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Case study for Germany: Entry and Competition for Bavaria, Germany

Notary Profession*

COMP/2006/D3/003 Conveyancing Services Market

Abstract

The purpose of this note is to analyse the entry effects on competitive conduct (markups) in notary profession in Bavaria, Germany. I focus on two issues in our German case study. First, I estimate the entry impact on the current competitiveness in Bavarian notary profession: I estimate the markup reduction of additional firm entry using the Bresnahan-Reiss Ratio, which measures the rate at which markups or variable profits fall with additional firm entry. Second, I analyse the effects of lowering the markups on the number of existing geographical notaries. The main results can be summarized as follows. First, I find that entry does affect conduct in the notary market. Empirical results indicate that the current Bavarian notary profession imposes net markups in the range of 53 to 116 percent over the competitive benchmark. Second, changes in markups would lead to changes in geographic coverage: a reduction in net markup is met with an increase in the number of geographc districts that are covered (in the sense of number of markets with at least one notary office). For example, if the net markups are decreased by 10, 20 and 30 percent then the number of geographc districts that are covered would increase by 8, 6 and 5 respectively. Consequently, the argument for a geographic entry restriction with high markups to ensure a high geographic coverage cannot be empirically supported in this note.

- *JEL Classification:*L11, L15, L69
- Keywords: Competition, Entry Threshold Ratio, Notary Profession

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1 Introduction

The purpose of this note is to analyse the entry effects on competitive conduct (markups) in notary profession in Bavaria, Germany. I focus on two issues in our German case study. First, I estimate the entry impact on the current competitiveness in Bavarian notary profession. Using the Bresnahan-Reiss Ratio, which measures the rate at which markups or variable profits fall with additional firm entry, I estimate the markup reduction of additional firm entry. Second, I analyse the effects of lowering the markups on the number of existing geographical notaries. In order to analyse the effects of geographic entry restriction on the notary profession in Bavaria, I focus on the 96 districts in Bavaria[1]. I chose Bavaria as our "representative" German case for two reasons. First, from the statistical aspect, Bavaria provides the largest data set for . Second, Bavaria is known to have the most restrictive entry requirements (both professionally and geographically) for the regional notary profession in Germany. The main results can be summarized as follows. First, I find that entry does affect conduct in the notary market. Empirical results indicate that the current Bavarian notary profession imposes net markup in the range of 53 to 116 percent over the competitive benchmark.Second, changes in markups would lead to changes in geographic coverage: a reduction in net markup is met with an increase in the number of geographc districts that are covered (in the sense of number of markets with at least one notary office). For example, if the net markups are decreased by 10, 20 and 30 percent then the number of geographc districts that are covered would increase by 8, 6 and 5 respectively. Consequently, the argument for a geographic entry restriction with high markups to ensure a high geographic coverage cannot be empirically supported in this note.

[1] I consider both "Landkreis" and "Kreisfreie" districts: e.g. city of Munich is classified as "Kreisfreie" whereas the district of Munich is classified as "Landkreis".

2 Notary Profession in Bavaria Germany and Data Description

2.1 Notary Market in Bavaria

I briefly describe the procedure for the entry into the notary profession in Bavaria as well as the geographic restriction that the profession faces. As in various justice ministries of German Bundesländer (a province or a state), Bavarian ministry of justice also takes the number of notarial acts needed as the prime factor in creating a new notarial office. Minimum numbers for creating new notarial positions usually range between 250 and 400 acts per year for attorney/notaries and between 1500 and 1800 per year for single-profession notaries. Although the Bavarian ministry bases the number of notarial acts authenticated by the notaries in the respective district in creating a new office, there are other economic and demographic factors such the district population and the economic output which also contributes in deciding for new notarial offices. These other factors, however, do not weigh equal proportion. For example, economic centers such Munich, where there is more demand for notarial services, have disproportionately more notaries as economic factors outweigh the population factor.

Once the need for a new notarial office has been confirmed, the province justice ministry appoints a Notarassessor from a list of applicants: the first appointment call goes to an applicant who obtained the highest state bar examination score. Thus, the entry into the notarial service profession can be described as not only extremely restrictive, but the practising of the service is geographically restrictive as well: one of the notary law further stipulates (§ 10a par. 2 BNotO) that a notary shall not exercise his tasks outside of his district, unless it is required by the interests of the parties.

2.2 Data Description

The data set contains information on the 96 Bavarian districts. I have information on the number of active notaries, income per capita, total population (as well as the demographic breakdowns), unemployment rate and the percentage change of number of houses in each of the 96 districts. I use a sample dataset from December 2003 for the number of notaries and 2004 figures for other explanatory variables. Table 1 shows the number of notaries per district in Bavaria, Germany. Around 83 percent of the districts (81 out of 96) comprises of three or less notaries. That is, there are 12 districts with no notary office, 22 districts with one notary office, and so forth. There are, however, two "outliers" in our sample: city of Munich and city of Nuernberg have 42 and 10 notary offices respectively, and these two cities are grouped into 6+ districts. The effects of these two cities on the empirical results are discussed in the later section.

Table 1: Number of Notaries per District in Bavaria, Germany

0	1	2	3	4	5	6+	Total
12	22	25	21	8	5	3	96

Source: `http://www.notare.bayern.de`

Table 2 describes the summary statistics of the variables that I use to analyse the entry effect on the conduct of Bavarian notary profession. I use the same explanatory variables as Nahuis, et al (2005), who study the effects of entry on the Netherlands notary profession, and Schaumans and Verboven (2006), who study the effects of entry and regulation on the health care professions in Belgium: pharmacists and doctors. One additional explanatory variable that I introduce is the percentage changes in the number of houses: this variable is introduced to capture the effect of the existing notaries on the development of housing markets. The other modification that I made in the explanatory variables is to introduce the fraction of population in the age range from 25 to 40. This age range is known in the housing literature as the age group that transacts (first time home buyers) most often. And hence, the 25 - 40 age group variable should theoretically be related to the number of notaries.

Table 2: Summary Statistics

Variable	Description	Mean	Std. Dev.	Min	Max
# Notaries	Number of notaries per district	2.60	4.36	0	42
ln(Population)	Logarithm of population	11.59	0.53	10.57	14.04
Income	GDP per capita (in 1.000€)	58.71	8.81	46.79	120.83
% Unemployed	Unemployment rate	8.56	3.01	4.30	17.10
% Pop. 25–40	Fraction of population between 25 and 40	19.90	1.46	17.17	26.16
% Δ House	Percentage change in the number of houses from 1995 to 2003	11.02	3.72	3.70	22.60

Source: `http://www.notare.bayern.de`, Statistisches Bundesamt

2.2.1 Data Source

I obtained the data from the following source:

- number of notaries per district: The Bavarian Notary Association. http://www.notare.bayern.de
- population, unemployment rate, changes in the number of houses, and mean income: German Federal Statistics Department: in particular Volkswirtschaftliche Gesamtrechnungen der Länder – VGR d L; http://www.vgrdl.de/Arbeitskreis_VGR/info.asp

3 Model

I use the entry model of Bresnahan and Reiss (1991) to address the entry effects on conduct of Bavarian notary profession. Since, for the most part, the model is identical to that in Bresnahan and Reiss, the exposition of the model will be brief.

Bresnahan and Reiss use the idea of entry threshold to measure the critical number of consumers required for an extra firm to be profitable. And the ratio of these entry thresholds provide scale-free measures of entry's effect on market conduct. Essentially, the Bresnahan and Reiss (BR) entry ratio looks at how the entry of a new firm in a (geographically defined) market affects the profit margins of existing firms. Bresnahan and Reiss model is particularly suitable for the Bavarian notary case study as the model explicitly bases on the assumption that entrants may

face entry barriers. Moreover, the ratio allows one to make inferences about the extent of competition by relating the number of entrants, N, to the size of the market, S.[2] That is, the ratio relates unobserved payoff from the equilibrium relationship between the observed market structure and market size. For example, a fall in variable profits (or net markups) due to an increase in competition implies that firms will require a larger market size, S, in order to remain profitable.

3.1 Entry Threshold Ratio

Below, I briefly describe the derivation of the equilibrium entry threshold ratio. The profit function, Π, for the nth entrant (firm) into the market can be defined as[3]

$$\Pi_n = \left[P_n - AVC\left(q_n, \mathbf{W}\right) d\left(\mathbf{Z}, P_n\right) \frac{S\left(\mathbf{Y}\right)_n}{n} \right] - F_n \tag{1}$$

where $P_n - AVC\left(q_n, \mathbf{W}\right)$ = average variable profitability, $d\left(\mathbf{Z}, P_n\right)$ = demand function for a consumer, $S\left(\mathbf{Y}\right)$ = "market size", n = number of firm in the industry, F_n = fixed cost for a firm, the vectors $\mathbf{Z}$ and $\mathbf{Y}$ represent demographic variables affecting market demand, and $\mathbf{W}$ denote the vector of cost shifting variables that affect AVC and the firm's output q_n. Given the set up above, Π_1, Π_2, and Π_3 represent the profit functions for a firm in a monopoly, duopoly and tripoly markets respectively. From equation (1), one can see that the more firms in the market, the less the variable profit margin.

The breakeven condition, $\Pi\left(S_n\right) = 0$, defines the breakeven level of demand. That is, one can determine the market size per firm as a function of fixed costs and equilibrium variable profits per

[2] To predict how N should vary with S, Bresnahan and Reiss assume that the product is homogenous and the entrants' characteristics are identical. For our purpose in analysing notary profession in Bavaria, these two assumptions are quite reasonable.

[3] For expositional purpose, I assume that later entrants' fixed and variable costs are not different than the earlier entrants'.

customer:

$$\begin{aligned} \Pi(S_n) &= 0 \\ &\Longrightarrow \\ s_n &\equiv \frac{S(\mathbf{Y})_n}{n} = \frac{F_n}{[P_n - AVC(q_n, \mathbf{W})\, d(\mathbf{Z}, P_n)]} \end{aligned} \tag{2}$$

Thus,the per firm entry threshold, s_n,decreases with increases in variable profits and margins (markups).

To obtain the entry threshold ratio, $ETR_{n,n+1} \equiv \frac{s_{n+1}}{s_n}$, that measures the rate at which markups or variable profits fall with entry, one uses the fact that the Nash equilibrium occurs for entry/existing firms when $\Pi_{n,n+1} < 0$. Thus, the ratio

$$\begin{aligned} \frac{s_{n+1}}{s_n} &\equiv \frac{\frac{S(\mathbf{Y})_{n+1}}{n+1}}{\frac{S(\mathbf{Y})_n}{n}} \\ &= \left[\frac{F_{n+1}}{[P_{n+1} - AVC(q_{n+1}, \mathbf{W})\, d(\mathbf{Z}, P_{n+1})]}\right] / \left[\frac{F_n}{[P_n - AVC(q_n, \mathbf{W})\, d(\mathbf{Z}, P_n)]}\right]. \end{aligned}$$

Assuming that the fixed costs for all firms are equal, I could then define the successive entry threshold ratio ($ETR_{n,n+1}$) as

$$ETR_{n,n+1} \equiv \frac{\frac{S(\mathbf{Y})_{n+1}}{n+1}}{\frac{S(\mathbf{Y})_n}{n}} = \frac{V_n}{V_{n+1}} \tag{3}$$

where,

$$\begin{aligned} V_n &= [P_n - AVC(q_n, \mathbf{W})\, d(\mathbf{Z}, P_n)] \\ V_{n+1} &= [P_{n+1} - AVC(q_{n+1}, \mathbf{W})\, d(\mathbf{Z}, P_{n+1})] \end{aligned}$$

The left-hand side of the ratio equation (3) ($\frac{\frac{S(\mathbf{Y})_{n+1}}{n+1}}{\frac{S(\mathbf{Y})_n}{n}}$) is observable and shows how competition affects variable profits. A ratio equal to one is an indication of perfect competition: variable

profitability (markups) does not change with entry of an additional firm. Consequently, the ratio that departs from one (i.e. greater than one) measures whether competitive conduct changes as the number of firms increases. One should, however, note that the entry threshold ratio does not measure the level of competition. Instead, it measures how the level changes with the number of firms.

3.2 Empirical Procedure for Entry Threshold Ratio

My empirical method follows that of Nahuis, et al (2005), who study the effects of entry on the Netherlands notary profession, and Schaumans and Verboven (2006), who study the effects of entry and regulation on the health care professions in Belgium: pharmacists and doctors.

In order to empirically address the aforementioned issues, I also use the ordered probit model, using maximum likelihood method, to estimate the entry threshold. The model treats firm's unobserved profitability as a latent variable, and uses information on the number of entrants as a proxy.[4] The

probability of observing markets with no firms equals

$$\Pr(N = 0) = \Pr(\Pi_1 < 0)$$

where, Π_1 denotes the monopolist's profit. And the probability of observing n firms in equilibrium equals

$$\Pr(N = n) = \Pr(\Pi_n > 0) \ \textit{and} \ \Pr(\Pi_{n+1} < 0)$$

That is, there are only n firms in the market as there is no profit incentive for extra firm to enter into this market (i.e. if one extra firm enters the market then he could expect to obtain negative profits).

As Nahuis, et al (2005) and Schaumans and Verboven (2006), I also use a functional form of

[4] One assumes free entry and that the new entrant breaks even at zero profit.

profits to estimate entry threshold:

$$\Pi_n = \lambda \ln(S) + X\beta - \alpha_n + \varepsilon_n \tag{4}$$

where S is the market size and $\mathbf{X}$ are the other explanatory variables. The cut points, α_n, of the estimation capture the effect of the number of firms in the market which still have positive profits. Consequently, according to the free entry condition, there will be at least n firms in the market if

$$\begin{aligned} \Pr(N \geq n) &= \Pr(\Pi_n^* > \varepsilon_n) \\ &= \Phi(\alpha_n - \lambda \ln(S) - X\beta) \end{aligned}$$

where $\Phi(\alpha_n - \lambda_n \ln(S) - X\beta_n)$ is the normal cumulative function and α_n is the value of the nth cut point estimated from the ordered probit.

Once the parameters, $\{\alpha_n, \lambda_n, \beta_n\}$, have been estimated via ordered probit, we then can construct the entry threshold by setting the profit function in equation (4) equal to zero: we can recover the market size, S_n, that is necessary to support a specific number of firms. In other words, we can find the entry threshold per firm by computing

$$\begin{aligned} \ln(S_n) &= \frac{\left(\widehat{\alpha}_n - X\widehat{\beta}\right)}{\widehat{\lambda}} \\ &\Longrightarrow \\ S_n &= \exp\left[\frac{\left(\widehat{\alpha}_n - X\widehat{\beta}\right)}{\widehat{\lambda}}\right] \end{aligned}$$

The entry threshold ratio, $ETR_{n,n+1}$, then is

$$\begin{aligned} ETR_{n,n+1} &= \frac{\frac{S(\mathbf{Y})_{n+1}}{n+1}}{\frac{S(\mathbf{Y})_n}{n}} \\ &= \exp\left[\frac{\widehat{\alpha}_{n+1} - \widehat{\alpha}_n}{\widehat{\lambda}}\right]\left(\frac{n}{n+1}\right) \end{aligned} \tag{5}$$

Thus, an entry threshold ratio greater than one implies that the per-firm entry threshold has to increase to in order to support an additional firm. Or, one could also interpret the increase in the rato as the reduction of markups of existing firms when the entry of extra firm occurs.

3.3 Empirical Results

My sample contains 96 isolated Bavarian districts (local markets).[5] Each district is clearly separated by local jurisdiction and most of the local population resides within each district (i.e. no overlapping customers), as in previous empirical literature on entry model, I also use population as a first approximation to the market size, $\mathbf{S(Y)}$. Figure 1 plots the distribution of our sample markets by ranges of the district's population.[6] The figures 1 and 2 show that our sample districts cover a wide range of market sizes, making it possible to estimate the population required to support one, two, and more firms. Moreover, the high correlation between the number of notaries and population also provide further support for using population as a proxy for market size.

<Insert Figure>

Table 3 provides our empirical model specification as well as the estimated parameters. Specification 1 and 2 can be considered as an "uncensored" ordered probit model (these models include Nuernberg and Munich with 10 and 42 notary offices respectively), whereas specification 3 and 4 are estimated without these two markets. Considering the Akaike criterion and the log likelihood values, specification 4 is considered to be the best fitted model. My final empirical observation is thus based on specification 4, although, the results from the rest of the specification are also reported. Judging from the estimation, all the explanatory variables are statistically significant, except for the percentage changes in the number of houses. As expected, the market size, measured by population, is the most significant market variable affecting the notaries' payoffs. The entry cut off values, $\{\alpha_i\}_{i=1}^{6}$ are all positive and increasing in value: this result is consistent with

[5] All data and estimation procedures can be obtained from the author.
[6] Figure 2 is same as Figure 1 without Munich and Nuernburg.

the theory of entry.

Table 3: Empirical Results: Ordered Probit Estimation

	Specification 1		Specification 2		Specification 3		Specification 4	
ln(Population)	0.9901	(0.2797)	0.9938	(0.2788)	0.7487	(0.3035)	0.7636	(0.3009)
GDP per capita	−0.0472	(0.0162)	−0.0472	(0.0162)	−0.0461	(0.0165)	−0.0461	(0.0165)
% Unemployed	0.1490	(0.0563)	0.1438	(0.0420)	0.1286	(0.0578)	0.1152	(0.0444)
% Pop. 25–40	0.2641	(0.0878)	0.2635	(0.0877)	0.2283	(0.0899)	0.2278	(0.0899)
% Δ House	0.0060	(0.0432)			0.0159	(0.0439)		
α_1	13.9622	(3.3486)	13.8815	(3.3024)	10.4854	(3.7414)	10.3579	(3.7272)
α_2	14.8220	(3.3528)	14.7412	(3.3066)	11.3412	(3.7455)	11.2136	(3.7313)
α_3	15.5851	(3.3667)	15.5025	(3.3185)	12.0966	(3.7591)	11.9650	(3.7437)
α_4	16.4042	(3.3908)	16.3207	(3.3418)	12.9074	(3.7816)	12.7735	(3.7657)
α_5	16.9977	(3.4233)	16.9154	(3.3761)	13.5035	(3.8104)	13.3727	(3.7956)
α_6	17.8036	(3.5097)	17.7249	(3.4687)	14.4352	(3.8789)	14.3146	(3.8687)
α_{10}	18.1445	(3.5625)	18.0669	(3.5234)				
α_{42}	18.9237	(3.7737)	18.8535	(3.7471)				
Observations	96		96		94		94	
Akaike criterion	3.462376		3.441747		3.419303		3.39942	
Log likelihood	−153.194		−153.204		−149.707		−149.773	

Standard errors in parentheses

Armed with the parameter estimates, I can now construct the entry threshold ratio according to equation (5). The results are in table 4. Looking at the last column in table 4, the entry threshold ratio for an additional firm in a monopoly market, $ETR_{1,2}$, equals 1.53: the monopoly market's net markup is reduced by 53 percent if an extra firm enters in this market. Or, one could interpret this ratio of 1.53 as the following: the market size needs to be increased by 53 percent in order to support both existing monopoly as well as the new entrant. For the markets with three existing firms, the entry threshold ratio, $ETR_{3,4}$, shows that an addition of one extra firm would result in a lose of 116 percent net markup. The main message from table 4 is that regardless of the current geographic market structure, the empirical results indicate high net markups (in relation to the competitive benchmark of no markup) in the Bavarian notary profession.

In order to analyse whether the lowering the net markup will lead to a redistribution of geographic coverage, I follow the estimation strategy proposed in Schaumans and Verboven (2006).[7]

[7] Unlike Schaumans and Verboven (2006), I cannot adjust both the entry requirement **and** net markups. In Schaumans and Verboven (2006), they study the Begium pharmacy market that has explicit limit on the market saturation point, i.e. maximum number of pharmacies required for each local district. Consequently, Schaumans

Table 4: Successive Entry Threshold Ratios

	Specification 1	Specification 2	Specification 3	Specification 4
$ETR_{1,2}$	1.1915	1.1877	1.5681	1.5334
$ETR_{2,3}$	1.4408	1.4343	1.8285	1.7834
$ETR_{3,4}$	1.7153	1.7085	2.2148	2.1624
$ETR_{4,5}$	1.4569	1.4553	1.7737	1.7534
$ETR_{5,6}$	1.8805	1.8818	2.8922	2.8613

For expositional purpose, I briefly state the estimation strategy. Let the variable profit to be defined as

$$V_n = \mu \cdot R_n \cdot S$$

where μ denotes the net markups and R_n denotes the revenues per customer. The change in the net markup, $\Delta\mu$, can be estimated by adjusting the estimated intercept from the order probit model: that is, $\widehat{\beta}_0$ to $\widehat{\beta}_0 + \widehat{\lambda} \ln(\Delta\mu)$.[8] Once the estimated intercept has been adjusted, one can then calculate the expected number of firms in each market using the marginal probabilities. Table 5 summarizes the entry predictions under various markups of notaries. One of the results in table 5 shows that the total number of notaries in Bavaria decreases if the net markups are reduced. This empirical observation is consistent with the theory of entry: the less the markups, the less firms could be supported to be competitive. The geographic coverage, however, would not decrease if the net markups were to be lowered: A reduction in net markup is met with an increase in the number of geographc districts that are covered (in the sense of number of markets with at least one notary office). For example, if the net markups are reduced by 10 ($\Delta = 0.9$), 20 ($\Delta = 0.8$) and 30 ($\Delta = 0.7$) percent then the number of geographc districts covered would increase by 8, 6 and 5 respectively.[9] The usual argument from the notary profession for geographic entry restriction with high markups is to ensure a sufficient coverage of notary service in the less attractive areas

and Verboven (2006) can provide empirical experiement on the effect of entry liberalization and reduction in the regulated markups on the expected number of pharmacies.

[8] $\Delta\mu < 1$ implies the reduction in net markups.

[9] I am comparing the number of actual districts with one or more notary offices to my estimated districts. For example, with a reduction in the net markups of 10% ($\Delta = 10$), the predicted number of districts with one or more notary offices is 90. The actual number (from the data) is 82. Thus, the difference is 8 more geographic coverage when there is 10 percent reduction in the net markup.

without triggering excessive entry elsewhere. The empirical results in table 5, however, indicate that such argument for geographic entry restriction with high markups does not seem to hold as the notary profession (industry) becomes more competitive.

Table 5: Predicted Observations (Specification 4)

	Number of Notaries							Total Number of Notaries	Total Number of District Coverage (1+)
	0	1	2	3	4	5	6		
Actual	12	22	25	21	8	5	1	198	82
Predicted ($\Delta = 0.9$)	4	20	58	10	0	1	1	177	90
Predicted ($\Delta = 0.8$)	6	29	50	7	0	1	1	161	88
Predicted ($\Delta = 0.7$)	7	44	35	6	0	2	0	142	87
Predicted ($\Delta = 0.6$)	13	55	20	5	0	1	0	115	81

4 Some Remarks

Using the data set that contains information on the 96 Bavarian districts, I analyse the entry effects on competitive conduct (markups) in notary profession in Bavaria, Germany. The main results can be summarized as follows. First, I find that entry does affect conduct in the notary market. Empirical results indicate that the current Bavarian notary profession imposes net markup in the range of 53 to 116 percent over the competitive benchmark. Second, a reduction in markups would lead to an increase in geographic coverage. Consequently, the argument for a geographic entry restriction with high markups to ensure a high geographic coverage cannot be empirically supported in this note.

For further research, it would be useful to follow Schaumans and Verboven (2006) on their effort to analyse the simultaneous effect of entry requirement **and** net markups on geographic coverage. As the Bavarian notary market does not have an explicit limit on the market saturation point, i.e. maximum number of notaries required for each local district, I can only adjust the markup dimension to see the effect on geographic coverage. My conjecture, however, is that if

there was a way to add the extra dimension of entry restriction, I would obtain even stronger results against the current geographic entry restriction as well as high net markups.

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Figure 1

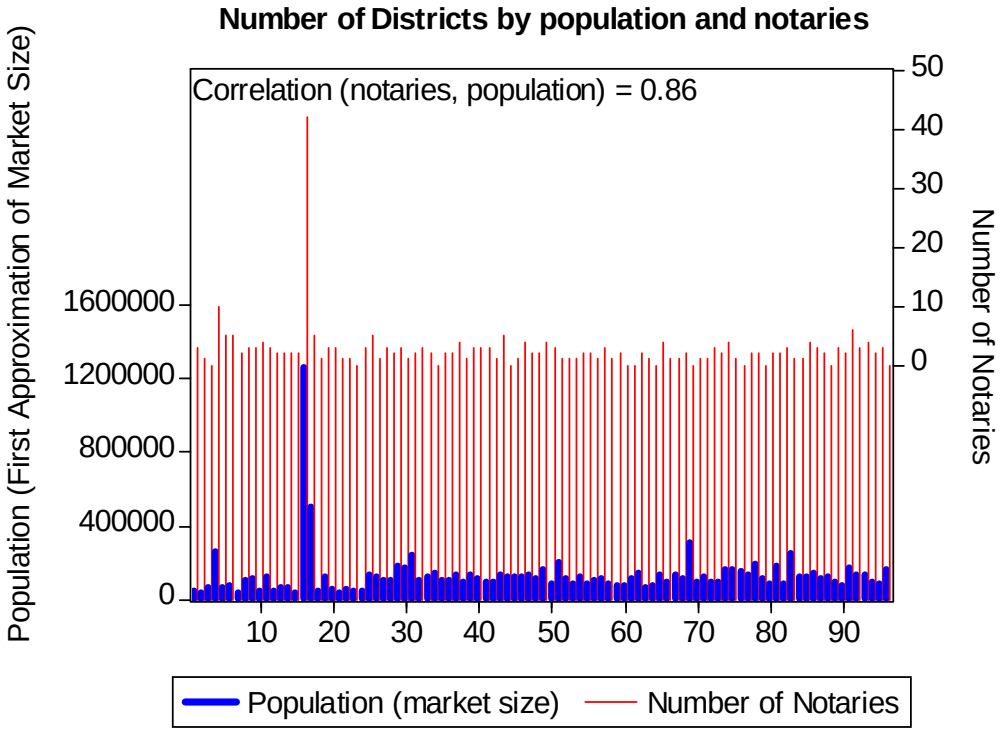

Figure 2