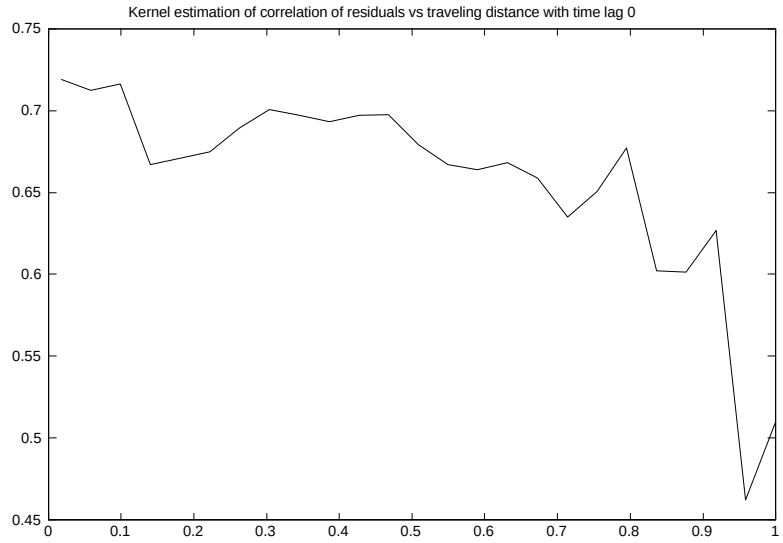


Figure 2:

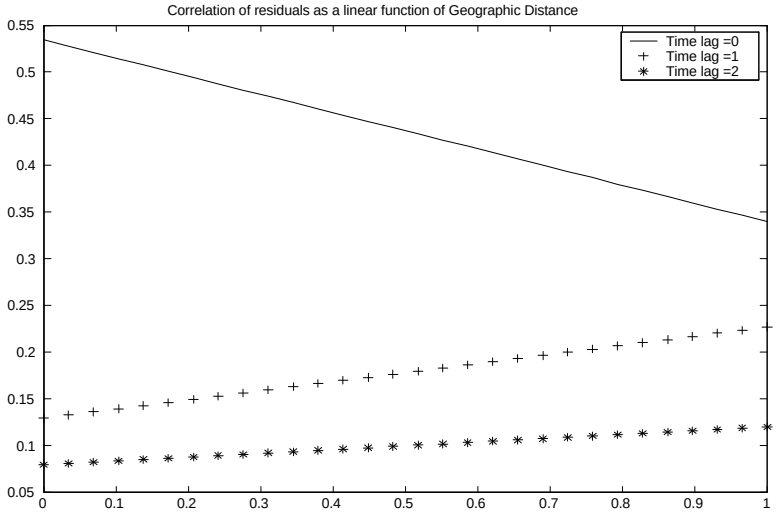


Figure 3:

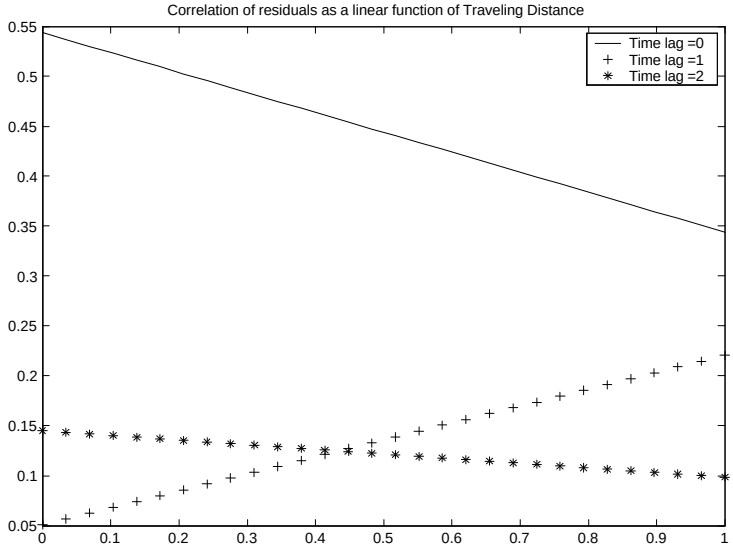


Figure 4:

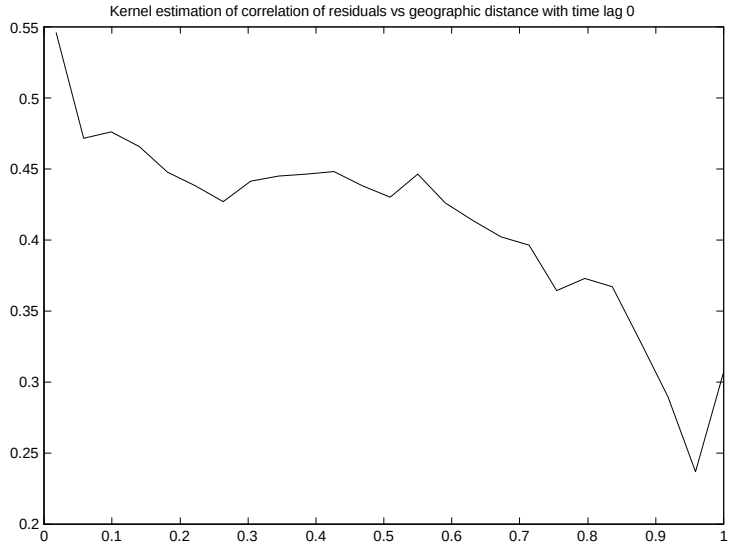


Figure 5:

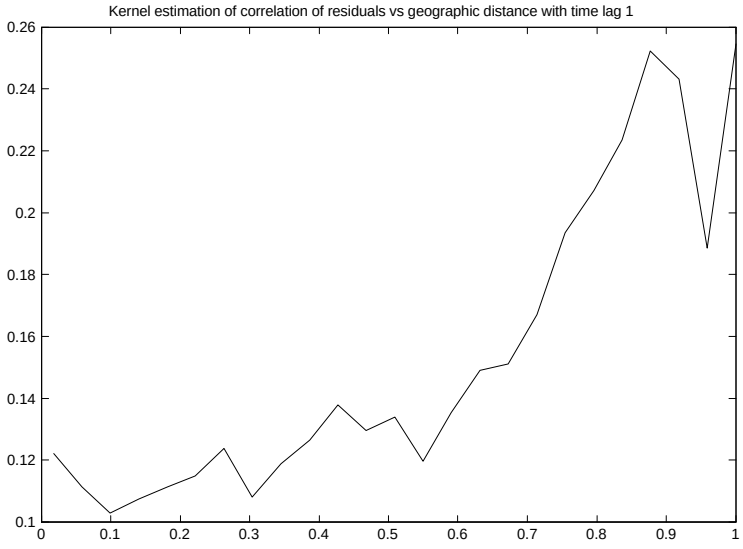


Figure 6:

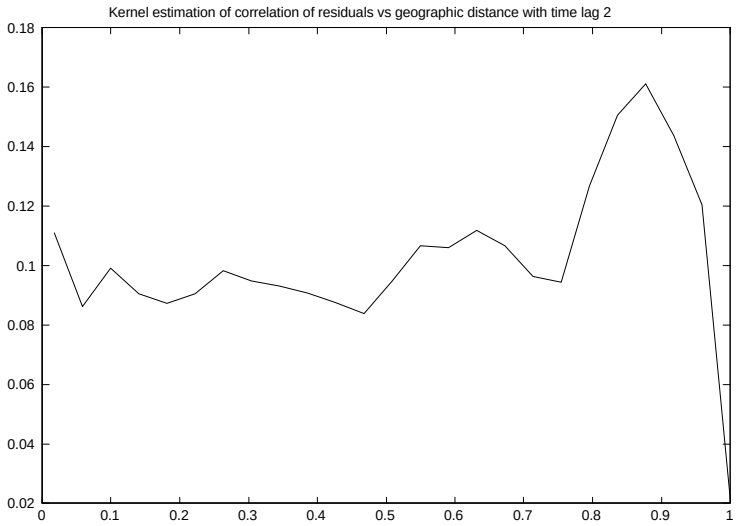


Figure 7:

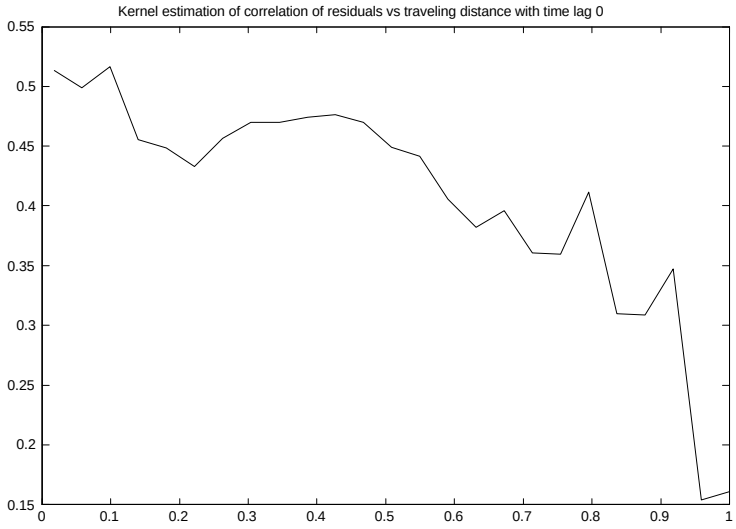


Figure 8:

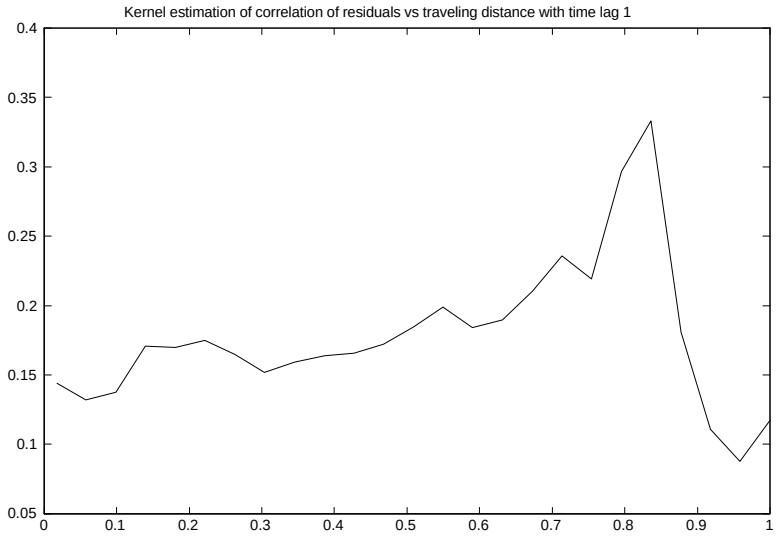


Figure 9:

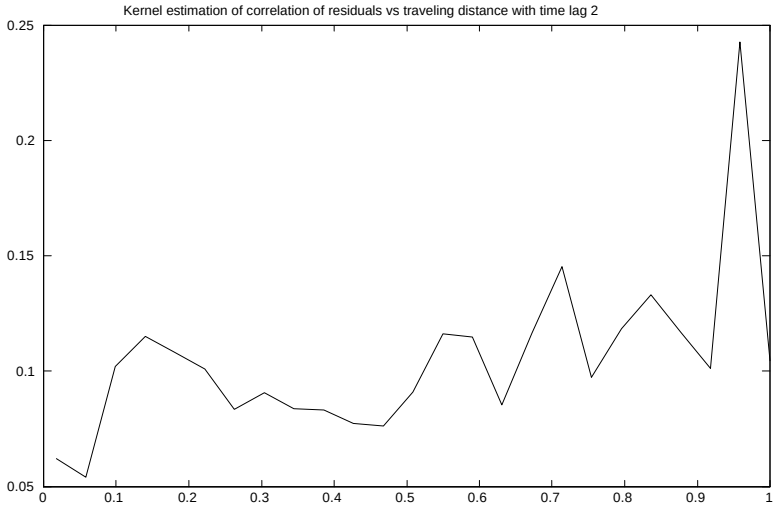


Figure 10:

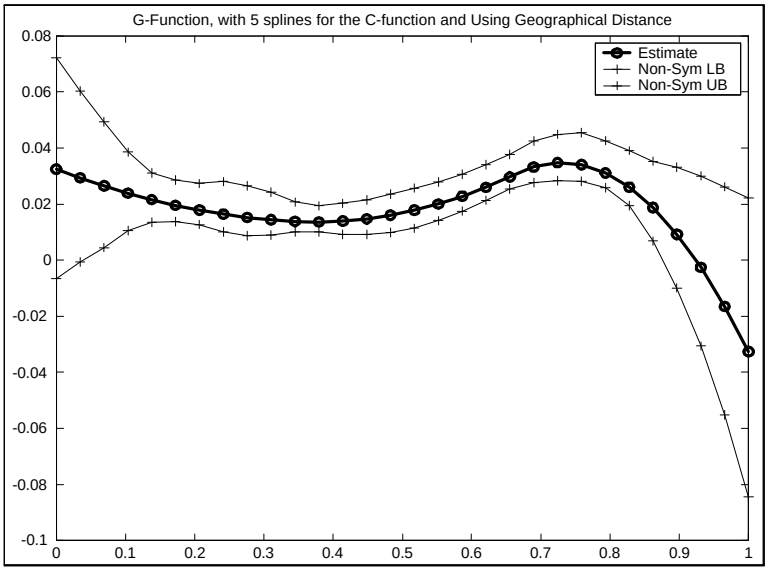


Figure 1: Figure 11

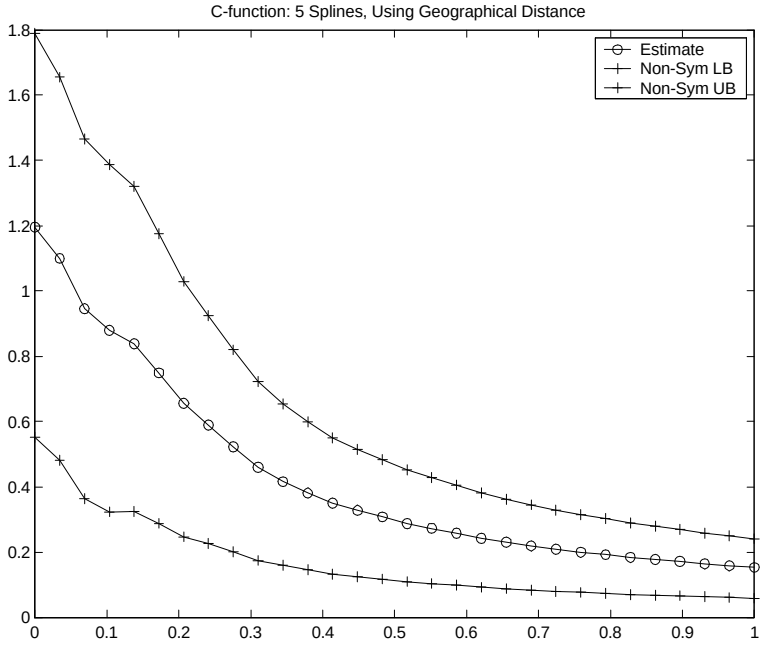


Figure 2: Figure 12

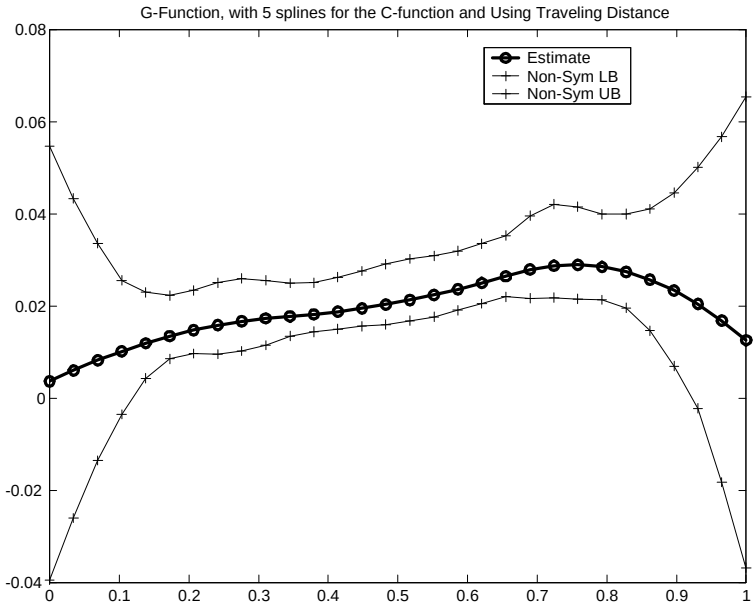


Figure 3: Figure 13

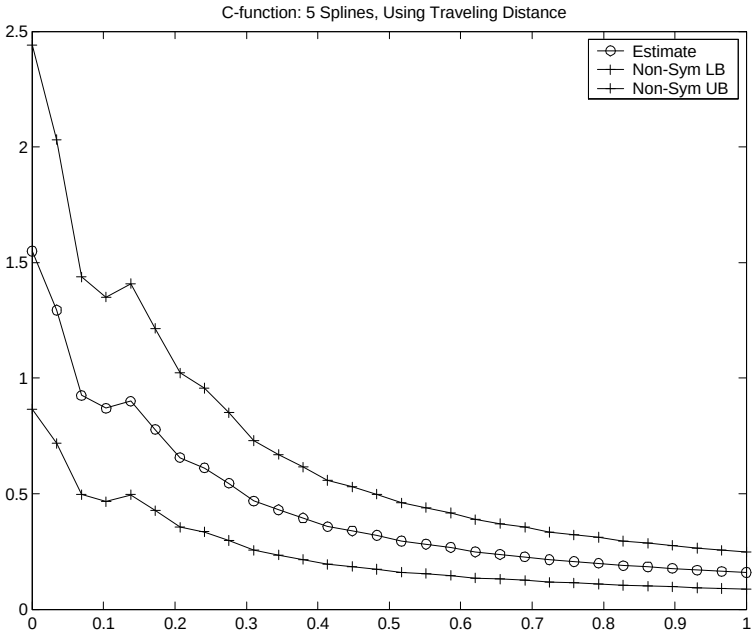


Figure 4: Figure 14

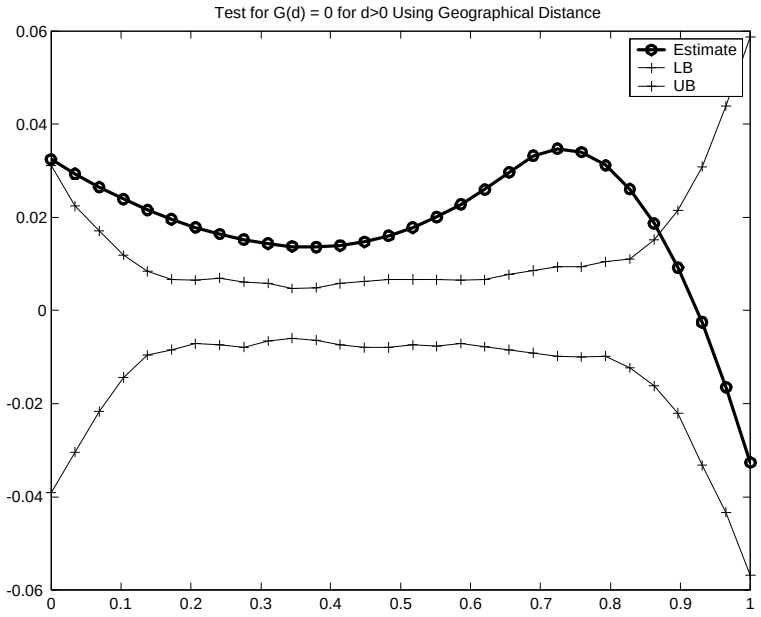


Figure 5: Figure 15

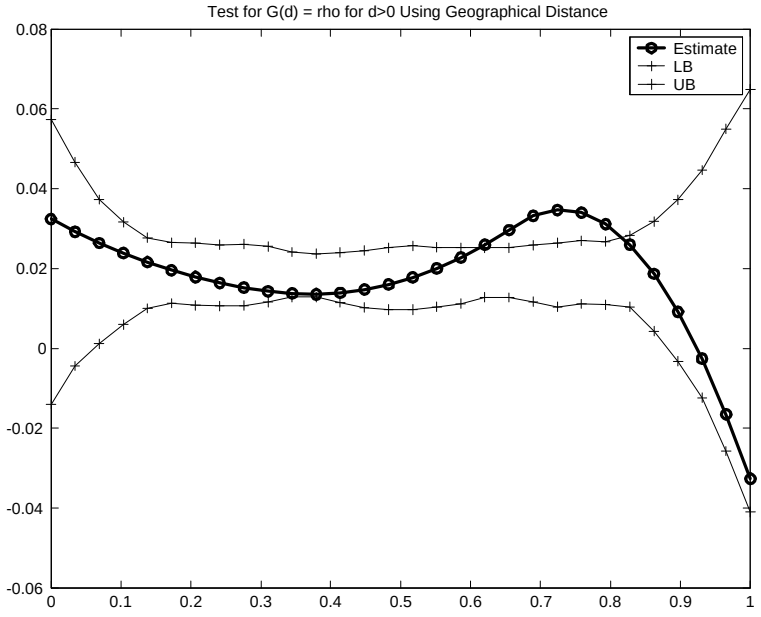


Figure 6: Figure 16

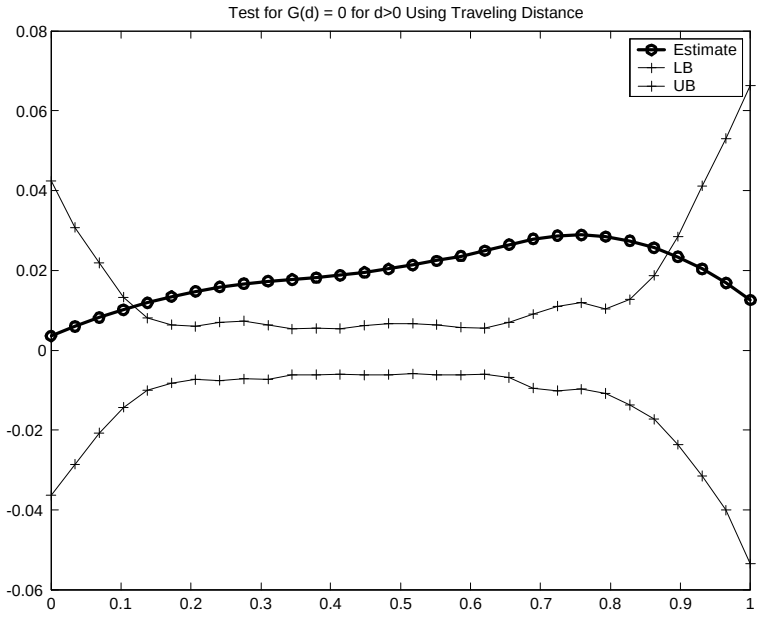


Figure 7: Figure 17

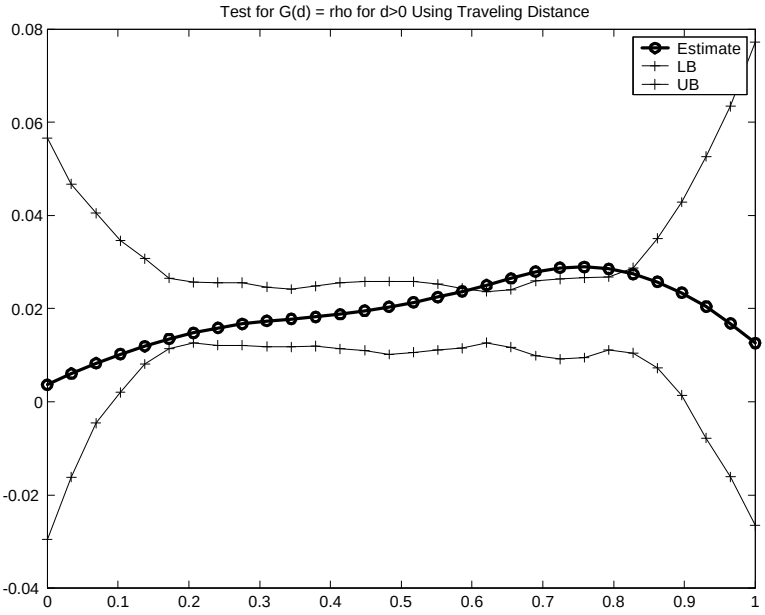


Figure 8: Figure 18

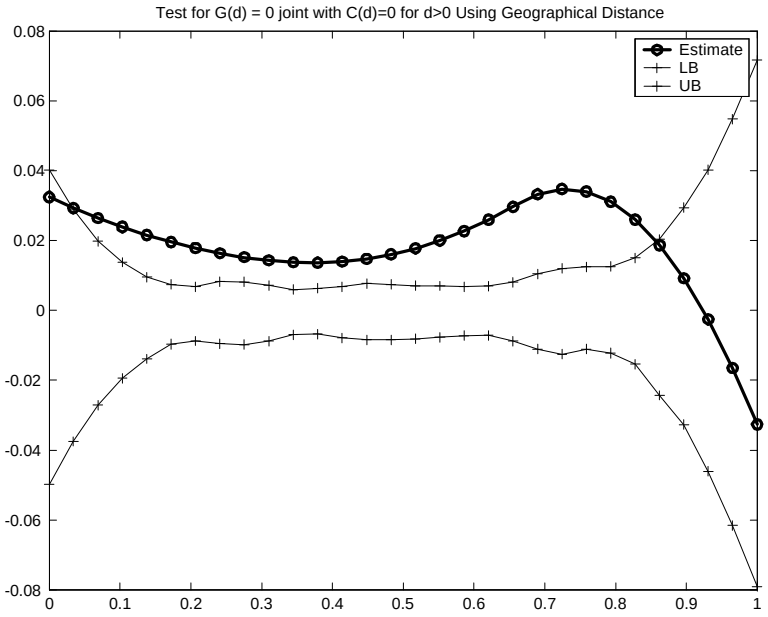


Figure 9: Figure 19

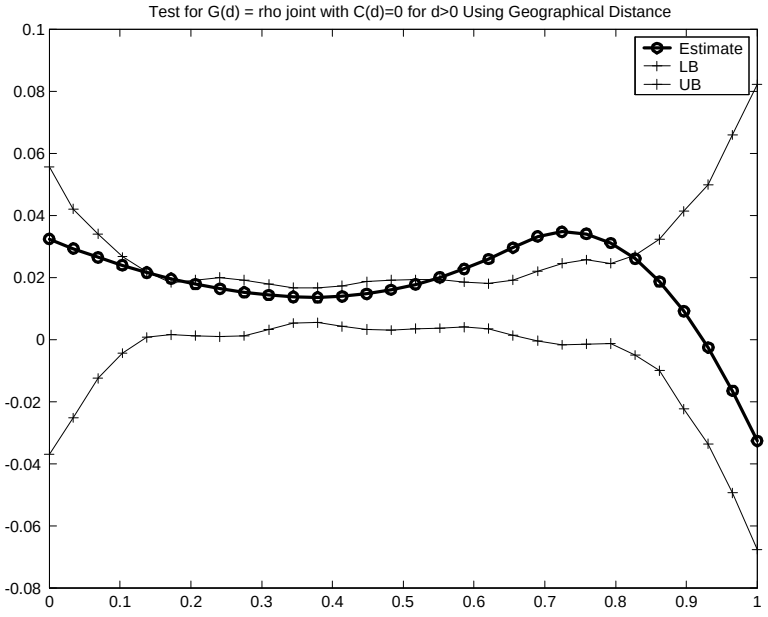


Figure 10: Figure 20

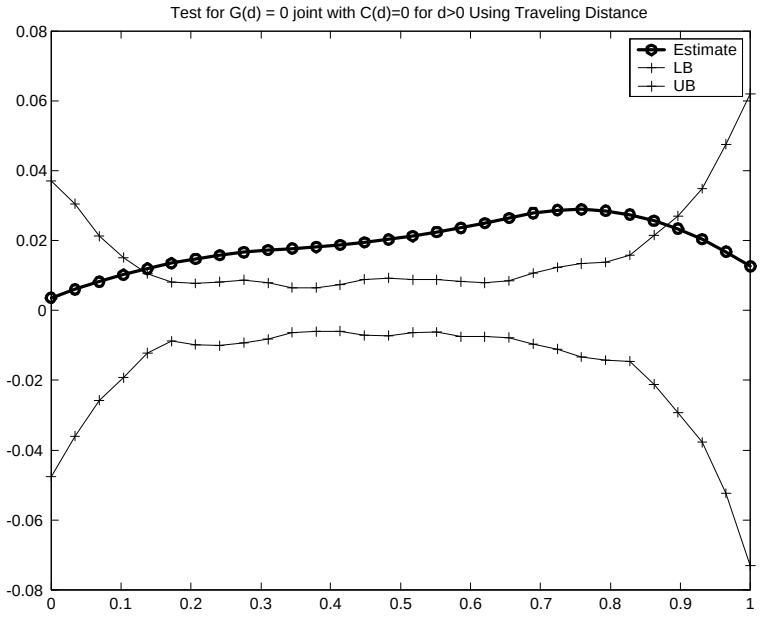


Figure 11: Figure 21

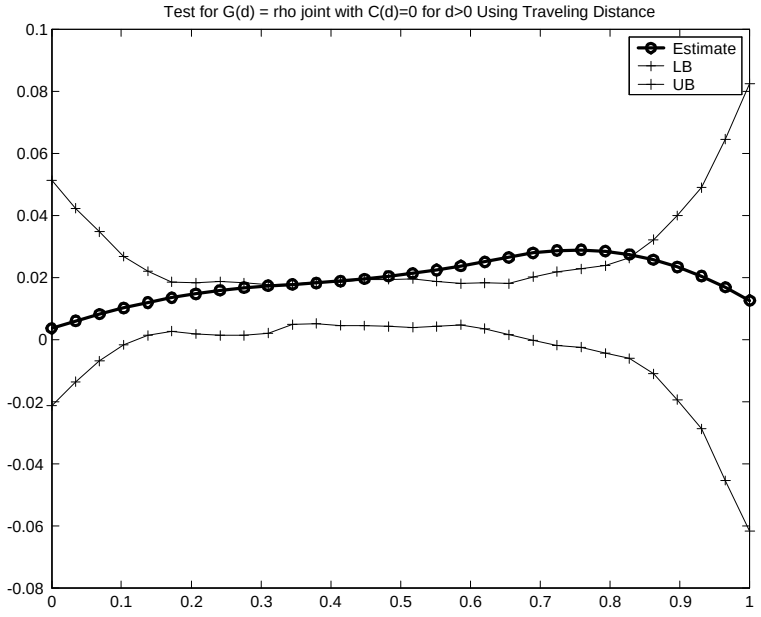


Figure 12: Figure 22

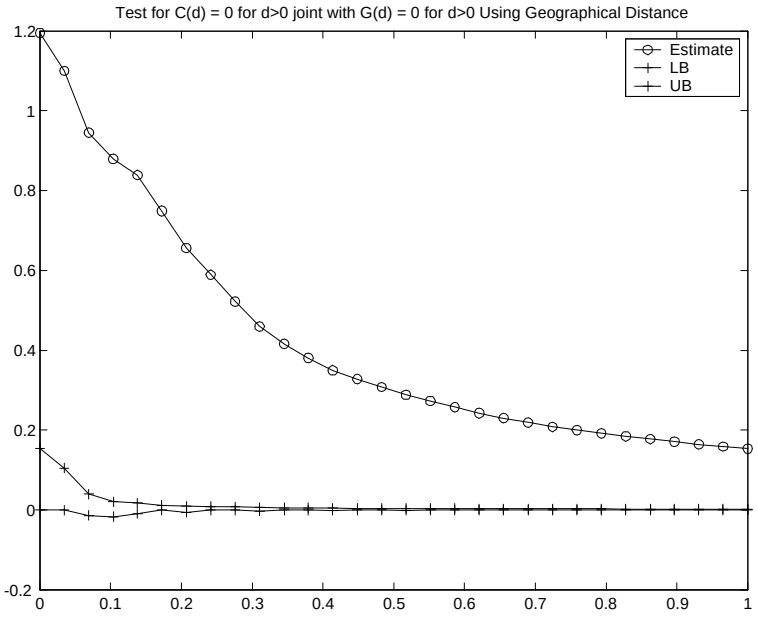


Figure 1: Figure 23

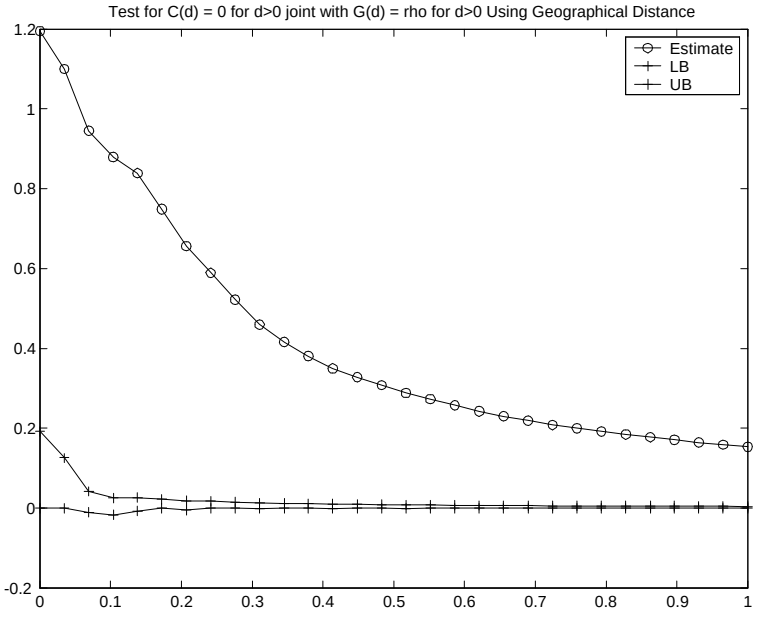


Figure 2: Figure 24

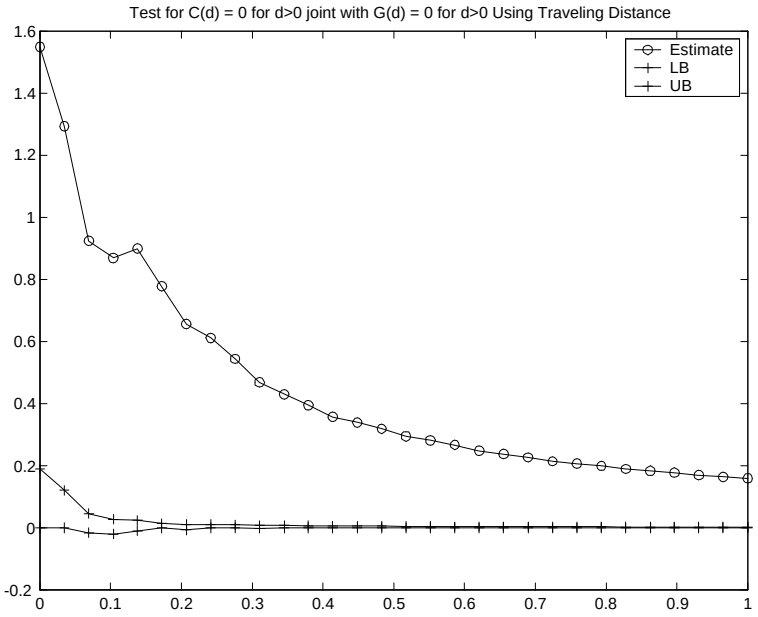


Figure 3: Figure 25

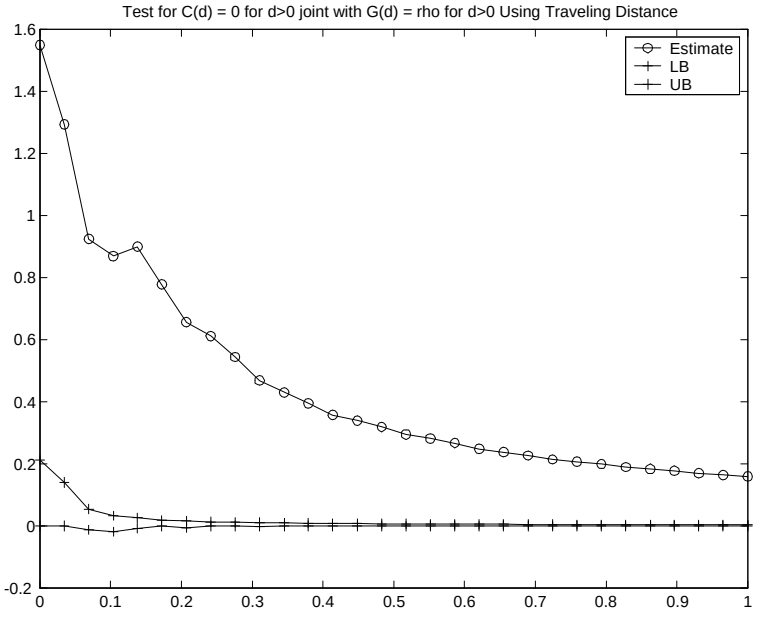


Figure 4: Figure 26

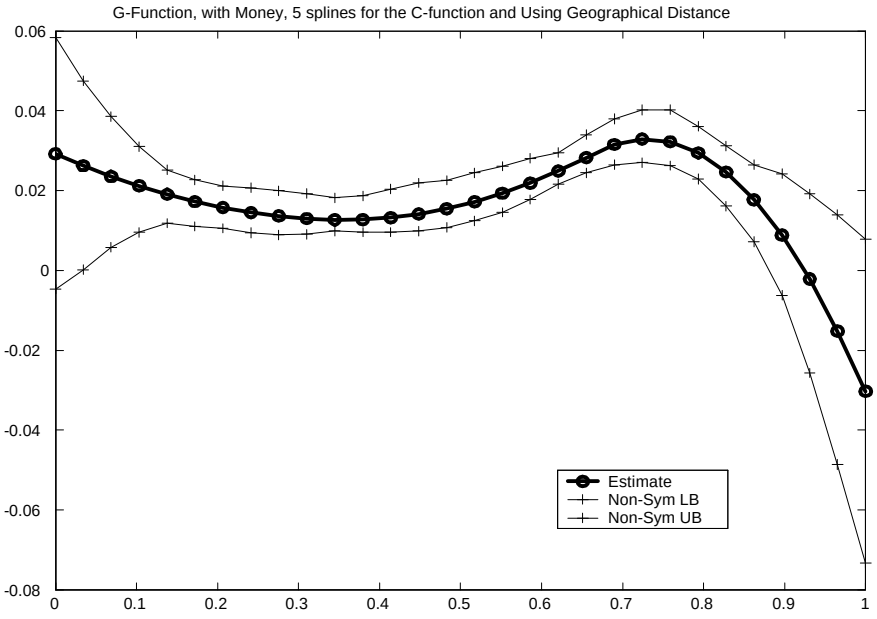


Figure 5: Figure 27

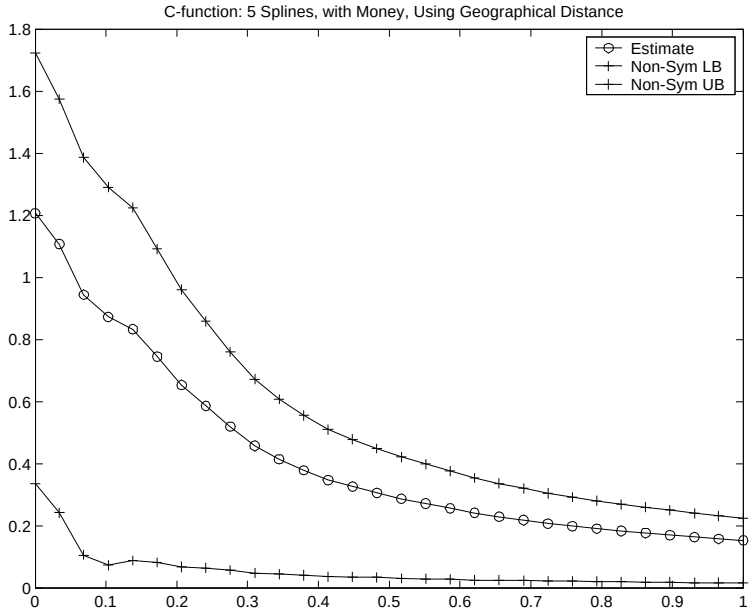


Figure 6: Figure 28

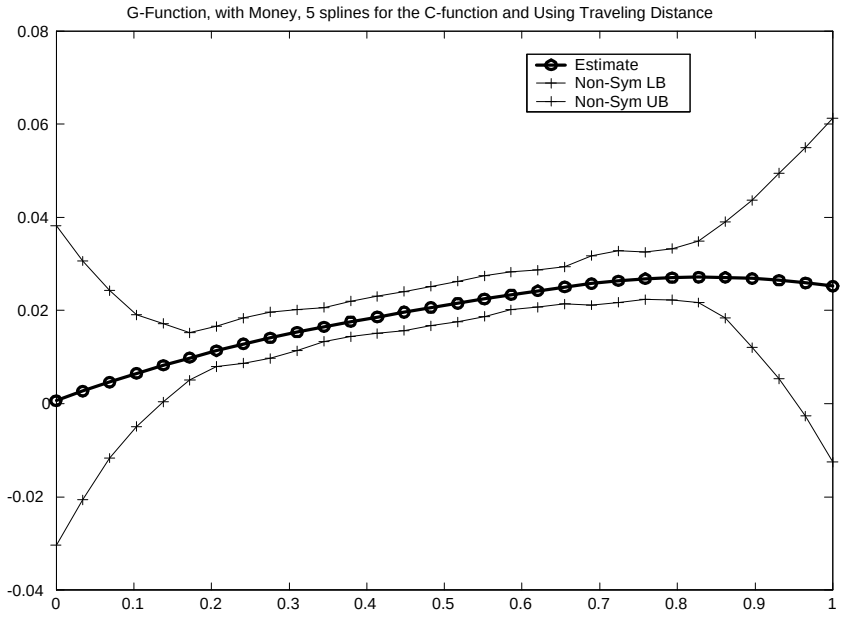


Figure 7: Figure 29

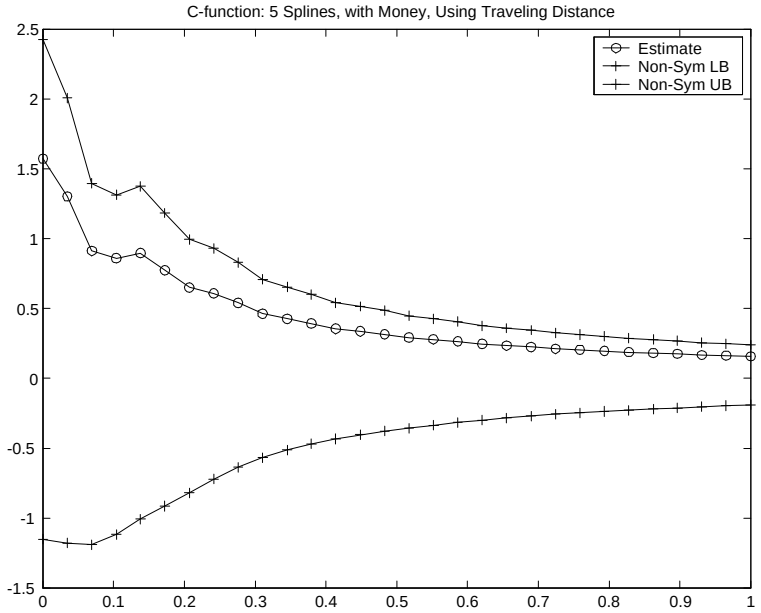


Figure 8: Figure 30

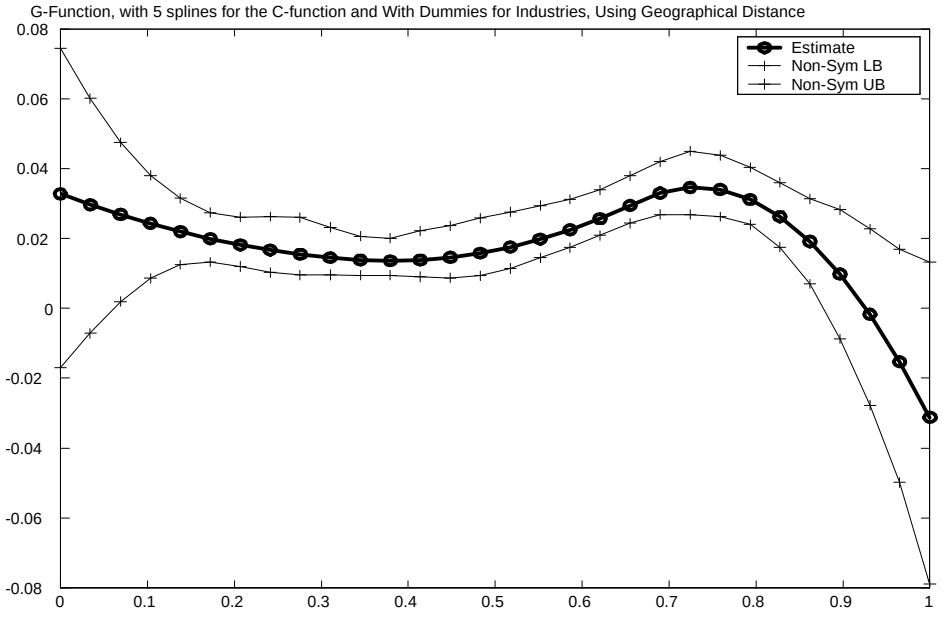


Figure 9: Figure 31

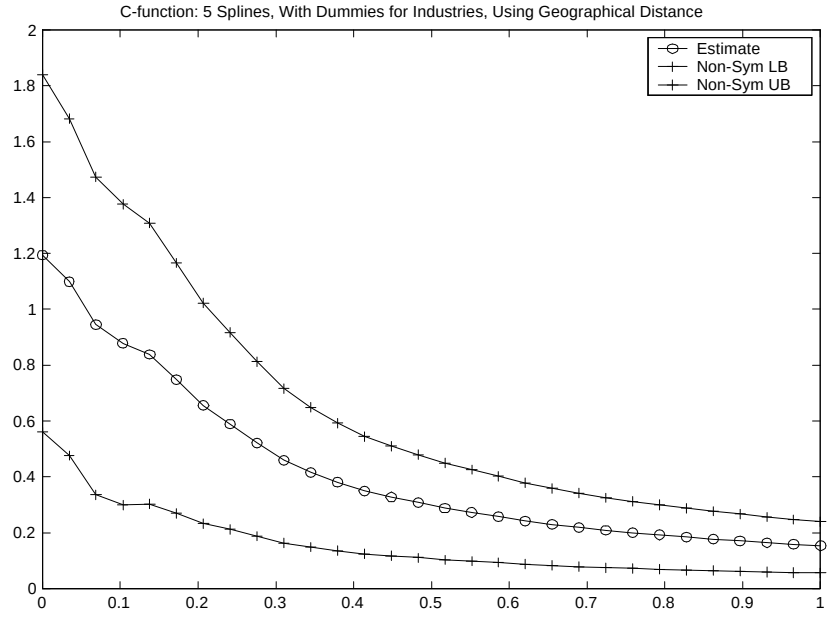


Figure 10: Figure 32

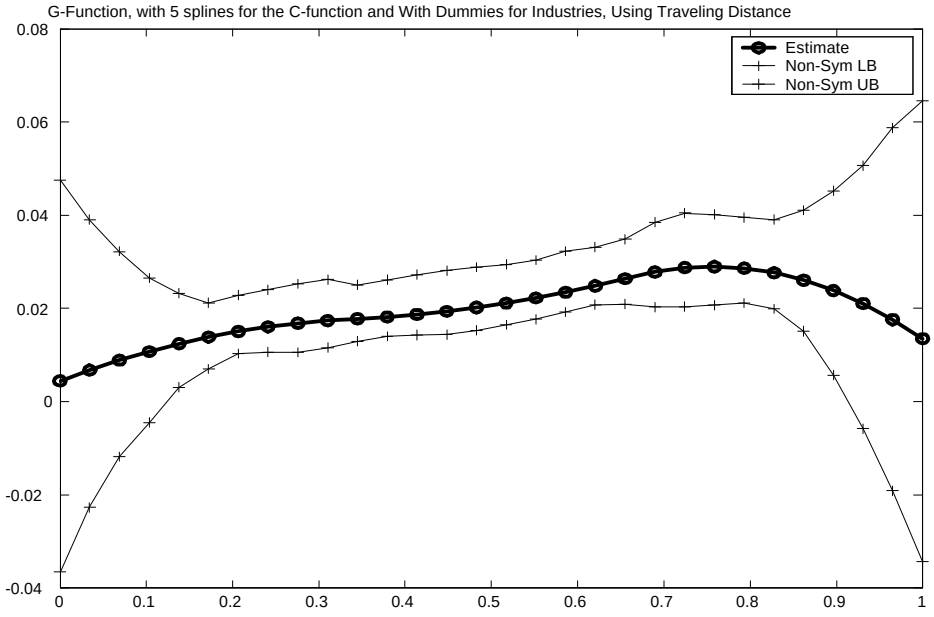


Figure 11: Figure 33

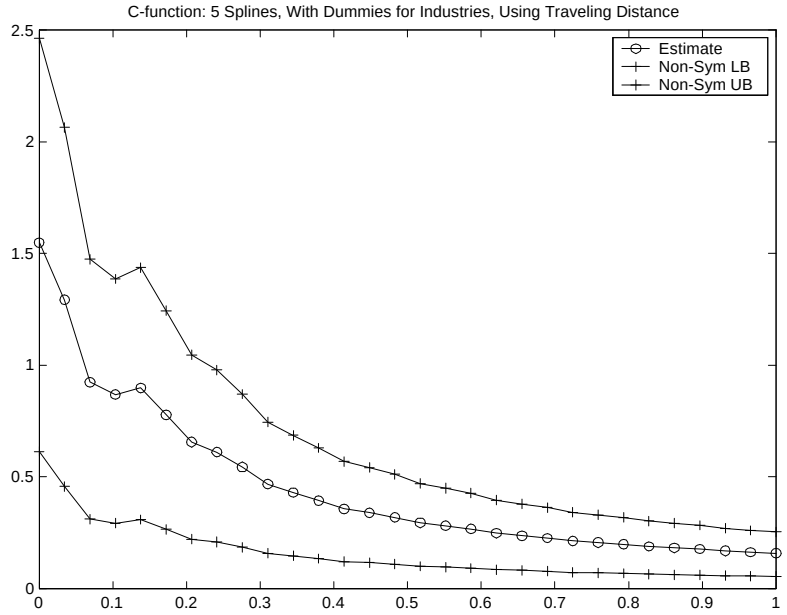


Figure 12: Figure 34

Table A (Harris)	Monthly Averages (in millions of livres)					Annual Expenditure	
	Taxes		Other Sources		% of taxes to		
Date	Nominal	Gold	Nominal	Gold	all revenue	Nominal	Stable
May-Dec 1789	33	33	36	36	48	656	656
Jan-Dec 1790	16	16	38	38	30	657	657
Jan-Dec 1791	19.5	17.5	103	93	16	1571	1451
Jan-Dec 1792	30.5	23	90.5	67.5	23	1450	1085
Jan-Dec 1793	28	15	266	35	9.5	3532	1801
Jan-Dec 1794	41	16.5	214	90.5	15	3180	1284
Jan-Dec 1795	118	6.5	1334	75.5	8	16380	981

Table B (Brezis-Crouzet)		The Issue of Assignat during the French Revolution (million of livres)				
Year	Month	Decreed	Issued	Burned	In Circulation	Smallest Denom.
1789	19-Dec	400				1000
1790	17-Apr					200
	29-Sep	800				
	8-Oct					50
	31-Dec		590		590	
1791	6-May					5
	5-Jun	600	1150	170	980	
	17-Dec	300				
	31-Dec		1730	370	1360	0.5
1792	27-Apr	300	2075	475	1600	
	31-May		2200		1650	
	31-Jul	300				
	24-Oct	400				
	31-Dec		2870	650	2220	
1793	1-Feb	800	3100	700	2400	
	7-May	1200				
	31-Aug		4800	950	3850	
	28-Sep	2000				
1794	19-Jun	1205	8236	2182	6054	
	22-Sep		8932	2358	6574	
1795	21-Mar		10787	2639	8148	
	23-Sep		20394	3123	17271	
1796	9-Feb		40279	5775	34504	

TABLE 1

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.929	allier	150.620	0.347	pyrenees_bas	546.925	0.754
aisne	0.977	doubs	315.438	0.319	pyrenees_or	765.626	0.719
allier	0.938	loire	115.365	0.438	seine_inf	359.892	0.796
alpes_bas	0.857	alpes_hau	53.221	0.362	seine_inf	712.718	0.687
alpes_hau	0.887	isere	76.100	0.373	seine_inf	662.524	0.718
ardeche	0.940	saone_hau	343.826	0.464	seine_inf	586.636	0.788
ardennes	0.934	cote_or	271.967	0.394	seine_inf	265.296	0.676
ariege	0.895	garonne_hau	74.889	0.392	seine_inf	721.680	0.644
aube	0.837	gard	496.913	0.278	seine_inf	253.604	0.620
aude	0.913	rhin_bas	728.536	0.374	pyrenees_or	72.888	0.719
aveyron	0.875	ariege	174.618	0.410	seine_inf	576.273	0.672
bouches_rhone	0.939	var	58.395	0.414	pyrenees_or	226.528	0.775
calvados	0.960	orne	91.405	0.406	seine_inf	109.045	0.760
cantal	0.912	loir_cher	308.302	0.472	seine_inf	510.618	0.779
charente	0.957	sevres_deux	86.338	0.322	pyrenees_or	395.760	0.739
charente_inf	0.916	allier	320.191	0.414	lozere	351.376	0.761
cher	0.940	nievre	58.998	0.420	seine_inf	278.556	0.758
correze	0.963	vienne_hau	74.494	0.415	seine_inf	465.734	0.793
cote_or	0.934	ardennes	271.967	0.300	seine_inf	374.256	0.669
cotes_nord	0.893	meuse	583.838	0.489	finistere	115.552	0.726
creuse	0.938	vienne	126.644	0.417	seine_inf	367.548	0.766
dordogne	0.909	lot_garonne	111.408	0.418	seine_inf	471.387	0.717
doubs	0.977	aisne	315.438	0.314	pyrenees_or	561.048	0.741
drome	0.861	nord	619.634	0.382	pyrenees_or	295.719	0.725
eure	0.939	lot_garonne	540.782	0.449	seine_inf	43.246	0.809
eure_loir	0.879	loir_cher	95.326	0.350	seine_inf	113.532	0.679
finistere	0.741	vendee	302.239	0.035	pyrenees_or	804.247	0.541
gard	0.892	rhone	218.591	0.310	finistere	801.892	0.674
garonne_hau	0.895	ariege	74.889	0.400	seine_inf	647.158	0.706
gers	0.859	vienne_hau	245.847	0.422	lozere	251.215	0.716
gironde	0.932	lot_garonne	118.555	0.384	lozere	324.092	0.764
herault	0.855	orne	610.787	0.396	seine_inf	682.981	0.723
ille_vilaine	0.822	cantal	472.006	0.274	seine_inf	250.696	0.613
indre	0.910	vienne_hau	114.324	0.499	pyrenees_or	467.525	0.774
indre_loire	0.926	orne	123.838	0.477	seine_inf	229.715	0.800
isere	0.908	meurthe	392.674	0.336	seine_inf	587.995	0.696
jura	0.940	ardeche	229.006	0.412	seine_inf	451.913	0.745
landes	0.870	rhin_hau	764.913	0.351	seine_inf	626.886	0.703
loir_cher	0.946	orne	130.192	0.503	vaucluse	488.565	0.763
loire	0.948	loire_hau	80.311	0.423	lozere	144.796	0.791
loire_hau	0.948	loire	80.311	0.373	finistere	694.307	0.791
loire_inf	0.915	loire_hau	486.969	0.280	lozere	495.575	0.719
loiret	0.920	manche	280.911	0.491	pyrenees_or	583.200	0.740
lot	0.925	meurthe	644.959	0.393	pyrenees_or	279.902	0.766
lot_garonne	0.939	eure	540.782	0.450	seine_inf	582.781	0.822
lozere	0.734	meuse	487.916	0.280	loire_inf	495.575	0.524
maine_loire	0.923	marne_hau	430.211	0.318	pyrenees_bas	465.112	0.716
manche	0.920	loiret	280.911	0.437	seine_inf	191.684	0.751
marne	0.883	cote_or	188.620	0.424	lozere	497.629	0.687
marne_hau	0.923	maine_loire	430.211	0.453	pyrenees_bas	685.234	0.772
mayenne	0.901	ain	497.955	0.351	pyrenees_or	661.550	0.739

meurthe	0.958	saone_hau	118.668	0.416	seine_inf	382.607	0.779
meuse	0.926	vosges	117.011	0.529	seine_inf	307.148	0.780
morbihan	0.937	doubs	662.539	0.261	pyrenees_or	707.477	0.686
moselle	0.934	meurthe	46.390	0.494	pyrenees_or	757.184	0.791
nievre	0.940	cher	58.998	0.439	seine_inf	311.090	0.805
nord	0.925	meurthe	292.178	0.434	pyrenees_or	852.727	0.770
oise	0.935	orne	185.067	0.504	pyrenees_or	751.074	0.803
orne	0.960	calvados	91.405	0.471	seine_inf	134.695	0.804
pas_de_calais	0.912	puy_de_dome	500.914	0.320	pyrenees_or	843.029	0.711
puy_de_dome	0.948	charente	227.376	0.314	vaucluse	246.315	0.737
pyrenees_bas	0.801	landes	67.526	0.318	maine_loire	465.112	0.546
pyrenees_hau	0.913	yonne	576.374	0.450	seine_inf	693.448	0.774
pyrenees_or	0.738	vaucluse	206.217	0.035	finistere	804.247	0.488
rhin_bas	0.919	rhin_hau	63.014	0.386	lozere	555.584	0.749
rhin_hau	0.919	rhin_bas	63.014	0.367	seine_inf	484.428	0.768
rhone	0.892	gard	218.591	0.252	finistere	724.092	0.655
saone_hau	0.958	meurthe	118.668	0.320	seine_inf	424.236	0.785
saone_loire	0.936	lot_garonne	403.864	0.471	seine_inf	447.194	0.792
sarthe	0.905	vienne	157.825	0.461	seine_inf	172.129	0.789
seine	0.908	ardeche	491.279	0.416	pyrenees_or	687.186	0.770
seine_inf	0.615	bouches_rhone	737.912	0.144	pyrenees_or	761.444	0.437
seine_marne	0.857	calvados	234.033	0.327	seine_inf	153.145	0.637
seine_oise	0.868	eure	74.963	0.335	lozere	485.676	0.723
sevres_deux	0.957	charente	86.338	0.310	vaucluse	490.534	0.716
somme	0.918	charente	496.686	0.376	aube	220.489	0.719
tarn	0.905	sarthe	513.910	0.377	seine_inf	654.394	0.766
var	0.939	bouches_rhone	58.395	0.338	pyrenees_or	250.676	0.723
vaucluse	0.833	gard	37.832	0.303	seine_inf	674.078	0.582
vendee	0.798	bouches_rhone	591.828	0.214	pyrenees_or	511.574	0.606
vienne	0.938	creuse	126.644	0.374	seine_inf	321.795	0.766
vienne_hau	0.963	correze	74.494	0.472	seine_inf	400.455	0.804
vosges	0.926	meuse	117.011	0.432	seine_inf	419.593	0.755
yonne	0.921	orne	269.467	0.481	pyrenees_or	569.321	0.788
Tot:	**0.977**	**doubs-aisne**	**315.438**	**0.035**	**pyren_or-finist.**	**804.247**	**0.724**

TABLE 2

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.714	indre	279.722	0.241	ille_vilaine	562.957	0.501
aisne	0.590	indre	338.164	0.104	ille_vilaine	420.833	0.420
allier	0.730	indre	129.158	0.264	pyrenees_or	431.423	0.526
alpes_bas	0.809	tarn	326.091	0.289	seine_inf	712.718	0.638
alpes_hau	0.698	cher	402.371	0.239	seine_inf	662.524	0.508
ardeche	0.696	mayenne	553.684	0.243	pyrenees_or	264.192	0.522
ardennes	0.855	somme	174.473	0.336	alpes_hau	589.475	0.653
ariege	0.892	sarthe	571.563	0.377	seine_inf	721.680	0.733
aube	0.773	loir_cher	219.653	0.301	pyrenees_or	629.205	0.560
aude	0.780	ariege	69.118	0.275	aisne	712.856	0.544
aveyron	0.893	vienne_hau	194.730	0.323	seine_inf	576.273	0.724
bouches_rhone	0.817	ariege	320.318	0.284	pyrenees_or	226.528	0.624
calvados	0.844	vosges	515.528	0.330	pyrenees_or	763.653	0.671
cantal	0.780	ariege	230.687	0.273	ille_vilaine	472.006	0.565
charente	0.836	ardennes	569.295	0.139	ille_vilaine	304.130	0.505
charente_inf	0.833	aveyron	295.285	0.238	ille_vilaine	274.626	0.515
cher	0.891	aveyron	304.131	0.200	pyrenees_or	488.819	0.587
correze	0.889	aveyron	120.238	0.219	pyrenees_or	299.667	0.573
cote_or	0.893	nievre	147.516	0.313	aube	128.893	0.671
cotes_nord	0.851	finistere	115.552	0.233	pyrenees_or	781.970	0.645
creuse	0.882	aveyron	209.596	0.225	pyrenees_or	394.253	0.570
dordogne	0.788	indre	194.206	0.291	ille_vilaine	371.019	0.579
doubs	0.774	cote_or	76.465	0.117	ille_vilaine	586.043	0.467
drome	0.784	ariege	345.585	0.321	seine_inf	577.722	0.592
eure	0.822	indre	251.079	0.385	seine_inf	43.246	0.638
eure_loir	0.759	vendee	280.213	0.333	aisne	198.732	0.557
finistere	0.851	cotes_nord	115.552	0.081	seine_inf	413.269	0.546
gard	0.753	loiret	490.343	0.140	pyrenees_or	172.363	0.569
garonne_hau	0.884	sarthe	496.735	0.379	aisne	682.190	0.681
gers	0.901	marne_hau	606.474	0.322	pyrenees_or	215.800	0.656
gironde	0.780	ariege	271.332	0.237	ille_vilaine	372.821	0.535
herault	0.823	garonne_hau	196.449	0.112	seine_inf	682.981	0.625
ille_vilaine	0.690	cote_or	509.748	0.041	seine_oise	291.667	0.389
indre	0.869	garonne_hau	356.107	0.231	pyrenees_or	467.525	0.678
indre_loire	0.851	cote_or	327.369	0.332	pyrenees_or	548.510	0.633
isere	0.760	ariege	413.738	0.203	pyrenees_or	356.717	0.462
jura	0.799	ariege	520.006	0.179	pyrenees_or	489.886	0.562
landes	0.846	sarthe	458.931	0.284	seine_inf	626.886	0.622
loir_cher	0.859	cote_or	280.490	0.352	aisne	276.336	0.605
loire	0.829	aveyron	201.320	0.237	ille_vilaine	519.513	0.541
loire_hau	0.870	aveyron	130.133	0.206	pyrenees_or	272.801	0.567
loire_inf	0.834	aveyron	454.667	0.119	pyrenees_or	615.317	0.522
loiret	0.853	cote_or	243.812	0.225	seine_inf	180.806	0.616
lot	0.811	ariege	192.639	0.249	ille_vilaine	434.709	0.525
lot_garonne	0.877	aveyron	155.267	0.391	aisne	638.688	0.626
lozere	0.729	seine_marne	449.207	0.243	seine_inf	574.845	0.578
maine_loire	0.856	gers	432.941	0.196	seine_inf	247.606	0.607
manche	0.878	vosges	594.090	0.277	seine_inf	191.684	0.646
marne	0.836	yonne	142.471	0.283	ille_vilaine	455.862	0.571
marne_hau	0.901	gers	606.474	0.335	seine_inf	331.663	0.654
mayenne	0.877	gers	500.139	0.268	seine_inf	202.863	0.641

meurthe	0.816	ariege	732.572	0.223	ille_vilaine	586.066	0.511
meuse	0.910	vosges	117.011	0.401	pyrenees_or	697.261	0.686
morbihan	0.722	gard	696.376	0.123	seine_inf	343.211	0.470
moselle	0.831	ariege	772.101	0.294	seine_inf	372.709	0.587
nievre	0.893	cote_or	147.516	0.341	seine_inf	311.090	0.647
nord	0.806	ariege	832.740	0.247	pyrenees_or	852.727	0.526
oise	0.860	vosges	351.274	0.349	pyrenees_or	751.074	0.658
orne	0.868	vosges	474.333	0.357	seine_inf	134.695	0.659
pas_de_calais	0.777	cote_or	367.832	0.180	seine_oise	171.227	0.487
puy_de_dome	0.802	cote_or	228.121	0.141	ille_vilaine	443.875	0.488
pyrenees_bas	0.752	pyrenees_hau	37.281	0.252	loire_inf	447.425	0.472
pyrenees_hau	0.865	garonne_hau	118.593	0.323	seine_inf	693.448	0.635
pyrenees_or	0.703	vendee	511.574	0.119	loire_inf	615.317	0.390
rhin_bas	0.825	garonne_hau	735.713	0.337	pas_de_calais	407.789	0.562
rhin_hau	0.787	vienne_hau	527.173	0.340	loire_inf	677.267	0.574
rhone	0.695	vendee	442.228	0.265	pas_de_calais	524.914	0.465
saone_hau	0.854	aveyron	458.409	0.303	seine_oise	325.408	0.563
saone_loire	0.844	aveyron	280.219	0.297	pas_de_calais	468.666	0.569
sarthe	0.892	ariege	571.563	0.377	seine_inf	172.129	0.661
seine	0.773	rhin_hau	381.008	0.324	ille_vilaine	307.821	0.573
seine_inf	0.586	vosges	419.593	0.081	finistere	413.269	0.353
seine_marne	0.833	vienne_hau	318.791	0.364	pyrenees_or	648.589	0.619
seine_oise	0.741	seine_marne	49.242	0.041	ille_vilaine	291.667	0.444
sevres_deux	0.861	cote_or	433.277	0.226	aisne	472.231	0.537
somme	0.891	cote_or	349.347	0.328	aisne	101.787	0.579
tarn	0.845	garonne_hau	63.268	0.389	pyrenees_or	113.744	0.635
var	0.823	calvados	830.220	0.406	isere	230.154	0.653
vaucluse	0.772	yonne	440.029	0.274	pyrenees_or	206.217	0.553
vendee	0.840	calvados	303.421	0.281	seine_inf	358.231	0.636
vienne	0.889	aveyron	303.503	0.330	ille_vilaine	226.428	0.648
vienne_hau	0.893	aveyron	194.730	0.431	ille_vilaine	335.776	0.661
vosges	0.910	meuse	117.011	0.496	ille_vilaine	605.185	0.716
yonne	0.885	cote_or	120.837	0.408	seine_inf	258.734	0.669
Tot:	**0.910**	**vosges-meuse**	**117.011**	**0.041**	**seine_o.-ille_vil.**	**291.667**	**0.579**

TABLE 3

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.647	finistere	734.526	0.051	pyrenees_or	430.386	0.377
aisne	0.512	nievre	287.866	0.038	seine_inf	184.146	0.366
allier	0.669	finistere	584.109	0.074	seine_inf	359.892	0.387
alpes_bas	0.661	finistere	909.580	0.196	aisne	641.672	0.447
alpes_hau	0.571	finistere	872.648	0.129	pyrenees_or	328.983	0.347
ardeche	0.660	finistere	760.964	0.119	seine_inf	586.636	0.405
ardennes	0.756	herault	688.833	0.150	aisne	82.460	0.459
ariege	0.749	finistere	715.468	0.288	pyrenees_or	111.190	0.572
aube	0.662	lozere	421.095	0.112	ille_vilaine	427.937	0.368
aude	0.648	finistere	731.446	0.169	seine_inf	697.812	0.460
aveyron	0.740	finistere	655.060	0.246	pyrenees_or	185.286	0.550
bouches_rhone	0.691	aveyron	249.292	0.193	seine_inf	737.912	0.507
calvados	0.788	vosges	515.528	0.196	pyrenees_or	763.653	0.563
cantal	0.705	vosges	474.359	0.130	seine_inf	510.618	0.505
charente	0.663	seine_oise	378.470	0.045	seine_inf	424.050	0.471
charente_inf	0.616	finistere	365.114	-0.033	seine_inf	431.134	0.352
cher	0.716	vosges	329.811	0.095	seine_inf	278.556	0.492
correze	0.697	finistere	541.908	0.058	seine_inf	465.734	0.411
cote_or	0.781	vosges	142.162	0.212	ille_vilaine	509.748	0.479
cotes_nord	0.775	vosges	683.916	0.280	seine_inf	298.515	0.528
creuse	0.651	calvados	374.629	0.011	seine_inf	367.548	0.432
dordogne	0.706	marne_hau	467.362	0.169	seine_inf	471.387	0.493
doubs	0.587	aveyron	418.647	0.113	seine_inf	440.926	0.396
drome	0.635	herault	168.931	0.208	seine_inf	577.722	0.465
eure	0.774	finistere	407.246	0.179	pyrenees_or	718.216	0.524
eure_loir	0.727	finistere	418.983	0.115	pyrenees_or	648.316	0.455
finistere	0.774	eure	407.246	0.309	isere	814.115	0.595
gard	0.662	seine_marne	538.307	0.007	ille_vilaine	664.748	0.385
garonne_hau	0.731	vosges	638.224	0.252	pyrenees_or	155.835	0.528
gers	0.732	vosges	675.853	0.196	ille_vilaine	522.827	0.492
gironde	0.613	vosges	654.619	0.124	seine_inf	526.459	0.405
herault	0.756	ardennes	688.833	0.273	pyrenees_or	128.041	0.536
ille_vilaine	0.676	finistere	181.721	-0.003	pyrenees_or	698.303	0.414
indre	0.733	aveyron	282.725	0.105	seine_inf	294.320	0.518
indre_loire	0.727	vosges	440.867	0.235	pyrenees_or	548.510	0.552
isere	0.540	ariege	413.738	0.019	pyrenees_or	356.717	0.291
jura	0.618	calvados	522.000	0.185	seine_inf	451.913	0.431
landes	0.618	vosges	717.915	0.146	pyrenees_or	306.376	0.449
loir_cher	0.774	vosges	389.071	0.182	seine_inf	204.698	0.526
loire	0.598	vosges	320.461	0.041	seine_inf	474.026	0.402
loire_hau	0.664	finistere	694.307	0.093	seine_inf	531.334	0.421
loire_inf	0.617	finistere	207.500	-0.038	seine_inf	314.496	0.370
loiret	0.759	vosges	341.853	0.236	seine_inf	180.806	0.541
lot	0.571	vosges	620.210	0.108	pyrenees_or	279.902	0.413
lot_garonne	0.714	vosges	630.193	0.187	seine_inf	582.781	0.496
lozere	0.771	meuse	487.916	0.184	ille_vilaine	561.502	0.508
maine_loire	0.721	aveyron	423.169	0.102	pyrenees_or	596.196	0.470

manche	0.775	vosges	594.090	0.252	seine_inf	191.684	0.530
marne	0.774	vosges	178.687	0.047	seine_inf	244.765	0.429
marne_hau	0.721	finistere	687.971	0.189	seine_inf	331.663	0.554
mayenne	0.695	ariege	597.466	0.138	seine_inf	202.863	0.462
meurthe	0.586	lozere	507.174	0.023	pyrenees_or	714.501	0.358
meuse	0.860	vosges	117.011	0.331	seine_inf	307.148	0.607
morbihan	0.646	lozere	594.549	0.118	loire_inf	99.391	0.429
moselle	0.628	vosges	107.364	0.130	seine_inf	372.709	0.462
nievre	0.722	vosges	281.350	0.166	seine_inf	311.090	0.527
nord	0.598	lozere	649.679	0.066	seine_inf	177.474	0.391
oise	0.781	vosges	351.274	0.235	seine_inf	72.534	0.522
orne	0.787	vosges	474.333	0.201	pyrenees_or	672.258	0.541
pas_de_calais	0.600	seine_oise	171.227	0.064	isere	608.561	0.366
puy_de_dome	0.638	lozere	142.730	0.030	seine_inf	432.740	0.407
pyrenees_bas	0.683	seine_marne	627.354	0.142	alpes_hau	536.116	0.442
pyrenees_hau	0.706	lozere	310.213	0.098	pyrenees_or	237.299	0.514
pyrenees_or	0.565	vosges	668.756	-0.003	ille_vilaine	698.303	0.230
rhin_bas	0.607	vosges	105.572	0.140	seine_inf	496.633	0.418
rhin_hau	0.646	vosges	66.436	0.192	isere	345.756	0.436
rhone	0.562	meuse	334.482	0.091	seine_inf	495.247	0.369
saone_hau	0.591	oise	360.846	0.102	seine_inf	424.236	0.423
saone_loire	0.649	finistere	702.933	0.146	seine_inf	447.194	0.443
sarthe	0.700	meuse	377.654	0.158	seine_inf	172.129	0.515
seine	0.687	lozere	490.259	0.145	loire_inf	343.992	0.407
seine_inf	0.612	tarn	654.394	-0.038	loire_inf	314.496	0.224
seine_marne	0.836	meuse	186.064	0.337	morbihan	413.408	0.563
seine_oise	0.696	loir_cher	146.083	0.181	pyrenees_or	680.602	0.492
sevres_deux	0.709	finistere	334.033	0.156	isere	495.983	0.442
somme	0.700	finistere	513.965	0.134	isere	583.950	0.431
tarn	0.727	meuse	617.569	0.279	pyrenees_or	113.744	0.525
var	0.710	cote_or	473.686	0.259	seine_inf	794.424	0.515
vaucluse	0.719	meuse	538.379	0.222	pyrenees_or	206.217	0.479
vendee	0.727	seine_marne	347.575	0.251	seine_inf	358.231	0.503
vienne	0.725	oise	342.723	0.321	pyrenees_or	477.105	0.544
vienne_hau	0.691	meuse	440.732	0.252	isere	356.426	0.517
vosges	0.860	meuse	117.011	0.375	isere	336.933	0.640
yonne	0.737	meuse	159.533	0.291	loire_inf	394.114	0.548
Tot:	**0.860**	**vosges-meuse**	**117.011**	**-0.038**	**sei._inf-loi._inf**	**314.496**	**0.461**

TABLE 4

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.898	puy_de_dome	171.668	-0.097	seine_marne	323.059	0.551
aisne	0.974	doubs	315.438	0.045	seine_marne	134.587	0.577
allier	0.905	loire	115.365	0.045	finistere	584.109	0.607
alpes_bas	0.751	alpes_hau	53.221	-0.127	vendee	612.009	0.396
alpes_hau	0.881	isere	76.100	-0.080	vendee	578.425	0.529
ardeche	0.907	saone_hau	343.826	0.003	finistere	760.964	0.592
ardennes	0.890	cote_or	271.967	-0.145	vendee	550.514	0.344
ariege	0.671	garonne_hau	74.889	-0.033	maine_loire	530.481	0.196
aube	0.814	gard	496.913	-0.073	vendee	421.022	0.344
aude	0.867	rhin_bas	728.536	0.047	ariege	69.118	0.486
aveyron	0.656	ariege	174.618	-0.040	maine_loire	423.169	0.285
bouches_rhone	0.765	var	58.395	-0.083	pyrenees_or	226.528	0.439
calvados	0.765	orne	91.405	-0.111	finistere	305.173	0.416
cantal	0.814	loir_cher	308.302	-0.064	seine_marne	400.594	0.535
charente	0.953	sevres_deux	86.338	-0.202	seine_marne	370.562	0.526
charente_inf	0.852	ain	456.309	-0.055	seine_marne	399.407	0.583
cher	0.820	nievre	58.998	-0.176	seine_marne	162.615	0.450
correze	0.924	vienne_hau	74.494	-0.073	lozere	159.486	0.567
cote_or	0.890	ardennes	271.967	-0.220	finistere	689.536	0.307
cotes_nord	0.740	meuse	583.838	-0.245	finistere	115.552	0.380
creuse	0.872	vienne	126.644	-0.158	seine_marne	269.605	0.517
dordogne	0.824	lot_garonne	111.408	0.037	seine_marne	398.774	0.446
doubs	0.974	aisne	315.438	0.024	seine_marne	290.279	0.582
drome	0.745	alpes_hau	102.944	0.038	ariege	345.585	0.440
eure	0.844	lot_garonne	540.782	0.028	lozere	532.282	0.568
eure_loir	0.728	loir_cher	95.326	-0.061	finistere	418.983	0.412
finistere	0.572	vendee	302.239	-0.314	pyrenees_or	804.247	0.145
gard	0.854	rhone	218.591	-0.162	finistere	801.892	0.402
garonne_hau	0.671	ariege	74.889	-0.012	vendee	363.215	0.331
gers	0.694	loire_inf	431.238	-0.222	lozere	251.215	0.378
gironde	0.886	lot_garonne	118.555	0.015	lozere	324.092	0.570
herault	0.596	alpes_hau	205.415	0.034	seine_inf	682.981	0.365
ille_vilaine	0.779	seine_oise	291.667	0.006	vendee	192.718	0.482
indre	0.646	cher	60.958	0.051	ariege	429.810	0.380
indre_loire	0.829	saone_loire	337.455	-0.073	seine_marne	194.749	0.535
isere	0.881	alpes_hau	76.100	0.053	vendee	526.031	0.549
jura	0.876	ardeche	229.006	0.021	ariege	520.006	0.497
landes	0.698	pyrenees_bas	67.526	0.021	vosges	717.915	0.350
loir_cher	0.830	puy_de_dome	242.273	-0.113	seine_marne	143.694	0.490
loire	0.918	loire_hau	80.311	-0.008	finistere	681.916	0.613
loire_hau	0.918	loire	80.311	-0.190	finistere	694.307	0.589
loire_inf	0.882	loire_hau	486.969	-0.163	finistere	207.500	0.520
loiret	0.825	yonne	126.445	-0.110	cote_or	243.812	0.426
lot	0.886	lot_garonne	33.979	0.049	seine_marne	483.071	0.576
lot_garonne	0.886	gironde	118.555	-0.001	seine_marne	506.415	0.591
lozere	0.511	mayenne	511.455	-0.222	gers	251.215	0.167
maine_loire	0.821	marne_hau	430.211	-0.196	pyrenees_bas	465.112	0.404
manche	0.810	orne	135.039	0.054	pyrenees_bas	644.909	0.449
marne	0.726	loire_inf	483.241	-0.154	finistere	634.783	0.392
marne_hau	0.821	maine_loire	430.211	-0.133	pyrenees_bas	685.234	0.452
mayenne	0.772	ain	497.955	-0.106	pyrenees_bas	531.001	0.389

meurthe	0.927	saone_hau	118.668	0.099	seine_marne	261.129	0.632
meuse	0.751	ardeche	450.826	-0.119	vendee	516.107	0.427
morbihan	0.922	doubs	662.539	0.020	seine_marne	413.408	0.510
moselle	0.892	meurthe	46.390	0.008	ariege	772.101	0.562
nievre	0.824	indre_loire	190.488	-0.111	seine_marne	174.282	0.530
nord	0.879	allier	422.961	0.108	ariege	832.740	0.594
oise	0.819	saone_loire	404.538	0.023	seine_marne	108.825	0.530
orne	0.875	saone_loire	429.019	0.093	pyrenees_bas	569.817	0.541
pas_de_calais	0.894	puy_de_dome	500.914	-0.105	seine_marne	194.766	0.555
puy_de_dome	0.937	charente	227.376	-0.113	seine_marne	307.352	0.588
pyrenees_bas	0.698	landes	67.526	-0.329	vosges	758.290	0.221
pyrenees_hau	0.824	nievre	483.084	-0.022	pyrenees_bas	37.281	0.485
pyrenees_or	0.729	vaucluse	206.217	-0.314	finistere	804.247	0.258
rhin_bas	0.867	aude	728.536	-0.084	lozere	555.584	0.499
rhin_hau	0.819	rhin_bas	63.014	-0.070	finistere	853.035	0.498
rhone	0.854	gard	218.591	-0.113	finistere	724.092	0.456
saone_hau	0.927	meurthe	118.668	0.034	finistere	768.130	0.610
saone_loire	0.879	lot_garonne	403.864	0.093	seine_marne	297.252	0.583
sarthe	0.752	tarn	513.910	-0.053	pyrenees_bas	524.239	0.499
seine	0.798	meurthe	284.744	-0.073	seine_marne	44.779	0.532
seine_inf	0.543	aisne	184.146	-0.185	vosges	419.593	0.233
seine_marne	0.687	vaucluse	537.078	-0.230	sevres_deux	340.568	0.140
seine_oise	0.790	lot	498.594	-0.013	lozere	485.676	0.523
sevres_deux	0.953	charente	86.338	-0.230	seine_marne	340.568	0.502
somme	0.874	sevres_deux	447.877	-0.115	seine_marne	154.329	0.451
tarn	0.777	loire_hau	208.036	-0.166	finistere	693.518	0.491
var	0.765	bouches_rhone	58.395	-0.104	pyrenees_or	250.676	0.316
vaucluse	0.779	gard	37.832	-0.109	finistere	823.929	0.254
vendee	0.572	finistere	302.239	-0.193	pyrenees_or	511.574	0.197
vienne	0.872	creuse	126.644	-0.163	lozere	336.185	0.496
vienne_hau	0.924	correze	74.494	-0.110	lozere	228.337	0.530
vosges	0.726	maine_loire	529.490	-0.329	pyrenees_bas	758.290	0.306
yonne	0.836	doubs	195.004	-0.053	cote_or	120.837	0.488
Tot:	**0.974**	**doubs-aisne**	**315.438**	**-0.329**	**vosges-pyr_bas**	**758.290**	**0.454**

TABLE 5

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.503	indre	279.722	-0.188	dordogne	366.393	0.111
aisne	0.476	lozere	560.010	-0.090	seine_oise	137.951	0.148
allier	0.457	indre	129.158	-0.169	aveyron	253.905	0.086
alpes_bas	0.569	tarn	326.091	-0.025	finistere	909.580	0.292
alpes_hau	0.442	cher	402.371	-0.094	ardennes	589.475	0.168
ardeche	0.425	mayenne	553.684	-0.196	cote_or	290.934	0.074
ardennes	0.820	somme	174.473	-0.168	seine_marne	203.162	0.348
ariege	0.665	charente_inf	356.193	-0.064	pyrenees_bas	163.375	0.426
aube	0.688	loir_cher	219.653	-0.292	seine_marne	108.001	0.317
aude	0.604	ariege	69.118	-0.113	rhin_bas	728.536	0.188
aveyron	0.728	creuse	209.596	-0.169	allier	253.905	0.408
bouches_rhone	0.529	vosges	523.158	-0.218	calvados	772.260	0.075
calvados	0.606	vendee	303.421	-0.384	pyrenees_or	763.653	0.118
cantal	0.525	aveyron	65.681	-0.245	ille_vilaine	472.006	0.049
charente	0.722	ardennes	569.295	-0.209	dordogne	68.516	0.128
charente_inf	0.665	ariege	356.193	-0.228	cantal	256.283	0.167
cher	0.716	aveyron	304.131	-0.309	ille_vilaine	324.879	0.030
correze	0.707	aveyron	120.238	-0.211	rhin_hau	529.195	0.126
cote_or	0.826	somme	349.347	-0.284	seine_marne	221.490	0.348
cotes_nord	0.709	vendee	270.878	-0.198	pyrenees_or	781.970	0.195
creuse	0.728	aveyron	209.596	-0.269	gers	295.276	0.109
dordogne	0.538	mayenne	338.637	-0.209	charente	68.516	0.158
doubs	0.652	cote_or	76.465	-0.152	seine_oise	339.045	0.133
drome	0.500	ariege	345.585	-0.124	seine_marne	435.021	0.156
eure	0.513	cote_or	343.983	-0.285	cher	236.253	0.109
eure_loir	0.543	vendee	280.213	-0.217	bouches_rhone	627.740	0.192
finistere	0.685	cotes_nord	115.552	-0.319	vendee	302.239	0.176
gard	0.713	loiret	490.343	-0.280	seine_marne	538.307	0.297
garonne_hau	0.651	manche	644.640	-0.257	calvados	634.269	0.300
gers	0.724	mayenne	500.139	-0.274	seine_marne	563.644	0.262
gironde	0.621	lozere	324.092	-0.222	cher	338.834	0.156
herault	0.495	garonne_hau	196.449	-0.241	seine_inf	682.981	0.168
ille_vilaine	0.591	lozere	561.502	-0.309	cher	324.879	0.117
indre	0.618	garonne_hau	356.107	-0.302	pyrenees_or	467.525	0.195
indre_loire	0.657	cote_or	327.369	-0.299	seine_oise	190.294	0.069
isere	0.568	ariege	413.738	-0.078	meuse	400.922	0.173
jura	0.563	ariege	520.006	-0.277	meuse	233.781	0.139
landes	0.637	sarthe	458.931	-0.105	pyrenees_bas	67.526	0.264
loir_cher	0.689	cote_or	280.490	-0.184	puy_de_dome	242.273	0.115
loire	0.621	ariege	373.796	-0.247	cher	205.899	0.122
loire_hau	0.658	aveyron	130.133	-0.252	cher	254.051	0.141
loire_inf	0.673	aveyron	454.667	-0.255	cher	301.221	0.180
loiret	0.713	gard	490.343	-0.242	somme	224.340	0.141
lot	0.604	cote_or	478.078	-0.167	seine_oise	498.594	0.133
lot_garonne	0.688	aveyron	155.267	-0.245	cher	348.271	0.115
lozere	0.621	gironde	324.092	-0.205	meuse	487.916	0.288
maine_loire	0.670	gers	432.941	-0.197	saone_loire	429.519	0.176

manche	0.651	garonne_hau	644.640	-0.189	morbihan	179.237	0.152
marne	0.607	aveyron	531.692	-0.214	cher	256.691	0.165
marne_hau	0.749	cote_or	87.458	-0.272	sevres_deux	467.726	0.131
mayenne	0.724	gers	500.139	-0.149	seine	244.715	0.252
meurthe	0.643	ariege	732.572	-0.189	seine_oise	299.223	0.110
meuse	0.500	vendee	516.107	-0.277	jura	233.781	0.097
morbihan	0.645	gard	696.376	-0.231	marne_hau	590.095	0.125
moselle	0.616	ariege	772.101	-0.199	saone_loire	329.170	0.126
nievre	0.761	cote_or	147.516	-0.321	seine_oise	214.084	0.130
nord	0.611	ariege	832.740	-0.195	jura	448.560	0.105
oise	0.601	aveyron	566.301	-0.219	saone_loire	404.538	0.154
orne	0.645	garonne_hau	543.898	-0.196	seine_oise	157.053	0.128
pas_de_calais	0.653	cote_or	367.832	-0.228	marne_hau	296.249	0.134
puy_de_dome	0.669	cote_or	228.121	-0.232	marne_hau	302.732	0.109
pyrenees_bas	0.512	sevres_deux	335.338	-0.260	gers	88.348	0.123
pyrenees_hau	0.683	cote_or	598.452	-0.200	sevres_deux	345.272	0.157
pyrenees_or	0.630	vendee	511.574	-0.384	calvados	763.653	0.150
rhin_bas	0.572	var	623.977	-0.240	cher	434.897	0.157
rhin_hau	0.513	aveyron	555.124	-0.245	cher	389.727	0.128
rhone	0.586	vendee	442.228	-0.175	cher	238.261	0.138
saone_hau	0.691	aveyron	458.409	-0.221	cher	291.023	0.124
saone_loire	0.633	cote_or	115.878	-0.219	oise	404.538	0.098
sarthe	0.637	landes	458.931	-0.061	seine_oise	168.537	0.201
seine	0.590	gard	580.932	-0.177	cantal	437.705	0.158
seine_inf	0.442	gard	670.726	-0.259	finistere	413.269	0.129
seine_marne	0.652	vienne_hau	318.791	-0.292	aube	108.001	0.181
seine_oise	0.501	lozere	485.676	-0.321	nievre	214.084	0.010
sevres_deux	0.788	cote_or	433.277	-0.272	marne_hau	467.726	0.144
somme	0.826	cote_or	349.347	-0.242	loiret	224.340	0.196
tarn	0.576	landes	222.647	-0.167	cher	387.307	0.167
var	0.572	rhin_bas	623.977	-0.113	meuse	631.009	0.251
vaucluse	0.713	yonne	440.029	-0.211	gers	339.213	0.245
vendee	0.709	cotes_nord	270.878	-0.319	finistere	302.239	0.312
vienne	0.658	aveyron	303.503	-0.130	ille_vilaine	226.428	0.178
vienne_hau	0.662	aveyron	194.730	-0.082	marne_hau	389.485	0.202
vosges	0.653	vendee	580.717	0.031	ille_vilaine	605.185	0.280
yonne	0.718	cote_or	120.837	-0.171	loiret	126.445	0.201
Tot:	**0.826**	**somme-cote_or**	**349.347**	**-0.384**	**pyr_or-calvad.**	**763.653**	**0.169**

TABLE 6

Department	Max	Department with which Corr. Is Max	Distance from Max	Min	Department with which Corr. Is Min	Distance from Min	Mean
ain	0.450	loiret	314.981	-0.196	marne	314.536	0.118
aisne	0.473	seine_oise	137.951	-0.089	lozere	560.010	0.217
allier	0.459	herault	332.892	-0.264	oise	331.742	0.038
alpes_bas	0.494	vendee	612.009	-0.228	pyrenees_or	310.698	0.045
alpes_hau	0.401	var	159.780	-0.201	alpes_bas	53.221	0.079
ardeche	0.504	herault	138.358	-0.287	oise	556.279	0.046
ardennes	0.669	lozere	589.432	-0.255	somme	174.473	0.068
ariege	0.389	finistere	715.468	-0.108	dordogne	259.108	0.135
aube	0.541	lozere	421.095	-0.210	gironde	524.788	0.016
aude	0.482	loire_inf	542.663	-0.194	aube	580.786	0.193
aveyron	0.490	indre	282.725	-0.151	dordogne	173.166	0.125
bouches_rhone	0.405	aveyron	249.292	-0.258	oise	706.469	0.053
calvados	0.358	ardennes	374.078	-0.238	saone_loire	504.635	0.017
cantal	0.472	seine_oise	430.461	-0.129	seine_inf	510.618	0.135
charente	0.631	seine_oise	378.470	-0.194	aube	417.350	0.242
charente_inf	0.430	herault	429.422	-0.229	seine_inf	431.134	0.059
cher	0.405	seine_oise	191.790	-0.314	seine_inf	278.556	0.056
correze	0.465	seine_marne	369.194	-0.299	seine	402.522	-0.005
cote_or	0.616	seine_marne	221.490	-0.301	sevres_deux	433.277	0.006
cotes_nord	0.492	seine_marne	400.046	-0.302	oise	368.143	0.026
creuse	0.372	seine_marne	269.605	-0.329	somme	415.995	-0.001
dordogne	0.574	marne_hau	467.362	-0.273	cotes_nord	454.347	0.192
doubs	0.519	seine_oise	339.045	-0.180	aube	188.225	0.186
drome	0.399	aude	279.425	-0.219	seine	479.275	0.055
eure	0.490	finistere	407.246	-0.238	cote_or	343.983	0.091
eure_loir	0.512	finistere	418.983	-0.155	dordogne	365.994	0.130
finistere	0.627	sevres_deux	334.033	-0.160	var	950.732	0.327
gard	0.653	seine_marne	538.307	-0.260	yonne	444.895	0.041
garonne_hau	0.376	manche	644.640	-0.183	pyrenees_or	155.835	0.086
gers	0.490	seine_marne	563.644	-0.334	lot_garonne	58.950	-0.011
gironde	0.462	finistere	444.528	-0.285	cotes_nord	442.212	0.108
herault	0.608	ardennes	688.833	-0.297	landes	354.571	0.176
ille_vilaine	0.625	seine_oise	291.667	-0.222	cote_or	509.748	0.231
indre	0.490	aveyron	282.725	-0.345	oise	292.432	-0.025
indre_loire	0.594	finistere	366.732	-0.279	gers	412.778	0.102
isere	0.346	var	230.154	-0.203	marne	433.262	0.034
jura	0.381	seine_marne	298.784	-0.193	correze	332.550	0.044
landes	0.335	var	526.013	-0.297	herault	354.571	0.077
loir_cher	0.578	seine_oise	146.083	-0.255	correze	261.137	0.139
loire	0.460	finistere	681.916	-0.234	cote_or	188.558	0.064
loire_hau	0.537	finistere	694.307	-0.262	oise	505.973	0.039
loire_inf	0.497	finistere	207.500	-0.299	oise	365.640	0.045
loiret	0.561	seine_oise	101.561	-0.236	indre	121.513	0.187
lot	0.448	seine_oise	498.594	-0.211	cotes_nord	511.852	0.131
lot_garonne	0.419	finistere	558.672	-0.334	gers	58.950	0.072
lozere	0.702	meuse	487.916	-0.231	loiret	394.041	0.198
maine_loire	0.453	dordogne	271.885	-0.308	marne	399.757	0.048
manche	0.414	charente	395.889	-0.244	mayenne	121.679	0.102
marne	0.494	seine_marne	134.107	-0.329	somme	182.131	0.008
marne_hau	0.574	dordogne	467.362	-0.249	cotes_nord	586.110	0.079
mayenne	0.406	lozere	511.455	-0.262	correze	365.986	0.039

meurthe	0.454	lozere	507.174	-0.190	marne	137.872	0.055
meuse	0.702	lozere	487.916	-0.355	somme	243.313	0.015
morbihan	0.571	seine_oise	382.653	-0.194	gers	514.775	0.211
moselle	0.390	finistere	768.550	-0.180	creuse	460.878	0.089
nievre	0.576	finistere	557.215	-0.213	gard	364.252	0.119
nord	0.449	lozere	649.679	-0.218	oise	126.553	0.066
oise	0.376	lozere	555.267	-0.345	indre	292.432	-0.029
orne	0.506	lozere	505.076	-0.264	indre	214.729	0.071
pas_de_calais	0.581	seine_oise	171.227	-0.270	meuse	241.881	0.100
puy_de_dome	0.569	seine_oise	342.990	-0.263	gers	306.323	0.153
pyrenees_bas	0.580	seine_marne	627.354	-0.194	herault	345.584	0.134
pyrenees_hau	0.551	finistere	621.981	-0.230	cotes_nord	627.004	0.122
pyrenees_or	0.547	var	250.676	-0.244	orne	672.258	0.019
rhin_bas	0.468	finistere	880.813	-0.318	meuse	191.343	0.069
rhin_hau	0.388	seine_marne	350.911	-0.300	seine	381.008	0.041
rhone	0.503	seine_marne	348.344	-0.148	yonne	245.025	0.090
saone_hau	0.384	lozere	400.870	-0.222	cote_or	90.530	0.056
saone_loire	0.482	finistere	702.933	-0.262	gers	443.612	0.068
sarthe	0.513	lozere	461.645	-0.203	somme	261.329	0.087
seine	0.625	lozere	490.259	-0.303	gers	593.212	0.029
seine_inf	0.492	tarn	654.394	-0.314	cher	278.556	0.021
seine_marne	0.653	gard	538.307	-0.280	seine_oise	49.242	0.186
seine_oise	0.631	charente	378.470	-0.280	seine_marne	49.242	0.262
sevres_deux	0.627	finistere	334.033	-0.301	cote_or	433.277	0.122
somme	0.625	finistere	513.965	-0.355	meuse	243.313	0.059
tarn	0.585	lozere	145.091	-0.166	marne	619.076	0.123
var	0.547	pyrenees_or	250.676	-0.251	bouches_rhone	58.395	0.137
vaucluse	0.504	pyrenees_bas	422.880	-0.101	yonne	440.029	0.173
vendee	0.586	seine_oise	340.100	-0.288	indre	193.989	0.135
vienne	0.528	morbihan	262.131	-0.258	yonne	280.963	0.174
vienne_hau	0.470	ille_vilaine	335.776	-0.205	var	478.382	0.118
vosges	0.529	pyrenees_or	668.756	-0.044	maine_loire	529.490	0.222
yonne	0.549	lozere	363.165	-0.260	gard	444.895	0.119
Tot:	**0.702**	**meuse-lozere**	**487.916**	**-0.355**	**somme-meuse**	**243.313**	**0.096**

TABLE 7

Using Traveling Distance				
		Point Est.	**LB 95%**	**UB 95%**
Time lag = 0	**gamma**	0.5438	0.5138	0.5738
	eta	-0.1998	-0.2675	-0.1321
Time lag = 1	**gamma**	0.0508	0.026	0.0756
	eta	0.1699	0.114	0.2258
Time lag = 2	**gamma**	0.1449	0.1204	0.1695
	eta	-0.0464	-0.1018	0.009

Using Geographic Distance				
		Point Est.	**LB 95%**	**UB 95%**
Time lag = 0	**gamma**	0.5343	0.5166	0.5521
	eta	-0.1946	-0.2336	-0.1556
Time lag = 1	**gamma**	0.1292	0.1134	0.1451
	eta	0.0977	0.0628	0.1326
Time lag = 2	**gamma**	0.0795	0.0657	0.0933
	eta	0.0405	0.0101	0.0709

TABLE 8

Department	alpha	SE(alpha)	sigma^2+C(0)	SE(sigma^2+C(0))
bouches_rhone	-0.201	0.080	0.017	0.006
orne	-0.179	0.075	0.015	0.006
somme	-0.001	0.061	0.010	0.006
maine_loire	-0.234	0.087	0.018	0.009
charente	-0.011	0.087	0.017	0.008
pas_de_calais	-0.308	0.087	0.018	0.007
vaucluse	-0.394	0.093	0.026	0.009
pyrenees_bas	-0.291	0.086	0.016	0.007
doubs	-0.040	0.091	0.023	0.012
gironde	-0.297	0.095	0.027	0.010
cher	-0.304	0.078	0.019	0.006
finistere	0.080	0.088	0.014	0.006
calvados	-0.006	0.110	0.020	0.010
aude	0.023	0.071	0.011	0.006
eure_loir	-0.479	0.094	0.014	0.006
puy_de_dome	-0.161	0.096	0.017	0.006
cote_or	-0.325	0.096	0.022	0.008
isere	0.062	0.087	0.012	0.007
charente_inf	-0.323	0.095	0.024	0.010
sarthe	-0.260	0.086	0.018	0.007
nord	-0.060	0.074	0.012	0.006
vienne_hau	-0.234	0.086	0.022	0.008
morbihan	0.010	0.073	0.011	0.006
rhone	-0.454	0.099	0.021	0.008
moselle	-0.288	0.105	0.025	0.010
lot	-0.321	0.074	0.016	0.006
herault	-0.358	0.078	0.019	0.006
allier	-0.268	0.077	0.014	0.007
meurthe	-0.096	0.079	0.018	0.007
loire_inf	-0.334	0.084	0.024	0.007
gard	-0.199	0.086	0.026	0.011
loiret	-0.456	0.082	0.013	0.006
seine	0.021	0.084	0.015	0.006
pyrenees_or	-0.114	0.111	0.040	0.020
vienne	0.086	0.068	0.017	0.007
ille_vilaine	-0.459	0.098	0.029	0.014
marne	-0.194	0.087	0.009	0.006
seine_inf	-0.359	0.102	0.022	0.013
loire	-0.189	0.069	0.018	0.006
cotes_nord	-0.298	0.074	0.010	0.006
aisne	-0.379	0.096	0.028	0.010
ardennes	-0.247	0.083	0.010	0.006
rhin_bas	-0.290	0.080	0.017	0.006
var	-0.088	0.094	0.012	0.007
garonne_hau	-0.110	0.078	0.006	0.006
indre_loire	-0.056	0.071	0.012	0.006
aube	-0.282	0.096	0.014	0.006
drome	-0.235	0.080	0.011	0.006
seine_oise	-0.456	0.080	0.013	0.007

TABLE 9

Department	alpha	SE(alpha)	sigma^2+C(0)	SE(sigma^2+C(0))	sigma^2+C(0)
bouches_rhone	-0.169	0.076	0.017	0.008	0.017
orne	-0.177	0.072	0.015	0.007	0.015
somme	0.034	0.060	0.010	0.005	0.010
maine_loire	-0.183	0.082	0.018	0.010	0.018
charente	-0.019	0.085	0.018	0.009	0.017
pas_de_calais	-0.366	0.068	0.017	0.008	0.018
vaucluse	-0.352	0.096	0.026	0.009	0.026
pyrenees_bas	-0.285	0.093	0.016	0.009	0.016
doubs	-0.059	0.103	0.023	0.013	0.023
gironde	-0.306	0.084	0.026	0.009	0.027
cher	-0.433	0.088	0.018	0.007	0.019
finistere	-0.005	0.079	0.015	0.006	0.014
calvados	0.003	0.100	0.020	0.011	0.020
aude	0.065	0.070	0.011	0.005	0.011
eure_loir	-0.478	0.087	0.014	0.006	0.014
puy_de_dome	-0.155	0.090	0.017	0.008	0.017
cote_or	-0.424	0.079	0.021	0.008	0.022
isere	0.020	0.090	0.011	0.007	0.012
charente_inf	-0.362	0.086	0.024	0.011	0.024
sarthe	-0.320	0.073	0.018	0.009	0.018
nord	-0.051	0.065	0.012	0.006	0.012
vienne_hau	-0.194	0.081	0.022	0.009	0.022
morbihan	-0.105	0.062	0.011	0.006	0.011
rhone	-0.381	0.102	0.022	0.008	0.021
moselle	-0.355	0.100	0.024	0.010	0.025
lot	-0.216	0.069	0.016	0.007	0.016
herault	-0.454	0.084	0.018	0.007	0.019
allier	-0.265	0.082	0.013	0.008	0.014
meurthe	-0.190	0.064	0.018	0.008	0.018
loire_inf	-0.264	0.083	0.024	0.008	0.024
gard	-0.183	0.090	0.027	0.010	0.026
loiret	-0.460	0.084	0.013	0.007	0.013
seine	0.004	0.081	0.016	0.007	0.015
pyrenees_or	-0.086	0.105	0.040	0.020	0.040
vienne	0.008	0.072	0.018	0.009	0.017
ille_vilaine	-0.421	0.099	0.030	0.014	0.029
marne	-0.130	0.083	0.008	0.005	0.009
seine_inf	-0.341	0.099	0.022	0.013	0.022
loire	-0.331	0.069	0.018	0.007	0.018
cotes_nord	-0.161	0.109	0.009	0.006	0.010
aisne	-0.335	0.094	0.028	0.010	0.028
ardennes	-0.173	0.090	0.011	0.007	0.010
rhin_bas	-0.188	0.087	0.017	0.007	0.017
var	-0.122	0.084	0.011	0.007	0.012
garonne_hau	-0.154	0.079	0.006	0.005	0.006
indre_loire	-0.098	0.061	0.012	0.006	0.012
aube	-0.315	0.106	0.014	0.008	0.014
drome	-0.235	0.074	0.011	0.006	0.011
seine_oise	-0.444	0.081	0.013	0.009	0.013

TABLE 10

Department	alpha	SE(alpha)	beta	SE(beta)	sigma^2+C(0)	SE(sigma^2+C(0))
bouches_rhone	-0.173	0.047	0.301	8.979	0.015	0.006
orne	0.044	0.041	0.088	7.308	0.009	0.006
somme	-0.233	0.055	0.279	5.341	0.017	0.008
maine_loire	0.097	0.054	-0.391	5.641	0.016	0.007
charente	-0.346	0.058	0.520	5.697	0.018	0.007
pas_de_calais	-0.439	0.058	0.692	6.507	0.025	0.009
vaucluse	-0.277	0.061	0.306	4.054	0.016	0.008
pyrenees_bas	-0.124	0.057	1.162	7.100	0.020	0.011
doubs	-0.306	0.061	0.394	7.390	0.027	0.010
gironde	-0.316	0.053	0.506	7.373	0.018	0.007
cher	0.122	0.060	0.090	5.452	0.014	0.006
finistere	0.073	0.068	-0.303	7.762	0.019	0.010
calvados	0.054	0.046	0.142	3.920	0.011	0.006
aude	-0.482	0.071	0.381	6.628	0.013	0.006
eure_loir	-0.205	0.063	0.725	7.361	0.016	0.007
puy_de_dome	-0.343	0.062	0.492	6.528	0.022	0.008
cote_or	-0.035	0.061	0.979	5.937	0.010	0.006
isere	-0.272	0.059	-0.197	7.161	0.023	0.009
charente_inf	-0.226	0.051	0.097	7.681	0.018	0.007
sarthe	0.031	0.050	-0.209	4.680	0.011	0.006
nord	-0.203	0.061	0.147	8.093	0.022	0.008
vienne_hau	0.057	0.048	0.071	6.983	0.011	0.006
morbihan	-0.482	0.067	0.492	5.749	0.021	0.008
rhone	-0.292	0.069	0.793	7.222	0.024	0.009
moselle	-0.320	0.046	0.380	6.490	0.016	0.006
lot	-0.324	0.055	0.090	7.456	0.019	0.007
herault	-0.208	0.057	-0.029	5.949	0.013	0.007
allier	-0.082	0.052	0.336	6.876	0.018	0.007
meurthe	-0.291	0.049	0.028	7.920	0.024	0.008
loire_inf	-0.177	0.053	0.323	6.668	0.026	0.011
gard	-0.443	0.056	0.572	6.000	0.013	0.006
loiret	0.023	0.051	0.282	6.482	0.015	0.007
seine	-0.196	0.057	0.401	9.357	0.016	0.006
pyrenees_or	-0.093	0.068	0.015	3.150	0.040	0.020
vienne	0.120	0.046	0.138	4.911	0.017	0.007
ille_vilaine	-0.515	0.068	0.962	4.077	0.027	0.012
marne	-0.246	0.064	0.545	4.673	0.008	0.006
seine_inf	-0.446	0.065	0.794	5.779	0.020	0.011
loire	-0.181	0.048	0.407	7.275	0.018	0.006
cotes_nord	-0.335	0.063	0.650	4.080	0.009	0.006
aisne	-0.368	0.061	0.299	8.114	0.028	0.010
ardennes	-0.305	0.060	0.820	6.356	0.010	0.006
rhin_bas	-0.267	0.050	0.178	6.189	0.017	0.006
var	-0.068	0.067	0.152	9.318	0.011	0.007
garonne_hau	-0.001	0.046	-0.316	5.323	0.006	0.006
indre_loire	-0.028	0.049	0.201	4.753	0.012	0.006
aube	-0.262	0.070	0.361	3.950	0.013	0.007
drome	-0.206	0.051	0.170	5.671	0.011	0.006
seine_oise	-0.465	0.062	0.495	6.498	0.013	0.007

TABLE 11

Department	alpha	SE(alpha)	beta	SE(beta)	sigma^2+C(0)	SE(sigma^2+C(0))
bouches_rhone	-0.165	0.048	0.251	12.518	0.014	0.016
orne	0.111	0.040	0.075	12.573	0.009	0.016
somme	-0.159	0.046	0.291	10.897	0.017	0.017
maine_loire	0.140	0.049	-0.364	11.020	0.016	0.016
charente	-0.398	0.056	0.475	11.547	0.017	0.016
pas_de_calais	-0.405	0.050	0.689	11.953	0.025	0.017
vaucluse	-0.271	0.054	0.275	10.802	0.016	0.017
pyrenees_bas	-0.181	0.058	1.107	8.655	0.020	0.019
doubs	-0.367	0.059	0.371	13.797	0.026	0.018
gironde	-0.336	0.052	0.493	13.107	0.018	0.016
cher	-0.001	0.054	0.029	11.349	0.015	0.016
finistere	0.006	0.073	-0.321	7.757	0.021	0.022
calvados	0.081	0.037	0.142	10.814	0.011	0.016
aude	-0.466	0.057	0.419	10.468	0.013	0.016
eure_loir	-0.161	0.063	0.792	14.207	0.017	0.017
puy_de_dome	-0.487	0.067	0.388	12.907	0.021	0.016
cote_or	-0.054	0.056	0.954	12.050	0.010	0.017
isere	-0.305	0.054	-0.279	14.180	0.023	0.018
charente_inf	-0.243	0.054	0.069	14.654	0.018	0.017
sarthe	0.081	0.044	-0.159	12.760	0.011	0.016
nord	-0.206	0.051	0.145	15.177	0.022	0.017
vienne_hau	-0.053	0.041	0.028	12.342	0.011	0.016
morbihan	-0.479	0.066	0.497	12.056	0.022	0.017
rhone	-0.312	0.062	0.728	12.557	0.023	0.018
moselle	-0.247	0.043	0.413	12.572	0.016	0.016
lot	-0.374	0.055	0.066	13.586	0.018	0.016
herault	-0.140	0.049	-0.041	10.639	0.013	0.016
allier	-0.150	0.050	0.278	14.141	0.018	0.016
meurthe	-0.278	0.048	0.060	15.321	0.023	0.016
loire_inf	-0.151	0.046	0.379	14.946	0.026	0.018
gard	-0.381	0.052	0.652	10.939	0.013	0.016
loiret	0.032	0.054	0.294	9.185	0.015	0.016
seine	-0.076	0.059	0.514	13.409	0.017	0.017
pyrenees_or	-0.098	0.071	-0.033	13.187	0.040	0.031
vienne	0.099	0.046	0.128	12.958	0.017	0.016
ille_vilaine	-0.454	0.067	1.038	11.251	0.028	0.021
marne	-0.198	0.052	0.616	8.566	0.008	0.016
seine_inf	-0.413	0.070	0.912	6.667	0.019	0.019
loire	-0.276	0.048	0.297	13.830	0.018	0.016
cotes_nord	-0.289	0.052	0.669	10.502	0.009	0.016
aisne	-0.314	0.061	0.379	14.910	0.028	0.018
ardennes	-0.270	0.064	0.894	11.273	0.010	0.016
rhin_bas	-0.233	0.050	0.163	12.466	0.016	0.016
var	-0.126	0.058	0.044	12.501	0.011	0.017
garonne_hau	0.012	0.042	-0.286	11.025	0.006	0.016
indre_loire	-0.032	0.047	0.214	11.078	0.012	0.016
aube	-0.232	0.079	0.429	7.707	0.013	0.017
drome	-0.196	0.049	0.128	10.386	0.011	0.016
seine_oise	-0.399	0.054	0.593	10.024	0.014	0.017

TABLE 12

Department	alpha	SE(alpha)	sigma^2+C(0)	SE(sigma^2+C(0))
bouches_rhone	-0.178	0.078	0.015	0.006
orne	-0.008	0.063	0.010	0.006
somme	-0.235	0.089	0.018	0.008
maine_loire	-0.017	0.087	0.017	0.007
charente	-0.311	0.079	0.018	0.007
pas_de_calais	-0.396	0.093	0.026	0.009
vaucluse	-0.291	0.091	0.016	0.008
pyrenees_bas	-0.037	0.097	0.023	0.012
doubs	-0.297	0.094	0.027	0.010
gironde	-0.298	0.077	0.019	0.007
cher	0.069	0.081	0.014	0.006
finistere	-0.005	0.094	0.020	0.011
calvados	0.018	0.068	0.011	0.006
aude	-0.479	0.099	0.014	0.006
eure_loir	-0.165	0.092	0.017	0.007
puy_de_dome	-0.331	0.088	0.022	0.008
cote_or	0.061	0.095	0.012	0.007
isere	-0.324	0.096	0.024	0.009
charente_inf	-0.258	0.078	0.018	0.007
sarthe	-0.067	0.078	0.012	0.006
nord	-0.237	0.088	0.022	0.008
vienne_hau	0.008	0.070	0.011	0.006
morbihan	-0.453	0.095	0.021	0.008
rhone	-0.291	0.102	0.025	0.010
moselle	-0.322	0.075	0.016	0.006
lot	-0.356	0.089	0.019	0.006
herault	-0.268	0.089	0.014	0.007
allier	-0.096	0.073	0.018	0.006
meurthe	-0.335	0.085	0.024	0.008
loire_inf	-0.201	0.083	0.026	0.011
gard	-0.451	0.083	0.013	0.006
loiret	0.017	0.074	0.015	0.006
seine	-0.205	0.082	0.017	0.006
pyrenees_or	-0.117	0.094	0.040	0.020
vienne	0.084	0.072	0.017	0.007
ille_vilaine	-0.459	0.103	0.029	0.013
marne	-0.198	0.098	0.009	0.006
seine_inf	-0.358	0.104	0.022	0.012
loire	-0.195	0.069	0.018	0.006
cotes_nord	-0.301	0.087	0.010	0.006
aisne	-0.380	0.095	0.027	0.010
ardennes	-0.250	0.088	0.010	0.006
rhin_bas	-0.284	0.078	0.017	0.006
var	-0.091	0.089	0.012	0.007
garonne_hau	-0.107	0.077	0.006	0.006
indre_loire	-0.064	0.068	0.012	0.006
aube	-0.281	0.096	0.014	0.007
drome	-0.233	0.084	0.011	0.006
seine_oise	-0.467	0.082	0.013	0.007

TABLE 13

Department	alpha	SE(alpha)	sigma^2+C(0)	SE(sigma^2+C(0))
bouches_rhone	-0.176	0.090	0.015	0.009
orne	0.034	0.068	0.010	0.008
somme	-0.170	0.094	0.017	0.009
maine_loire	0.013	0.096	0.017	0.008
charente	-0.362	0.083	0.018	0.008
pas_de_calais	-0.364	0.095	0.026	0.010
vaucluse	-0.295	0.089	0.016	0.010
pyrenees_bas	-0.102	0.090	0.023	0.013
doubs	-0.354	0.089	0.026	0.010
gironde	-0.319	0.082	0.018	0.008
cher	-0.041	0.101	0.015	0.008
finistere	-0.050	0.106	0.021	0.014
calvados	0.043	0.069	0.011	0.008
aude	-0.462	0.093	0.014	0.008
eure_loir	-0.129	0.092	0.018	0.009
puy_de_dome	-0.469	0.090	0.021	0.009
cote_or	0.036	0.087	0.011	0.009
isere	-0.359	0.097	0.024	0.011
charente_inf	-0.281	0.083	0.018	0.009
sarthe	-0.033	0.074	0.012	0.008
nord	-0.231	0.082	0.022	0.009
vienne_hau	-0.100	0.079	0.011	0.008
morbihan	-0.438	0.106	0.022	0.009
rhone	-0.317	0.104	0.024	0.011
moselle	-0.244	0.073	0.016	0.008
lot	-0.412	0.095	0.018	0.008
herault	-0.202	0.084	0.013	0.008
allier	-0.169	0.072	0.018	0.008
meurthe	-0.312	0.078	0.023	0.009
loire_inf	-0.179	0.099	0.027	0.011
gard	-0.388	0.087	0.014	0.009
loiret	0.014	0.092	0.015	0.008
seine	-0.099	0.086	0.017	0.009
pyrenees_or	-0.118	0.101	0.040	0.023
vienne	0.058	0.083	0.017	0.009
ille_vilaine	-0.403	0.102	0.030	0.015
marne	-0.138	0.086	0.008	0.008
seine_inf	-0.316	0.112	0.021	0.013
loire	-0.294	0.071	0.018	0.008
cotes_nord	-0.250	0.080	0.009	0.008
aisne	-0.324	0.094	0.028	0.011
ardennes	-0.203	0.093	0.011	0.008
rhin_bas	-0.243	0.083	0.016	0.008
var	-0.159	0.104	0.012	0.009
garonne_hau	-0.087	0.079	0.006	0.008
indre_loire	-0.076	0.072	0.012	0.008
aube	-0.253	0.108	0.014	0.009
drome	-0.227	0.080	0.011	0.008
seine_oise	-0.407	0.090	0.014	0.010

TABLE 14

	Using Geographic Distance		Using Traveling Distance	
Industry	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**
calicoes	-0.0037	0.0055	-0.0033	0.0052
coal	0.0065	0.0075	0.0071	0.0078
cotton	0.0050	0.0033	0.0052	0.0034
ceramics	-0.0074	0.0847	-0.0080	0.0125
metalwork	0.0021	0.0035	0.0020	0.0039
ports	-0.0004	0.0055	-0.0002	0.0051
silk	-0.0143	0.0090	-0.0141	0.0087
textiles	-0.0014	0.0034	-0.0018	0.0033