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Is there a Lower Bound to the Firm Size Distribution Comparing Transition Economies with an Established Market Economy

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Is there a lower bound to the firm size distribution comparing transition economies with an established market economy

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September 2003

Abstract

We apply Suttons (1998) framework to compare the firm size distribution of two transition economies, Slovenia and Bulgaria with that of a market economy, Belgium. We find that there exists a minimum degree of inequality in the size of firms. In addition firm size inequality levels in Belgium and Slovenia are found to have comparable values while levels in Bulgaria remain considerably lower. Furthermore, we find that the industrial structure in a leading accession country is closest to the structure that we find in a market economy.

Keywords: firm size distribution, transition economies, manufacturing

JEL: L11, P2, L6

Acknowledgements:

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I. Introduction

The legacy of communism implied that at the start of the transition period in Central and Eastern Europe (CEE) (state owned) firms tended to be large, inefficient and vertically integrated, while small and medium sized enterprises were in effect nonexistent (Roland, 2000). The privatization and restructuring of these state owned enterprises and the introduction of market forces in CEE implied the emergence of new small firms and a decline of the old inefficient ones. However, little is known about the actual evolution of the firm size distribution in these countries and whether they are converging to the typical size distribution we see in developed market economies. Yet, with the upcoming EU enlargement this seems to be a relevant question given the obvious implications for market structure and potential market power of firms in transition economies (e.g. Konings, Van Cayseele and Warzynski, 2003). In this paper we study the evolution and shape of the firm size distribution that holds across a wide range of industries in two transition economies, Slovenia and Bulgaria, and compare them with a benchmark of a developed comparable market economy, Belgium. Although Slovenia and Bulgaria are both former communist countries they are at very different stages in the transition process. Slovenia forms part of the first wave of accession countries joining the EU in 2004 while Bulgaria forms part of the second wave joining in 2007. Slovenia implemented market oriented reforms fairly rapidly and is now one of the leading accession countries with the highest GDP per capita in excess of 70% of the EU average. In contrast, Bulgaria was a slow reformer experiencing a painful transition and has a GDP per capita of 23% of the EU average.

Table 1: Selected Economic indicators for 2001

	GDP (millions euros)	GDP pre capita (euros)	Population (millions)
Bulgaria	15.2	6,500	7.91
Slovenia	20.9	16,000	1.99
Belgium	256.5	24,482	10.27

Source: Regular report for Slovenia from the European Commission and the Belgian National Bank

We see from table 1 that Belgium is the wealthiest of the three countries with a GDP per capita in 2001 of € 24,982. This compares to Slovenia with a GDP per capita of € 16,000 and Bulgaria €6,500. It is therefore of great interest to compare not only the size distributions between different transition economies but also to be able to compare their distributions and with an European benchmark. The context in which we analyze the size distributions of firms is to be placed in the recent evolutions in the “growth of firms” literature as surveyed by Sutton (1997) and the “bounds approach” to studying firm size distributions.

An old theme in industrial organization deals with the dynamics of firm size and industry structure, which goes back to Gibrat’s law of proportionate effect. Gibrat (1933) showed that the firm size distributions he examined were approximately log normal in form and explained this by postulating a “law of proportionate effect”, stating that a firm’s growth rate could be modelled as a random variable whose mean was proportional to the firm’s current size. In recent years, however, various empirical studies starting with Evans (1987a,b) and Dunne, Roberts and Samuelson (1989) have shown that Gibrat’s law fails to hold. They rather point out a negative relationship between firm growth and size and a negative relationship between firm growth and age of the firm. These are findings that were interpreted in the context of theoretical approaches that highlight the role of learning in explaining the dynamics of firm size and industry structure as in Jovanovic (1982) and Erickson and Pakes

(1989). However, as pointed out by Sutton (1997), there is no rationale for positing a general relationship between a firm's size and its expected growth rate, nor can there be any a priori expectation about the size distribution of firms to take any particular form for the general run of industries.

The empirical literature suggests that there is no "typical" size distribution that would hold for the general run of industries. This was the starting point of the "bounds approach" to modelling equilibrium size distributions of firms in Sutton (1998) and is the topic of this paper. In particular we test whether Sutton's framework, which is based on a derived lower bound to the equilibrium size distribution of firms, holds. To this end we use a unique data set of Slovenian, Bulgarian and Belgian manufacturing firms. This allows us to test whether the stochastic framework that drives the lower bound to firm size holds in advanced market economies as well as in emerging markets. An analysis of the evolution of the size distribution of firms in a transition economy is of particular interest as the size distribution of firms under communism were driven by the Central Planner, rather than market or stochastic forces. Sutton claims that it is of particular interest to compare countries that experience differing average size distributions. Nowhere is this more prevalent than when we compare transition economies with western market economies.

There have been only a few empirical studies testing this "lower bounds" approach. The first empirical study was by Sutton (1998) where he tested his approach for the US and German manufacturing sector and for the US cement industry and found that the data conformed well to the lower bound. Subsequent studies of the Spanish Retail Banking Sector (DeJuan, 1999), the Italian Motor Industry (Buzzacchi and Valletti, 1999) and the Carbonated Soft drinks industry

(Walsh and Whelan, 2001) all applied the bounds approach. For transition economies the literature has focused on the traditional “firm-growth” analysis aimed at unravelling the relationship between firm size, age and growth, rather than an application of the bounds approach (e.g. Konings and Xavier, 2003). Newbery and Kattuman (1992) compared the average size of enterprises in market economies and in Soviet type economies and found that there existed fundamental differences in the size distribution of firms.

In this paper we investigate the firm size distribution one decade on since the initiation of the transition process. This allows us to see firstly, how different the firm size distribution in the manufacturing sector deviates in Slovenia and Bulgaria from the one in Belgium and secondly, to see if there has been an evolution of the size distribution during the Slovenian and Bulgarian transition period relative to a well established market economy.

The outline of our paper is as follows. In section II we outline the theoretical framework while in section III we discuss the data. We present the results in section IV and in section V we conclude.

II. Theoretical Framework

The recent firm growth literature introduced models of passive and active learning as potential explanations for the observed evolution of firm size distributions, however, testing such models empirically leaves often room for alternative interpretations¹. Sutton (1998) suggests to follow a different analytical route. Rather than trying to control for all possible (sometimes unobservable) factors driving the skewness of size distributions, instead it is possible to ask whether there exists some mechanism that induces some minimal degree of inequality in firm's sizes, which is driven by pure stochastic factors, rather than strategic interaction effects. Sutton (1998) shows that such a mechanism exists and that it emerges because the industries are characterized by many independent submarkets. These submarkets within each four or five digit SIC code may emerge because of independent product groups or because of different geographical regions of a country in which firms operate.

To reach such a benchmark two simple conditions are introduced, conditions that are set up in such a way that they should generate a minimal degree of firm size inequality. The first condition is that the probability that the next market opportunity is filled by any currently active firm is independent of the size of that firm. The second condition that is required is that the probability, p that the next market opportunity is filled by a new entrant is constant over time. Using these two conditions Sutton (1998) derives a stochastic model of the evolution of firm size, which yields a limiting size distribution of firms. We will repeat the basic outline of the model in what follows.

¹ For passive learning models see Jovanovic (1982) and for active learning models see Ericson and Pakes (1995). The first empirical tests of these models are in Evans (1987a,b).

Let each opportunity be of the same size in terms of profitability for a firm and maximum one firm can take up an opportunity. If more than one firm takes up the same opportunity it would turn out to be unprofitable. These opportunities are labelled by $t=1,2,3,\dots,T$. The size of a firm is measured by the number of opportunities that it taken up.

Figure 1:

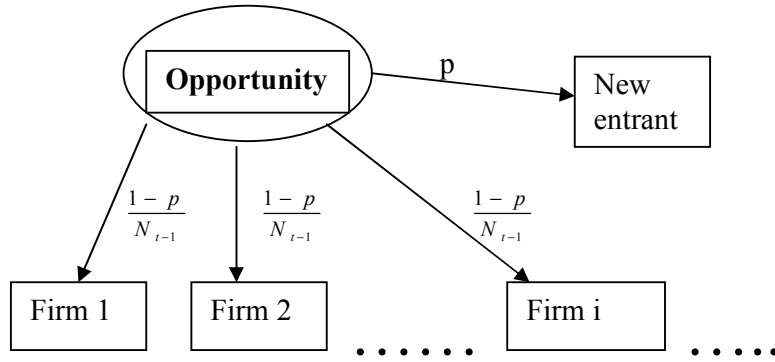


Figure 1 illustrates how independent opportunities may be taken up by any active or any new firm. Let N_t denote the number of active firms at time t , where

$$N_t = \sum_{i=1}^T n_{it} \quad (1)$$

In (1) n_{it} stands for the number of firms of size i at stage t .

At stage 1 ($t=1$), the first opportunity is taken up by some firm and so $N_1=1$. In the next stages, each opportunity may be taken up either by some active firm or by a new entrant. The objective is to characterize the evolution of the number of firms N_t and their size distribution, described the vector n_{it} . The evolution of the number of

firms depends only on condition 2 and can be analysed independently of the size distribution. Thus the total number of firms entering between stage 2 and stage t , which is equal to $N_t - 1$, by definition, is described by a binomial distribution with density

$$\Pr(N_t = N) = \binom{t-1}{N-1} p^{N-1} (1-p)^{t-N} \quad (2)$$

The number of firms has a mean of $1 + p(t-1)$, where p denotes the probability that the new opportunity arising in any period is captured by an entrant.

The characterisation of the limiting size distribution of firms associated with a particular number of firms is more complicated. The idea is to characterize the size distribution of firms whose Lorenz curve is closest to the diagonal subject to condition 1. We refer to Sutton (1998), pp 250-256, for a derivation of the limiting size distribution of firms, which can be summarized in the following proposition

Under conditions 1 and 2 for any fixed ratio k/N , an asymptotic lower bound to the k -firm concentration ratio is given by

$$C_{k/N} \geq \frac{k}{N} \left(1 - \ln \frac{k}{N} \right) \quad (3)$$

Equation (3) will be the basis of our empirical test. Equation (3) shows that the lower bound to concentration is independent of the entry parameter p . This parameter affects the average firm size, but not the shape of the size distribution, which contrasts sharply with the traditional literature in which the skewness of size distributions was parametrized by p (e.g. Hart and Prais, 1956). Equation (3) also shows that various k -

firm concentration ratios are all bounded below by a curve that approximates (3). So in our empirical testing we can pool data for various k-firm concentration ratios. It is also worth noting that the lower bound to concentration lies above the equal size distribution benchmark, $C_{k/N} = \frac{k}{N}$ corresponding to a Lorenz curve lying along the diagonal.

III. Data

We use individual firm level data for Belgium, Slovenia and Bulgaria for the period 1996-1999. Our data consists of all manufacturing companies that have to report full company accounts to the national statistical offices or central banks. Therefore in our paper we do not have to deal with the empirical issues that arise in testing of the lower bound when using official statistics. Official statistics often apply a standard cut off level for the firm size generally only reporting those firms that operate with at least 5-10 employees. This practice, however, underestimates the role micro-enterprises play in many countries. Moreover, omitting these micro-enterprises can affect the accurate empirical estimation of the lower bound. Sutton (1998) points out that incorporating a cut off point causes the number of firms, N , to be lower than the actual amount of firms resulting in an overestimation of the concentration estimate C_k that can cause the lower bound to be violated. In addition very few official statistics report the four, eight and twenty concentration ratios at the 3 digit nace level and even less report the number of firms active in each market. By using individual firm level data can calculate both these concentration ratios and also establish a complete picture of the number of firms active in each market without suffering from the effects of adopting a cut off point. The database used for Belgium and Bulgaria is

a commercial database collected by “Bureau Van Dijck” which is a quoted software and consulting company and sold under the name ‘Amadeus’.² The data that we have at our disposal cover both small and medium sized enterprises as well as the large ones. Furthermore, the data is based on a standard format of company accounts with the data covering variables such as operating revenues, number of employees and total fixed assets. The availability of data varies between countries, depending on the national legislation regarding accounting practices. The data quality for Belgium and Bulgaria is particularly good. In Belgium all companies have to report by law their financial statements (full or abbreviated depending on the size of the company) to the Central Bank. Also in Bulgaria the law stipulates that companies are required to submit their accounts to the Central statistical office.

For Slovenia we use the company accounts of virtually all the manufacturing sector that was available at the Slovenian Central Statistical Office. Table 2 compares the employment coverage of our data set with the data from the industrial labour organisation yearbook. We can note that we cover virtually the entire manufacturing employment for all countries in our study. We cover 59,150 firms reporting employment for Belgium, 21,850 for Slovenia and 18,641 for Bulgaria.

Table 2: Comparison between Amadeus and ILO Yearbook

	Belgium	Bulgaria	Slovenia*
1996	0.87	0.78	0.69
1997	0.90	0.69	0.70
1998	0.89	0.55	0.70
1999	0.90	0.98	0.74

* we compare our data for Slovenia with the Slovenian Statistical yearbook 2001

² Previous papers to have used Amadeus dataset include Konings, Van Cayseele and Warzynski (2001, 2003) and Huiznga (2003)

We proxy for the size of the firm by the level of employment. The level of employment is defined as the number of employees on the payroll of the firm, regardless of whether they are full time or part time staff. We experimented with other proxies for size such as total assets, but this did not change our main results.

Table 3: Summary Statistics of Employment:

	1996	1999
Average emp in Belgium	37	37
Average emp Slovenia	50	44
Average emp Bulgaria	166	77
Empgrowth Bulgaria(96-99)	-18.06	-16.8%*
Empgrowth Slovenia(96-99)	-6.0%	-4.4%*
Empgrowth Belgium(96-99)	-3%	-2.05*
* indicates the actual employment growth calculated from the ILO		

We see from table 3 that the average employment in the three countries differs considerably. As we expect Belgiums average employment level is lower than the other two countries and remains constant over the sample period. For both Bulgaria and Slovenia average employment level reduces over the period towards the Belgian level. Furthermore, we see that both transition countries have experienced more employment decline than Belgium.

IV. Results

We start by showing for the three countries the Lorenz curve that corresponds to the lower bound of the size distribution and the observed four, eight and twenty firm concentration ratios defined at the three digit NACE sector classification for the year 1999, our last year of observations. Appendix 3 provides the list of three digit codes and the corresponding number of firms in each category for each country. The three digit NACE classification corresponds to a relatively high degree of aggregation. Sutton points out that it is conceivable that a three digit nace industry (four digit SIC) may also comprise a number of four digit industries in which the average firm size may be widely different. Moreover, he proposed that the lower bound might be affected by taking data from two or more industries with different p values. If indeed the entry rates are different then the average firm sizes would also be different. Sutton splits this aggregation problem into two parts ‘independent subindustries’ and ‘interdependent subindustries.’ In the independence subindustries case, if the average firm size in all subindustries is not equal then although the predicted bound outlined by equation (3) will hold the data may not be tight to the bound. Nevertheless, we have also experimented with a finer aggregation level (four and five digit), but this did not change our results, which suggest that the patterns that we get are not due to some aggregation bias³.

From figures 2, 3 and 4 we can note that for all three countries the lower bound to the size distribution of firms is not violated, although quite some observations lie close to the lower bound. This suggests that a minimal degree of inequality of firm size distributions as predicted by the theory, purely driven by stochastic forces and independence effects, exists across a wide range of industries

³ We did not have four or five digit nace available for Belgium and Bulgaria.

and even in newly emerging market economies. Although the model predicts that the lower bound will be stable it is still perhaps surprising given that transition countries previously had a contrived industrial structure.

Figure 2: Bulgaria

1999

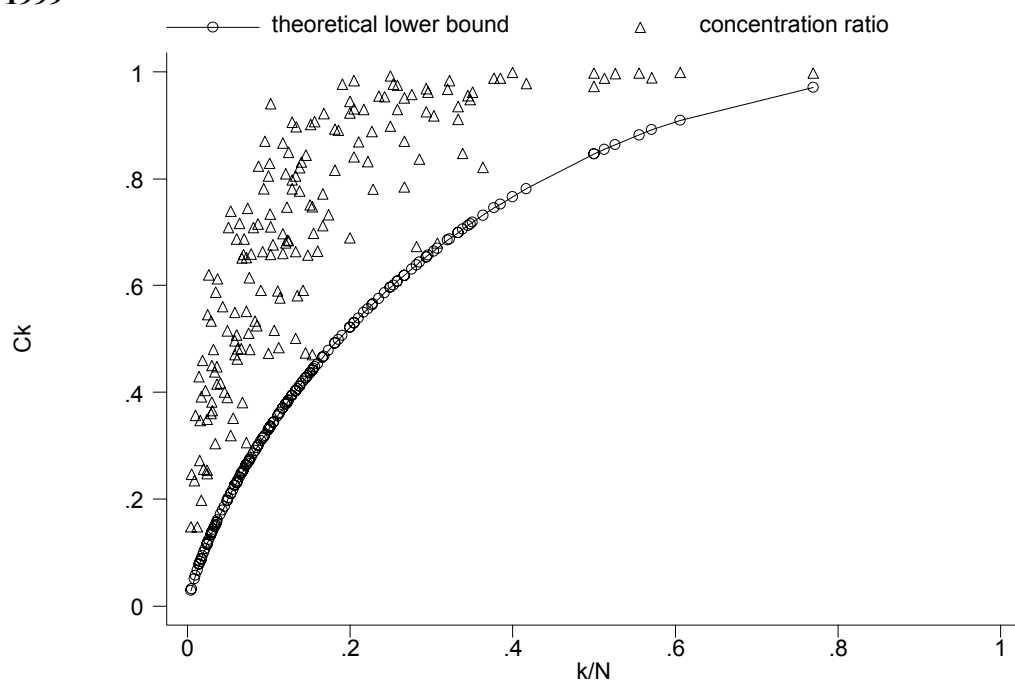


Figure 3: Slovenia

1999

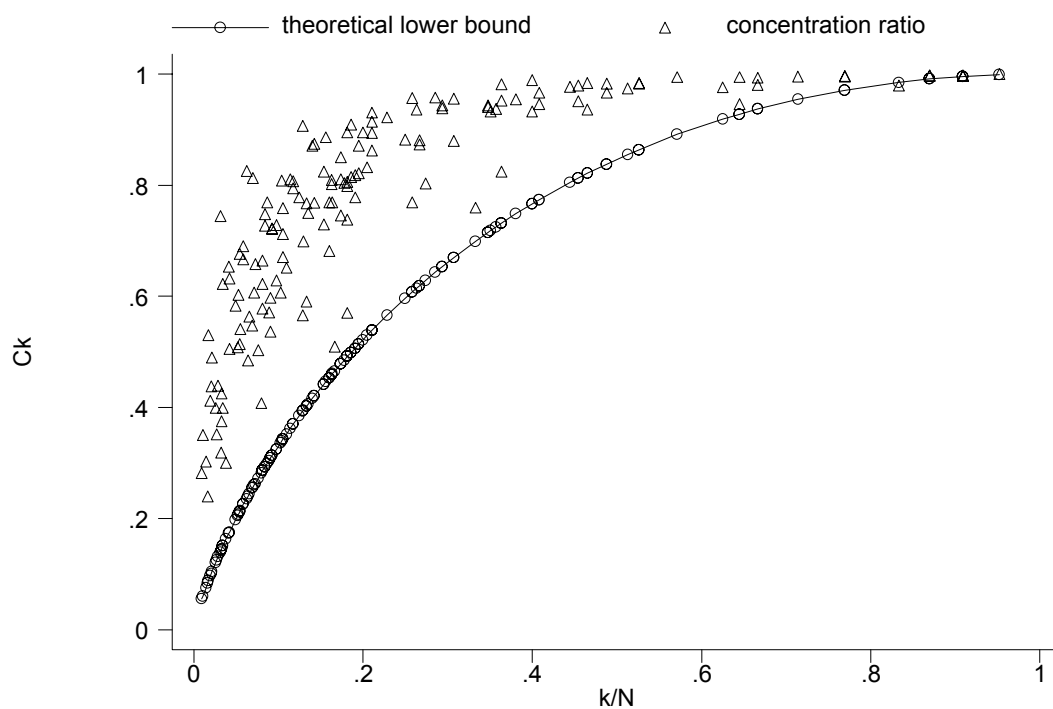
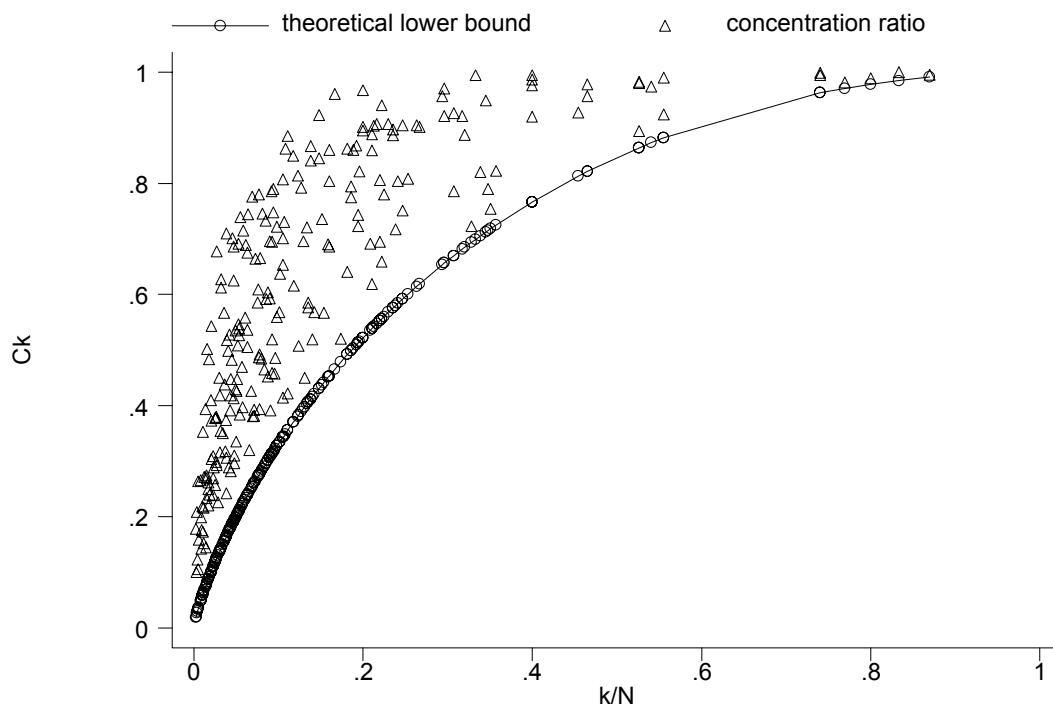


Figure 4: Belgium

1999



In table 4 we show the number of violations of the theoretical lower bound when we would increase the lower bound by 5%, 10% and 15% in Bulgaria, Slovenia and Belgium. It is remarkable how little violations we encounter within a range that is so close to the bound. If we take a margin of 15% only 20 sectors in Slovenia and Belgium and 10 sectors in Bulgaria would fall below the lower bound.

Table 4: Number of Violations of the Theoretical Lower Bound in 1999

Number of Violations in:	at 5%	at 10%	at 15%
Bulgaria	1	3	5
Slovenia	12	16	22
Belgium	10	11	16

While we can confirm that the minimal degree of inequality in firm size distributions holds even in the newly emerging market economies, based on these graphs we can not make any strong statement about how similar the market structure in Bulgaria and Slovenia is to the one in Belgium and whether there has been a convergence towards size distributions which are closer to the one in Belgium, a market economy. We therefore plot the same type of graphs for the year 1996⁴ for the three countries and in addition we report the evolution of the Gini coefficient, which measures the degree of inequality, for the three countries in table 5. The Gini coefficient is a measure of inequality of a distribution of some variable across a population. It takes the form of the following ratio: the area between the Lorenz curve and the diagonal (that represents perfect equality of distribution of the variable), divided by the area of the triangle beneath the diagonal (which is 0.5).

⁴ See Appendix 2

$$\text{Gini} = \sum_{i=1}^n \sum_{j=1}^n \left| \frac{x_i - x_j}{2xn^2} \right|$$

The Gini coefficient takes the value 0 if there exists complete equality across the population and 1 if there is complete inequality. With these coefficients we can see how the firm size distribution has evolved in both countries and also quantify these differences in inequality by reporting the Gini coefficients. In table 4 we can note that in Belgium and Slovenia the Gini coefficient remains stable over time and that they have a comparable value. In contrast, in Bulgaria, the Gini coefficient is much lower and remains low over time indicating more equality in the size distribution of Bulgarian firms. This higher equality means that in Bulgaria there are more firms of similar size and this may reflect the Central Planners policy of generating economies of scale via the establishment of large enterprises as opposed to small and medium sized enterprises.

Table 5:Gini coefficients

Gini	1996	1997	1998	1999
Bulgaria	0.74	0.57	0.59	0.75
Slovenia	0.86	0.86	0.86	0.85
Belgium	0.82	0.82	0.82	0.82

We find that the role of small and medium size enterprises SMEs⁵ differs within each of the three countries. We see from table 6 that the role played by large firms is higher in Bulgaria than in Belgium and Slovenia. This finding of the presence of large firms combined with the lack of SMEs is consistent with our interpretation as to why Bulgaria has the lowest Gini coefficients. However, over the sample period both

⁵ Definition of a SME is a firm with less than 250 employees.

Bulgaria and Slovenia tend towards the level that is found in Belgium. Our findings that Belgium has the lowest percentage of large firms corresponds with the findings of Audretsch and Thurik, (1997 and 2000). They show that in market economies there has been a shift away from large enterprises towards the role of small enterprises in providing more economic activity. Although in Bulgaria there has been an increase in the role of SMEs we find that by 1999 the percentage of large firms is still twice the level found in Belgian manufacturing. This indicates that Bulgaria is still behind in aligning its industrial structure towards small firms. Furthermore, Audretsch, Carrree, van Stel and Thurik (2000) show that there exists an optimal industrial structure and deviations away from this structure, as measured in terms of the relative importance of small firms, results in a cost in terms of forgone GNP growth. If we take Belgium to have the benchmark industrial structure then Bulgaria is experiencing more of a deviation from the benchmark industrial structure reflecting its poor position in the transition league tables.

Table 6: Percentage of firms with >250 employees

	1996	1997	1998	1999
Belgium	2.3	2.3	2.3	2.3
Slovenia	4.6	4.2	4.1	3.8
Bulgaria	12.7	26.8	30.9	4.9

V. Conclusion:

In this paper we investigate the firm size distribution using Suttons (1998) bounds approach. We test whether there exists a lower bound to the size distribution of firms in two transition countries and compare their mathematically predicted lower bound to the lower bound of an established economy. We find that there exists a minimum degree of inequality in the size of firms. Therefore, despite the fact the three countries have had significantly different histories that consequently resulted in different industrial structures all are bounded by Suttons lower bound.

We find that the industrial structure in Bulgaria differs most from the structures in both Slovenia and Belgium. For Bulgaria we find that both the firm size inequality levels and the percentage of SMEs in its industrial make-up are furthest from the Belgian level. We conclude that transition economies with industrial structures closest to that of a market economy are more likely to be also those countries leading the way in the accession process.

One area for further research would be to allow for competition to play a role within submarkets. This would result in far richer policy implications particularly in the area of competition policy.

VI. References:

Audretsch, D.B, and Thurik, A.R (1997),” Sources of Growth: the entrepreneurial versus planned economy. *CEPR discussion paper*.

Audretsch, D.B, and Thurik, A.R (1997),”Capitalism and democracy in the 21st century: from managed to the entrepreneurial economy”, *Journal of Evolutionary Economics*.

Audretsch, D.B, Carree, M.A, Van Stel, A.J and Thurik, A.R (2000), “ Impeded Industrial Restructuring: The Growth Penalty” *CEPR discussion paper*.

Buzzacchi, L. and T. Valetti, (1999), “ Firm Size Distribution: Testing the “Independent Submarkets Model in the Italian Motor Insurance Industry”, *Discussion papers Series EI, STICERD, LSE*.

De Juan, R., (1999), “The independent Submarkets Model: An application to the Spanish Retail Banking Markets”, *International Journal of Industrial Organisation*.

Dunne, T., M. Roberts and L. Samuelson, (1988), “Patterns of firm Entry and Exit in the Us Manufacturing factory Industries”, *Rand Journal of Economics* 18:pp1-16.

Ericson, N., and A. Pakes, (1989), “ Empirical implications of alternative models of firm dynamics”, *WP8803, University of Wisconsin*.

Evans, D. S., (1987a), “Test of Alternative Theories of firm Growth”, *Journal of Political Economy*, 95, 4, 657-674.

Gibrat, R., (1931), Les inégalités économiques; applications: aux inégalités des richesses, à la concentration des entreprises, aux populations des villes, aux

statistiques des familles, etc., d'une loi nouvelle, la loi de l'effet proportionnel. *Paris*: Librairie de Recueil Sirey.

Hart, P.E., and S. J. Prais, (1956), "The Analysis of Business Concentration: A statistical Approach." *Journal of the Royal Statistical Society* (series A) 119:150.
Jovanovic, B., (1982) "Selection and the Evolution of Industry", *Econometrica*, 50:649-70.

Konings, J., Van Cayseele. P and F. Warzynski, (2001), "The dynamics of Industrial Markups in Two Small Open Economies: Does National Competition matter?", *International Journal of Industrial Organisation*, Vol.19, pp.841-859

Konings, J., Van Cayseele. P and F. Warzynski, (2003), "The effects of Privatization and Competitive Pressure on Firms, Price-cost Margins: Micro Evidence from Emerging Economies," *LICOS Discussion Paper 125/2002, K.U.Leuven, Belgium*.

Konings, J., and A. Xavier, (2002) "Firm growth and Survival in a Transition Country: Micro Evidence from Slovenia" *LICOS Discussion Paper 114/2002, K.U.Leuven, Belgium*.

Newbery, D. and P. Kattuman, (1992), "Market Concentration and Competition in Eastern Europe," *World Economy*, XV, (1992), 315-334.

Roland, G., (2000), "Transition and Economics, Politics Markets and Firms". *Cambridge, MA: MIT Press*.

Sutton, J., (1991), Sunk costs and Market structure: Price competition, Advertising and the evolution of concentration, *Cambridge, MA: MIT Press*.

Sutton, J., (1997), 'Gibrat's legacy', *Journal of Economic Literature*, 35:40-59.

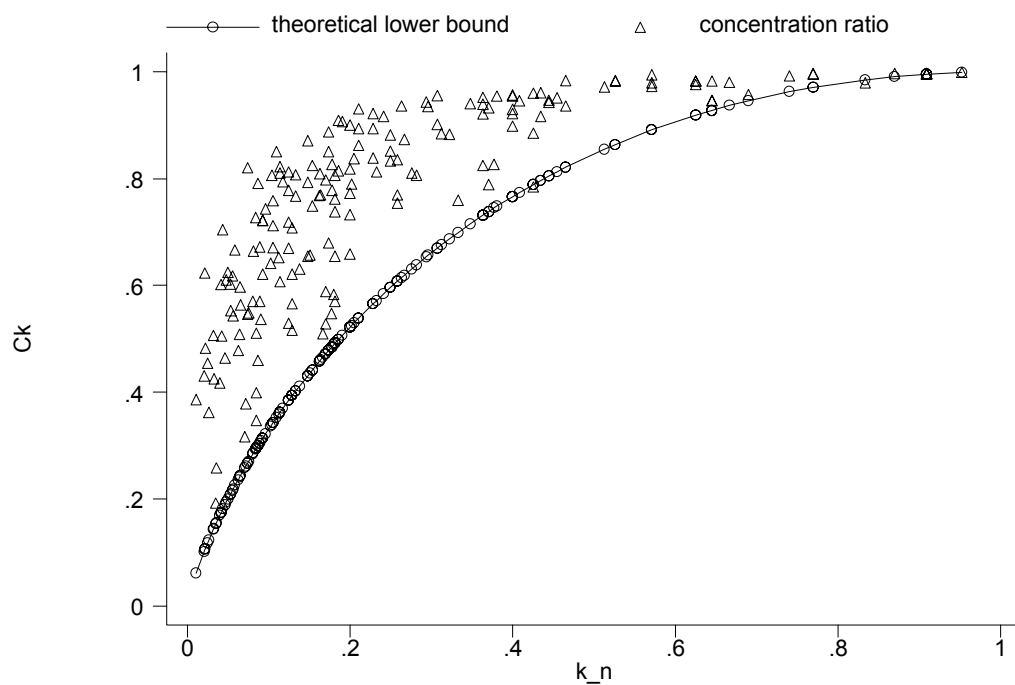
Sutton, J., (1998), Technology and Market Structure, *Cambridge, MA: MIT Press*.

Walsh, P.P and C. Whelan, (1999a), “ Product differentiation and firm Size distribution: An Application to Carbonated Soft Drinks”, *Working paper in the Centre of Economic Research, University College Dublin.*

Appendix 1:

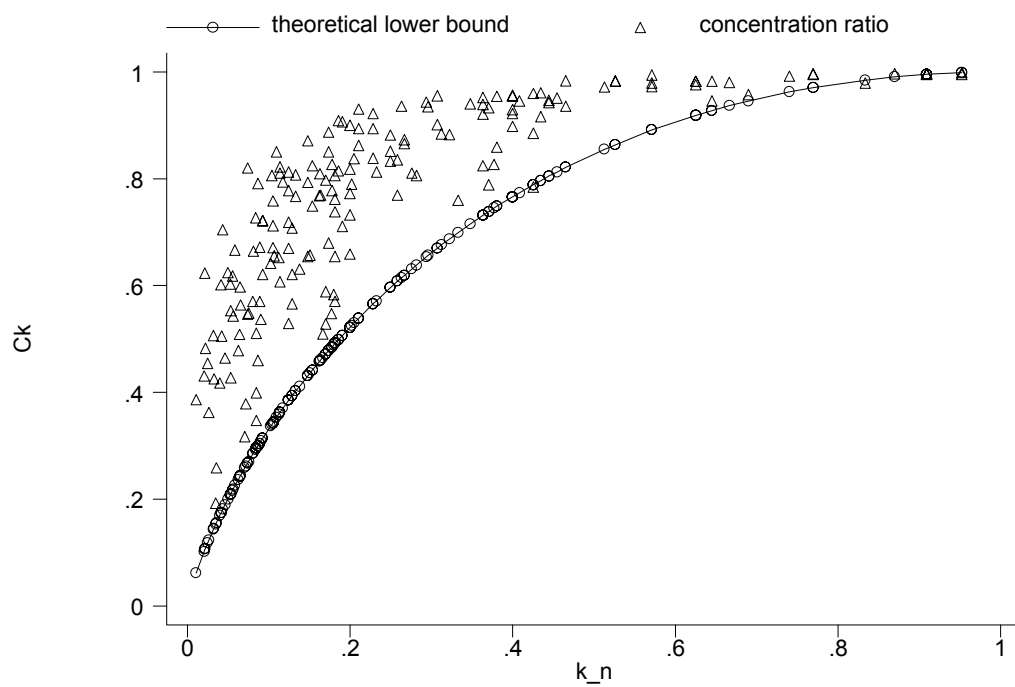
Slovenia (nace4)

1999



Slovenia (nace5)

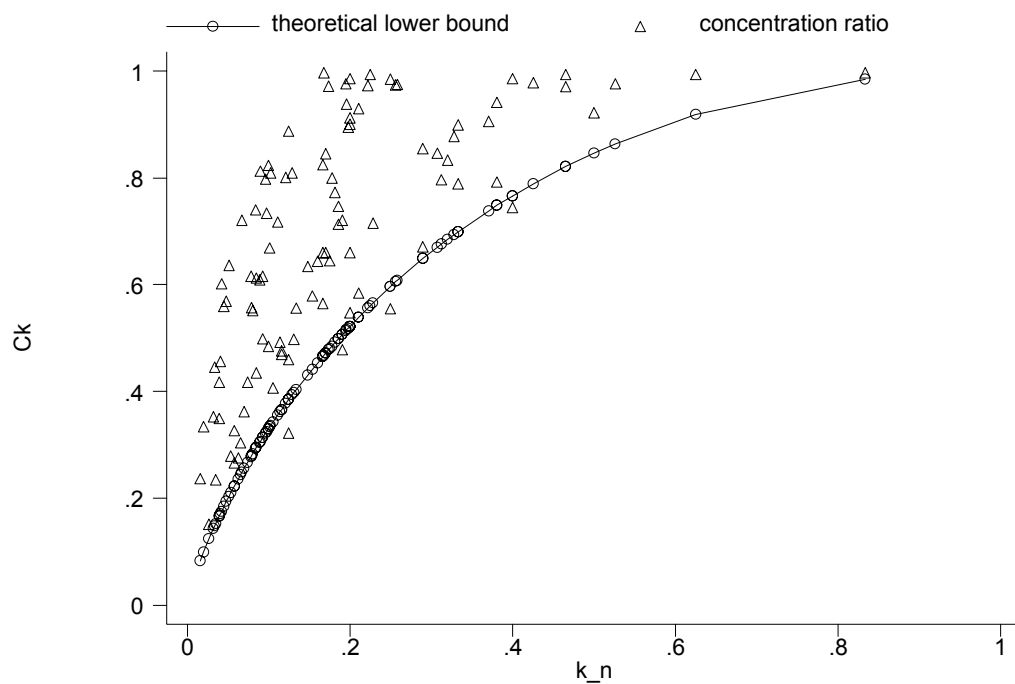
1999



Appendix 2:

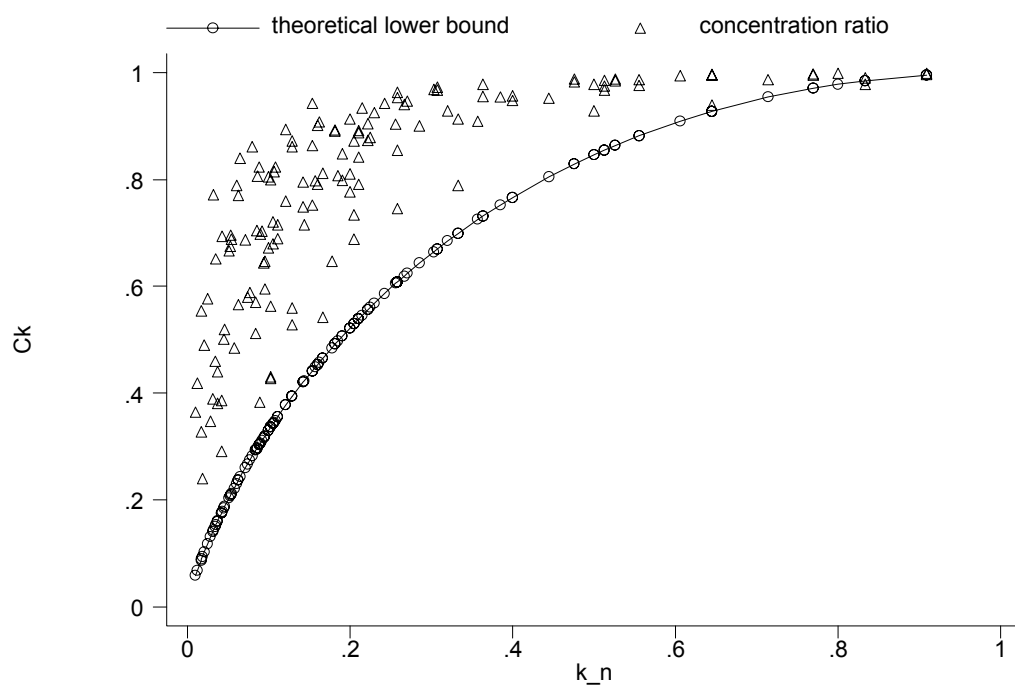
Bulgaria

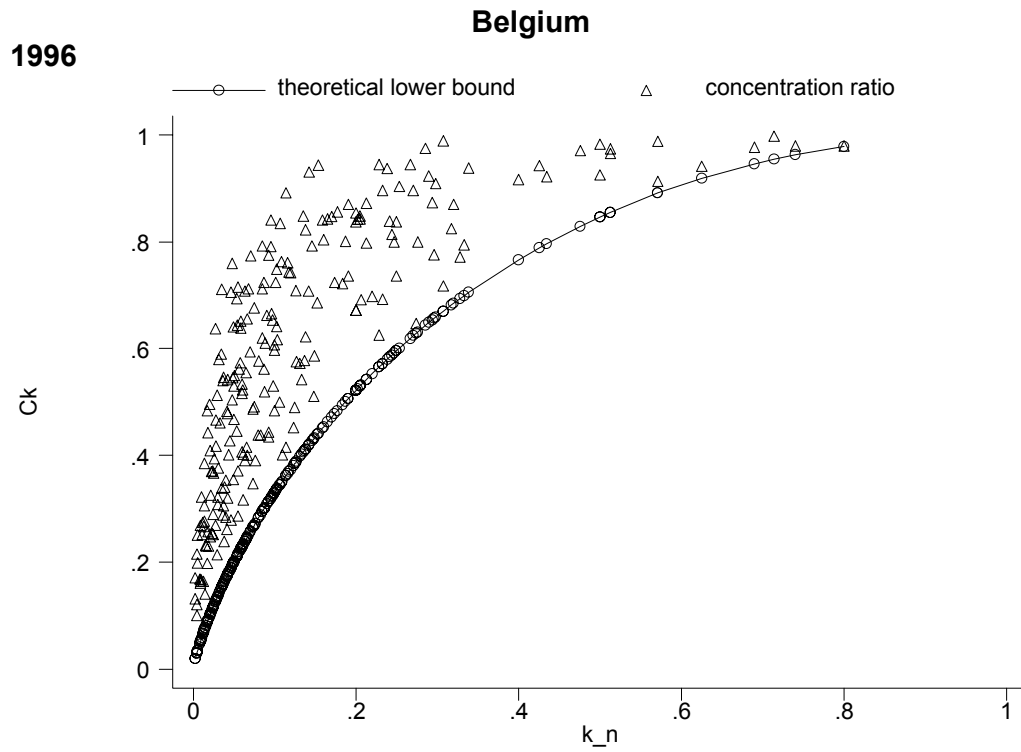
1996



Slovenia

1996





Appendix 3:

nace3	No of firms in Bulgaria	No of firms in Slovenia	No of firms in Belgium
151	282	55	634
152	19	6	60
153	138	40	130
154	57	7	38
155	205	22	187
156	177	16	104
157	56	9	203
158	816	176	2491
159	250	43	234
171	36	13	175
172	61	19	239
173	76	5	162
174	31	58	308
175	38	69	424
176	32	3	32
177	40	59	-
181	19	11	18
182	924	318	902
183	12	1	34
191	8	7	24
192	20	30	72
193	145	47	51
201	137	180	337
202	21	25	80
203	123	131	578
204	29	36	101
205	72	103	165
211	13	12	64
212	112	81	308
221	257	275	1228
222	170	465	2888
223	7	5	44
231	-	-	2
232	5	4	32
233	2	-	7
241	66	33	231
242	4	3	11
243	31	12	136
244	40	14	123
245	95	35	186
246	32	62	125
247	3	1	24
251	43	43	115
252	239	374	672
261	25	28	188

262	41	25	72
263	8	2	24
264	-	16	92
272	11	4	30
274	26	5	74
275	69	60	121
282	32	23	149
283	10	5	43
284	20	24	283
285	81	205	1330
286	77	120	159
287	115	554	392
291	62	45	168
292	156	143	524
293	58	51	144
294	27	52	146
295	220	147	398
296	18	3	22
297	43	28	75
311	27	44	101
312	60	44	106
313	13	6	32
314	11	6	14
315	35	22	193
316	92	174	155
321	50	107	98
322	53	33	51
323	19	14	63
331	41	42	449
332	35	80	78
333	33	46	72
334	22	27	45
335	1	4	10
341	3	10	33
342	7	22	233
343	45	53	110
351	44	16	141
352	14	4	16
353	3	5	48
354	3	11	41
355	3	-	10
361	342	317	1310
362	32	27	354
363	2	9	38
364	7	16	39
365	16	15	64
366	69	93	288

nace3	No of firms in Bulgaria	No of firms in Slovenia	No of firms in Belgium
371	8	27	173
372	4	14	249
total	7560	6037	15526