E C O N O M I C S   B U L L E T I N

Is firm growth proportional? An appraisal of firm size distribution

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Abstract

The aim of this paper is to shed light on the phenomenon of firm growth, analyzing the evolution of young firms within some selected industries. We find that the firm size distribution is fairly skewed to the right during the infancy stage, whereas it converges towards a more symmetric distribution, via selection mechanisms, with the passing of time.

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1 - Introduction

Analysis of the size-growth relationship is a commonly used approach to the study of the evolution of market structure. In fact, the firm size distribution (FSD) has received considerable attention - since the seminal works of Herbert Simon and his co-authors between the late 1950s and the 1970s (cf. Simon and Bonini, 1958; and Ijiri and Simon, 1964, 1977) - in most theoretical and empirical studies dealing with the overall process of industry dynamics. The empirical evidence showed a FSD highly skewed to the right, meaning that the size distribution of firms is lognormal, both at the industry level and in the overall economy. This piece of evidence is coherent with the so-called Law of Proportionate Effect (or Gibrat's (1931) Law): as Simon and Bonini (1958) point out, if one "…incorporates the law of proportionate effect in the transition matrix of a stochastic process, […] then the resulting steady-state distribution of the process will be a highly skewed distribution". Recent evidence based on more complete data sets, suggests that Gibrat's Law is not confirmed, either for new-born or established firms (for a survey, cf. Geroski, 1995; Lotti *et al.*, 1999), since smaller firms grow more than proportionally with respect to larger ones. This decreasing relationship between size and growth suggests that the distribution of firm sizes is not stationary over time and may differ from the lognormal distribution. Gibrat's Law, applied to the analysis of market structure, represents the first attempt to explain in stochastic terms the systematically skewed pattern of the size distribution of firms within an industry (Sutton, 1997). In effect, the Law cannot be rejected if a) firm growth follows a random process and is independent from initial size, and b) the resulting distributions of firms' size are lognormal[1]. Although, from a theoretical viewpoint, labeled as "unrealistic" since Kalecki's (1945) study on the size distribution of factories in US manufacturing, this result was initially consistent with some empirical studies dealing with incumbent, large firms (Hart and Prais, 1956; Simon and Bonini, 1958; Hymer and Pashigian, 1962).

In this paper - using quarterly data for 12 cohorts of new manufacturing firms - we account for the evolution of the FSD over time in the case of young firms. The paper is organized as follows: section 2 contains a description of the data, in section 3 the methodology and some results are reported, while in section 4 some conclusions are made.

2 – The data

We look at the evolution of 12 cohorts of newborn firms in selected industries in order to analyze the process of convergence of the firm size distribution, in terms of number of employees, with respect to the overall industry landscape. The aim of this analysis is to show whether the findings by Herbert Simon and his co-authors concerning the Skewness to the right of the FSD are confirmed also in the case of newborn, small firms, and how does the FSD evolves over time and firms' age.

The data, provided by the Italian National Institute for Social Security (INPS), deal with 12 cohorts of new manufacturing firms (with at least one paid employee) born in each month of 1987, and their follow up until December 1992. Since all private Italian firms are compelled to pay national security contributions for their employees to INPS, the registration of a new firm as "active" signals an entry into the market, while the cancellation of a firm denotes an exit (this happens when a firm finally stops paying national security contributions)[2]. For accuracy, we carried out a cleaning procedure aimed at identifying internal inconsistencies and entry or exit due to firm transfers and acquisitions. As regards acquisitions, these are denoted as "extraordinary variations" in the INPS database, and firms involved in such activities can therefore be easily identified and cancelled from

[1] Of course, a FSD skewed to the right implies only that Gibrat's Law cannot be rejected. However, one cannot *a priori* exclude that the skewness is the result of *turbulence*, namely of the presence of new-born small firm in the right tail of the distribution.

[2] For administrative reasons - delays in payment, for instance, or uncertainty about the current status of the firm - some firms are classified as "suspended". In the present work we consider these suspended firms as exiting from the market at the moment of their transition from the status of "active" to that of "suspended", while firms which have stopped their activity only temporarily were included again in the sample once they turned back active.

the database itself. A correct identification of firms disappeared via acquisitions permitted to avoid acquiring firms to be drawn disproportionately from the low end of the size distribution. As pointed out by Sutton (1998; cf. also Hart and Prais, 1956; Hymer and Pashigian, 1962) this would have caused a violation in the proposed bound and altered the significance of the overall analysis.

We focus our analysis on four industries - Electrical & Electronic Engineering, Instruments, Food, and Footwear & Clothing - mainly for two main reasons: the first one concerns their very different market structure in terms of cost of entry (sunk costs), and the second the fact that the latter two industries are less technologically progressive than the former two ones.

To examine the effect of firms' age on the distribution of their sizes, we study each cohort at each quarter after start-up, and this for their first six years in the market. In Table 1 and in Table 2 some descriptive statistics are reported.

Tables 1 and 2 about here

In general, all industries experience a shakeout period during which the number of survivors, among new entrants, declines by 40 per cent or more. From Table 1 it turns out that, on average, the survival rate at the end of the period (i.e., after 21 quarters) is much higher within the cohorts belonging to the Electrical & Electronic Engineering and the Instruments industries, than it is the case with the Food and the Footwear & Clothing industries. Looking at Table 2, one immediately observes that - with the sole exception of the Food industry - the standard deviation of firm sizes is much higher at the end of the relevant period than in the first quarter. Dispersion of firm sizes tends therefore to widen as surviving firms reach the MES level of output and specialize in one of the many clusters of products which - according to John Sutton's (1998, pp. 597-605) "independent submarkets" hypothesis - characterize each industry. In turn, firm size increases along with its age for the Electrical & Electronic Engineering and the Instruments industries, but only for the first 13 and 12 quarters respectively, corresponding with a period comprised approximately between December 1989 and January 1991[3]. Afterwards, a decline in average firm size emerges, which is consistent with views of recessions (the period between 1991 and 1993 has been characterized in Italy by a significant slowdown in the GDP growth rates) as times of "cleansing" (cf. Boeri and Bellmann, 1995).

3 - Results

The basic idea of our work is to look if, with the passing of time, the empirical distribution of firm sizes converges towards a lognormal distribution, under the hypothesis that this represents the limit distribution. Accordingly, in order to test statistically the conformity of the logarithm of the empirical distribution to the normal distribution, we computed some tests of normality. First of all, we estimated the Skewness and Kurtosis statistics, which represent very good descriptive and inferential indexes for measuring normality. The Skewness and the Kurtosis indexes are the third and the fourth standardized moments of the distribution.
In particular, the literature refers to the Skewness index as:

$$\sqrt{b_1} = \frac{E(X-m)^3}{s^3}$$

and to the Kurtosis index as:

$$b_2 = \frac{E(X-m)^4}{s^4}$$

[3] In effect, since the 12 cohorts include firms born in each month of 1987, each column in Table 2 deals with all firms and all cohorts.

where m and s are the mean and the standard deviation of the distribution under exam. Since for a normal distribution they are equal to 0 and 3 respectively, a natural way to evaluate the nonnormality of a distribution is to look at the difference of such empirical moments from those values.

The Skewness index measures the degree of symmetry of a distribution: if $\sqrt{b_1} > 0$ it's skewed to the right, while $\sqrt{b_1} < 0$ corresponds to skewness to the left. Looking at Table 3, one can note that for three industries out of four (the only exception being the Footwear & Clothing one) the FSD tends to become more symmetric over time, with different patterns of convergence. But even after 21 quarters, the FSD in the Electrical & Electronic Engineering, the Instruments and the Food industries is still skewed to the right, while in the Footwear & Clothing industry, starting from a distribution skewed to the right, it turns out to be skewed to the left.

The Kurtosis index represents a measure of the curvature: distributions with $b_2 > 3$ show thicker tails than the normal distribution and tend to exhibit higher peaks in the center of the distribution, whereas distributions with $b_2 < 3$ tend to have lighter tails and to have broader peaks than the normal. For all industries (see Table 3), the Kurtosis index shows a convergence towards the normal distribution, although in the case of the Electrical & Electronics and the Instruments industries, at the end of the relevant period, it appears to be more concentrated around the mean than in that of the other two industries, for which it tends to be more spread.

Aimed at evaluating the pattern of convergence to a normal distribution, we computed also different tests for normality. First, we used a simple test based on the Skewness and Kurtosis indexes (D'Agostino *et al*. 1990), which allow to test statistically the null hypothesis $H_o : \sqrt{b_1} = 0$ and $H_o : b_2 = 3$. The results are reported, in terms of significance, in the first two lines of Table 3. In the third line the results from Kolmogorov-Smirnov[4] test are reported: we used this test to compare statistically the empirical distribution to the normal distribution. Subsequently, two *omnibus* tests were computed: the Shapiro-Wilk W test (Shapiro and Wilk, 1965) and the D'Agostino-Pearson K^2 (D'Agostino and Pearson, 1973). By *omnibus*, following D'Agostino *et al.* (1990) we mean a test that is able to detect deviations from normality due to either skewness or kurtosis.

The results suggest a strong departure from normality of the FSD for all industries during their infancy. With the passing of time and the effects of the mechanism of self-selection, the Electrical & Electronics and the Instruments industries show a certain degree of normality at the end of the relevant period, even if with different timings, while for the Food and the Footwear & Clothing industries no significant converge does emerge. The results therefore confirm, coherently with the normality tests, the different patterns of the evolution of the size distribution of firms in the various industries.

4 - Conclusions

In this paper we examine the firm size distribution and its evolution over time, for 12 cohorts of newborn firms. In general, the process of convergence towards the limit distribution appears to be just a matter of time, although, unfortunately, our data set allows us to follow the post-entry performance of these firms only for their first 6 years in the industry.

However, we take into account four industries very different from the point of view *a)* of the productive capacity required for entering the market at the MES level of output, and *b)* of their technological content and characteristics. Differences in industry-specific characteristics concerning the levels of sunk costs and the rate of entry allow for differences in the way a convergence towards a lognormal distribution does or does not arise. This Bayesian perspective helps to explain the different speed of convergence of the FSD to a lognormal distribution. In particular, it is consistent with our empirical finding that only in the most technologically advanced industries - in which

[4] We computed such test even if we are aware of its poor properties when testing for normality.

smaller entrants tend to invest in their capacity more gradually, after exploring their efficiency level with respect to their competitors - a convergence towards the lognormal distribution emerges with the passing of time. Conversely, in the most traditional industries the same tendency is less marked. Whether this is due to the fact that the selection and learning processes are much slower in the traditional consumer goods industries than it is the case with the technologically progressive ones could be detected only when and if new data will be forthcoming allowing a thorough analysis of the behavior on new-born firms in these industries beyond their 21st quarter in the market.

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Table 1 –Number of firms, for each quarter, all industries.

Elect.&Electr.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Cohort 1	128	125	121	120	117	113	112	109	108	107	106	105	104	103	102	102	97	95	93	92	90
Cohort 2	64	61	59	56	53	51	52	51	50	50	50	50	49	47	44	43	40	38	36	37	38
Cohort 3	72	68	65	62	60	61	61	61	57	55	53	53	53	51	51	48	48	48	48	47	43
Cohort 4	49	46	47	47	47	47	45	43	43	43	42	41	40	41	41	39	38	34	33	33	33
Cohort 5	59	53	53	52	53	50	50	47	46	48	46	44	44	43	41	40	37	37	35	34	34
Cohort 6	71	68	65	64	62	62	63	59	58	55	49	49	49	48	47	45	44	42	41	37	36
Cohort 7	41	41	41	41	39	38	38	37	37	36	34	30	30	29	28	27	27	27	25	24	23
Cohort 8	18	18	18	17	17	17	17	17	16	15	15	15	15	15	14	14	14	14	14	12	12
Cohort 9	72	67	63	63	64	62	60	58	58	57	57	57	55	56	52	52	53	52	50	50	49
Cohort 10	60	58	54	50	49	50	52	49	47	47	44	44	44	41	42	42	42	42	40	39	38
Cohort 11	57	53	55	53	53	51	51	51	50	48	46	46	43	42	40	41	39	38	39	39	39
Cohort 12	29	28	26	25	25	25	25	26	25	25	24	23	23	23	23	22	22	22	21	20	19
Total	720	686	667	650	639	627	626	608	595	586	566	557	549	539	525	515	501	489	475	464	454

Instruments	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Cohort 1	62	61	60	60	59	56	56	56	55	53	51	51	50	50	48	46	43	41	40	42	40
Cohort 2	38	37	35	36	35	35	34	34	34	33	32	29	28	27	27	27	26	24	24	25	25
Cohort 3	34	32	33	33	31	31	30	30	28	27	27	26	24	23	22	21	19	20	20	20	20
Cohort 4	26	26	25	24	23	23	20	19	19	18	18	17	17	17	17	16	17	17	17	17	17
Cohort 5	20	20	20	19	19	19	19	19	18	19	18	17	17	15	14	14	14	14	14	13	13
Cohort 6	33	33	32	31	28	28	28	27	27	25	24	23	21	21	21	21	21	21	21	17	19
Cohort 7	35	34	30	30	30	28	27	25	25	25	24	25	25	24	23	23	22	21	21	22	22
Cohort 8	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	7	7	7	6
Cohort 9	27	27	25	24	24	23	23	23	23	22	22	22	21	20	20	20	19	20	18	18	18
Cohort 10	32	30	28	26	26	27	25	24	23	24	22	21	21	20	19	18	18	18	18	17	17
Cohort 11	26	25	25	24	24	22	22	19	19	19	18	17	17	17	17	17	16	16	15	15	15
Cohort 12	18	18	17	16	15	14	14	14	14	14	14	13	13	12	11	11	11	11	11	11	10
Total	362	354	340	333	324	316	308	300	295	289	280	271	264	256	249	244	234	230	226	224	222

Food	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Cohort 1	93	88	88	83	78	76	73	72	70	70	68	67	65	63	61	59	58	56	57	55	54
Cohort 2	47	43	40	37	34	34	33	33	29	28	28	27	24	24	24	24	22	23	23	21	21
Cohort 3	46	43	42	39	40	37	37	34	34	33	30	27	26	27	25	21	21	23	23	19	19
Cohort 4	40	35	30	29	30	29	29	29	28	28	29	27	26	25	23	19	19	20	20	19	19
Cohort 5	41	38	35	33	34	35	34	32	29	28	27	27	25	24	23	22	22	21	21	21	19
Cohort 6	44	42	37	35	32	29	29	29	28	28	25	25	25	25	25	25	24	24	24	24	22
Cohort 7	46	35	35	34	38	35	33	33	35	30	30	27	25	24	24	23	22	21	22	22	21
Cohort 8	20	16	15	15	14	13	12	8	9	8	8	8	8	8	8	8	9	7	7	7	7
Cohort 9	30	27	22	19	20	19	18	17	18	19	17	18	16	17	15	15	14	15	14	13	13
Cohort 10	51	40	34	32	32	30	30	26	29	26	23	24	26	21	19	18	23	19	18	16	19
Cohort 11	110	65	53	47	72	49	42	40	67	40	32	31	40	33	31	30	57	38	30	28	43
Cohort 12	80	42	23	23	47	29	21	18	49	19	12	12	22	10	10	9	37	25	12	11	27
Total	684	514	454	426	471	415	391	371	425	357	329	320	328	301	288	273	328	292	271	256	284

Footw.& Cloth.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Cohort 1	164	159	158	156	145	143	136	132	129	126	121	120	113	112	110	110	103	100	98	95	93
Cohort 2	92	89	84	80	74	69	68	67	61	55	55	55	53	50	46	46	43	42	40	37	35
Cohort 3	85	79	76	73	71	65	62	60	59	56	51	50	48	45	45	41	40	40	38	38	37
Cohort 4	97	91	83	77	72	70	69	64	64	62	58	51	51	45	40	40	37	36	35	34	34
Cohort 5	100	93	86	83	83	79	78	74	74	70	68	66	67	65	59	55	55	48	40	49	45
Cohort 6	89	87	81	77	74	72	72	70	69	64	63	59	58	53	51	50	49	45	44	43	41
Cohort 7	88	80	73	69	69	65	63	60	57	55	54	55	53	52	48	44	43	43	42	41	41
Cohort 8	36	28	24	26	25	23	22	23	22	21	19	18	17	16	15	13	13	13	13	12	12
Cohort 9	97	95	87	84	78	75	70	68	67	63	65	63	60	59	57	56	55	55	52	51	49
Cohort 10	104	99	88	81	78	75	78	71	66	62	61	62	61	56	56	55	54	52	46	46	43
Cohort 11	96	93	86	78	75	68	63	61	61	57	54	51	49	47	43	41	40	40	38	37	34
Cohort 12	51	46	43	41	39	35	34	34	35	31	29	27	28	28	27	26	26	26	26	24	20
Total	1099	1039	969	925	883	839	815	784	764	722	698	677	658	628	597	577	558	540	522	506	484

Table 2 – Average Size, Standard Deviation, and Number of Firma Active at the end of each quarter, all industries.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Electrical & Electronic Eng.																					
Average Size	4.61	6.33	7.23	7.77	8.24	8.78	9.11	9.23	9.48	9.69	9.98	9.91	10.51	10.42	10.53	10.34	9.81	9.84	9.73	9.67	9.66
Standard Deviation	9.01	10.89	12.45	13.24	14.15	15.7	16.06	16.02	16.25	16.87	17.56	18.47	28.27	31.86	31.53	31.06	28.88	29.92	28.52	30.23	29.03
Number of ActiveFirms	720	686	667	650	639	627	626	608	595	586	566	557	549	539	525	515	501	489	475	464	454
Instruments																					
Average Size	3.37	4.66	6.02	7.31	7.9	8.2	8.63	9.14	9.36	9.37	9.43	9.72	9.59	7.91	8.01	8.15	8.05	7.97	8.07	9.68	9.85
Standard Deviation	7.77	11.03	15.77	20.97	25.21	25.98	27.29	29.02	29.39	29.83	29.67	30.47	29.97	17.79	17.72	17.85	17.62	17.47	18.05	36.59	37.3
Number of ActiveFirms	362	354	340	333	324	316	308	300	295	289	280	271	264	256	249	244	234	230	226	224	222
Food																					
Average Size	4.15	4.39	4.44	4.43	4.66	4.65	4.49	4.46	4.87	4.6	4.53	4.43	4.59	4.38	4.31	4.22	4.52	4.28	4.21	4.06	4.16
Standard Deviation	8.28	8.51	10.16	10.15	9.72	10.04	9.4	9.4	9.74	9.63	10.29	10.45	10.83	10.65	11.04	11.18	11.77	11.33	11.47	11.43	11.45
Number of ActiveFirms	684	514	454	426	471	415	391	371	425	357	329	320	328	301	288	273	328	292	271	256	284
Footwear & Clothing																					
Average Size	6.31	8.67	9.36	9.76	9.78	9.81	9.76	9.88	9.81	9.64	9.39	9.28	9.16	9.14	8.91	8.76	8.68	8.43	8.08	7.74	7.17
Standard Deviation	10.26	13.95	14.85	16.03	16.29	16.98	17.34	17.7	17.7	18.02	17.84	17.83	17.81	18.32	15.57	18.62	18.87	18.92	18.59	18.32	17.5
Number of ActiveFirms	1099	1039	969	925	883	839	815	784	764	722	698	677	658	628	597	577	558	540	522	506	484

Table 3 –Test for Normality for each quarter, all industries.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Electr. & Electronic Eng.																					
Skewness[a]	1.23***	0.68***	0.55***	0.44***	0.36***	0.34***	0.31***	0.26***	0.24**	0.25**	0.24**	0.27**	0.27**	0.24**	0.23**	0.19*	0.19*	0.16	0.13	0.07	0.11
Kurtosis[b]	3.86***	2.83***	2.78	2.66**	2.71*	2.76	2.79	2.86	2.90	2.92	3.03	3.02	3.30	3.31	3.29	3.23	3.09	3.15	3.11	3.14	3.12
Kolmogorov-Smirnov	0.26***	0.15***	0.11***	0.10***	0.08***	0.08***	0.07***	0.06***	0.06**	0.05**	0.05*	0.06**	0.04*	0.05*	0.05*	0.05*	0.05**	0.05*	0.04*	0.04	0.04
Shapiro-Wilk	0.95***	0.98***	0.98***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.98***	0.98***	0.98***	0.99***	0.99***	0.99**	0.99**	0.99***	0.99***
D'Agostino	*38.54****	37.02***	26.91***	20.41***	14.29***	12.13***	1.039***	7.20**	5.72*	6.31**	5.38*	6.59**	8.04**	6.89**	6.50**	4.65*	3.31	2.98	1.77	1.07	1.43
Instruments																					
Skewness[a]	1.85***	1.29***	1.12***	0.96***	0.96***	0.91***	0.83***	0.79***	0.75***	0.75***	0.70***	067***	0.61***	0.44***	0.40**	0.33**	0.32**	0.34**	0.30*	0.50***	0.47***
Kurtosis[b]	6.43***	4.60***	4.40***	4.04***	4.27***	4.09***	3.81**	3.75**	3.61*	3.61*	3.61*	3.60*	3.55*	2.98	2.93	2.89	2.84	2.85	2.80	3.50	3.44
Kolmogorov-Smirnov	0.33***	0.23***	0.18***	0.16***	0.12***	0.11***	0.11***	0.10***	0.10***	0.09***	0.08**	0.08**	0.08**	0.08**	0.07*	0.07*	0.07*	0.06	0.06	0.06	0.06
Shapiro-Wilk	0.90***	0.94***	0.95***	0.96***	0.96***	0.96***	0.96***	0.96***	0.97***	0.97***	0.97***	0.97***	0.97***	0.98***	0.98***	0.98***	0.98***	0.98***	0.98***	0.97***	0.98***
D'Agostino	65.44***	60.88***	48.89***	37.89***	38.55***	34.03***	27.73***	25.29***	22.17***	21.91***	19.59***	17.84***	15.09***	7.64**	6.28**	4.59	4.21	4.68*	3.81	10.05***	8.88**
Food																					
Skewness[a]	1.39***	0.83***	0.75***	0.69***	0.72***	0.56***	0.52***	0.49***	0.57***	0.40***	0.40***	0.41***	0.42***	0.37***	0.38***	0.39***	0.60***	0.46***	0.40***	0.42***	0.54***
Kurtosis[b]	4.49***	3.02	2.91	2.81	2.88	2.61*	2.50**	2.48***	2.57**	2.41***	2.39***	2.36***	2.33***	2.37***	2.39***	2.38***	2.68	2.52**	2.42**	2.35***	2.55*
Kolmogorov-Smirnov	0.26***	0.18***	0.17***	0.15***	0.15***	0.13***	0.13***	0.12***	0.12***	0.11***	0.12***	0.12***	0.12***	0.11***	0.13***	0.12***	0.12***	0.11***	0.11***	0.12***	0.12***
Shapiro-Wilk	0.94***	0.97***	0.97***	0.97***	0.97***	0.98***	0.97***	0.98***	0.97***	0.98***	0.98***	0.98***	0.97***	0.98***	0.97***	0.97***	0.97***	0.97***	0.98***	0.97***	0.97***
D'Agostino	43.52***	37.99***	28.82***	24.46***	28.41***	19.65***	19.39***	17.66***	21.26***	16.23***	15.81***	16.85***	18.44***	14.35***	13.20***	13.32***	16.62***	12.18***	11.92***	13.69***	13.89***
Footwear & Clothing																					
Skewness[a]	0.71***	0.31***	0.14*	0.07	0.05	0.00	-0.02	-0.04	-0.05	-0.05	-0.05	-0.09	-0.12	-0.15	-0.14	-0.12	-0.09	-0.11	-0.10	-0.13	-0.11
Kurtosis[b]	2.53***	2.23***	2.15***	2.28***	2.30***	2.33***	2.36***	2.40***	2.35***	2.44***	2.45***	2.43***	2.44***	2.51***	2.45***	2.45***	2.46***	2.46***	2.40***	2.38***	2.31***
Kolmogorov-Smirnov	0.20***	0.11***	0.10***	0.09***	0.08***	0.08***	0.08***	0.07***	0.07***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.07***	0.06***	0.07***	0.08***
Shapiro-Wilk	0.98***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.99***	0.98***	0.98***	0.99***	0.99***	0.99***	0.98***	0.98***	0.98***
D'Agostino	84.03***	72.09***	58.61***	43.27***	36.40***	29.53***	26.13***	21.22***	25.12***	16.04***	14.58***	16.29***	15.57***	11.74***	13.79***	13.24***	11.69***	11.74***	14.15***	15.51***	19.65***

***, **, * mean statistically significant at $\alpha = 0.01$, $\alpha = 0.05$ and $\alpha = 0.10$ respectively.
[a, b] = The values are the Skewness and Kurtosis indexes. We reported the significance level of the D'Agostino *et al.* Test.