

## SERVICE AND ITALIAN ECONOMIC GROWTH (1950-1971)

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### Abstract

The paper investigates the role of service sector in Italy during the “Golden Age” (1950-1971), to ascertain whether some branches of service grew more than others, driving the growth of the entire sector, and which was eventually the integration among them. Using time series techniques, it finds, firstly, that there is no branch of services driving the dynamics of the entire sector, but their evolution depends on a common external shock, the high rate of growth of the GDP per capita. Secondly, it finds that the selected service branches show quite few and weak links among themselves - at most 2 links, as shown by Business Services, Trade and Communication - confirming the existence of an “external”, common force driving all of them. Thirdly, it finds that all branches show a link with Transport and Communication, which therefore are “Granger caused” by all of other branches. This means that the expansion of the diffusion of mass production in manufacturing, especially in automobile industry, enlarged the demand for all services, which, on their turn, asked for more Transport and communication services.

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## Introduction

A growing body of historical literature copes with the evolution of service sector and its role in economic growth: a “disease” as in Baumol approach (Baumol, 1967) or a “dynamic engine” as, for example, in the new view of the “British climacteric” of the late Victorian Age (Broadberry, Crafts, 1992). The recent and positive consideration of service for economic growth builds essentially on the integration between services and manufacturing (Fixler, Siegel, 1999; Oulton, 1999). According to this view some services improve the productivity of manufacturing through a more intense integration with them, showing therefore a more rapid rate of innovation, growth and profitability. The aim of the paper is to investigate the role of service sector in Italy during the “Golden Age” (1950-1971), to ascertain if some branches of service grew more than others, driving the growth of the entire sector and which was the degree of integration among them.

### 1. Data set and method

We use a set of six service branches, aggregated according to Table A1. The data set figures (see appendix A), refer to capital value of business firms; in this we try to escape the problem of evaluating the market value of services, using data from firms operating in “markets”.

If we look firstly to the evolution of the series we note that the composition of the service sectors do not change very much, with financial service covering more than 70% on the entire period (table I). More interesting sounds, instead, the rate of growth (table II), where business service shows the higher rate of growth (20.13%) - despite the very low absolute level – with transport ( 18.28%) and communication (17.26%).

We investigate the matter by applying modern time - series methods. The basic idea of time series methods is that individual sectors output movements give information on the extent that either common or industry specific forces drive aggregate growth. These methods identify the extent to which common features are present in individual data and whether a single or small number of stochastic trends represent the data. The smaller the number of common stochastic trends (the greater the existence of cointegration) in disaggregated series, the more pervasive the effects of a wider productivity shock. On the contrary, if the effects of industry specific productivity shocks are localized, any industry shows distinct output trends.

An useful extension of the analysis to consider causal relationship among industries follows from the observation of common trends: if common forces drive the output of industry

groups, tests for causality across groups is useful to locate the sources of growth in particular industries.

Since the seminal work by Engle and Granger (1987) and after the contribution of Stock and Watson (1988), the discussion on common trends in disaggregate data focuses on non-stationary time series. They proved that non-stationary time series can be decomposed into stationary components (cointegrating vectors) and stochastic common trends; the stochastic common-trend components are the persistent forces, while the stationary components are transitory cycles. Hence, the permanent innovations can be associated with productivity-augmenting shocks, industry specific shocks, rather than generic technological progress.

Firstly we examine the series (Figure I), to discover the existence of linear trends in each sector; in the cases where data for a series appears to be trend stationary,  $I(0)$ , the results from the unit root test are reported (Table III). We use the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Test (Kwiatkowski, Phillips, Schmidt, Shin, 1992) to detect the existence of linear trends in the series, because it is the most robust amongst the unit root tests. For our six sectors the unit root test never fails to reject the null hypothesis of stationarity<sup>1</sup> : all sectors are integrated of order one,  $I(1)$ .

Since there are six non-stationary output series, at most five different stochastic trends drove overall capital growth of business firms in Italian services in the period 1951-1971. Thus, the forces driving the growth in Italy could be understood looking to the shifts in the stochastic trends in the six non-stationary series but not necessarily in all of them. The problem is to define exactly how many of these stochastic trends are common to more than one sector and which are, if they exist, the sectors that can be considered as the sources of growth among them. In other words, the central issue is how the possible sources of growth can be reduced on the basis of the existence of stochastic common trends among the non-stationary sectors.

To establish the number of common trends for the six sectors, we use the standard approach suggested by Engle and Granger (1987) and developed by Johansen (1988, 1991, 1995). Engle and Granger (1987) point out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are cointegrated. The stationary linear combination is called *cointegrating equation* and is interpreted as a long-run equilibrium relationship among the variables. If this combination exists, the corresponding parameter vector is called *cointegrating vector*.

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<sup>1</sup> The KPSS test differs from the standard tests (the Dickey-Fuller or the Phillips-Perron tests are the most used) in that the series is assumed to be trend stationary under the null hypothesis.

The aim of a cointegration test is to determine whether a group of non-stationary series are cointegrated or not and to indicate the number and the coefficients of all the possible cointegrating vectors. In particular, with  $n$  non-stationary variables and  $n-k$  significant cointegrating vectors, there will be  $k$  common trends. When a system reduces to a single stochastic common trend, a singular permanent force, driving disaggregate, capital has the same effect on each sector and the trend growth will be the same for all sectors<sup>2</sup> (Greasley, Oxley, 2000). By implication, the smaller the number of common stochastic trends, the greater the existence of cointegration, the more pervasive the effect of technological progress. Even if a system of sectors may have a single stochastic common trend, the response of each sector's aggregate capital trend to the same shock may be proportional.

As mentioned above, we use the Johansen procedure to discover the number of cointegrating vectors and, consequently, the number of common stochastic trends. The results (Table IV) state the existence of a single stochastic common trend for the six non-stationary series, suggesting that there is convergence. In particular, the Trace Statistics and the Maximum Eigenvalue Criterion suggest that cannot be rejected the existence of five cointegrating vectors (at 1%) . This means that there is no branch that drove the dynamics of the entire sector, the six non stationary time series show the same stochastic trend, due to a common external shock. We candidate for the role the exceptional rate of growth of GDP per capita during the period, which was based on the diffusion of the mass production technologies especially in Iron and Steel and in Automobile Industry. We show elsewhere, using the same approach, that these industrial branches drive the dynamics of the Italian industrial production in this period ( Giannetti, 2004).

## 2. Causality in Service Sectors

The previous section shows the existence of only a group of cointegrated sectors driving the overall services growth in Italy between 1951 and 1971. The group involves all the branches considered: Trade, Transport, Communication, Finance, Business Services and Social and Personal Services. Now the central issue is to verify whether particular industries within the cointegrated group defined above show causal linkages which spill across the common trend groupings. In fact cointegration and common trends provide an alternative explanation to the expenditure-based input-output approach to measure interrelations among sectors.

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<sup>2</sup> This correspond to Bernard and Durlauf's (1995) definition of long run convergence if the long term forecasts for the sectors are equal at a fixed time.

This point is crucial to answer to the question if specific branches drive the aggregate evolution by their integration with the others, as in the modern view of the dynamic role of “key” services.

Extension of the analysis to consider possible causal relationships among sectors growth follows from a discussion of common trends. To test the existence and the direction of causal relations we use the Granger- type causality tests. The Granger (1969) approach to the question of whether  $x$  causes  $y$  is to see how much of the current  $y$  can be explained by past values of  $y$  and then to see whether adding lagged values of  $x$  can improve the explanation of  $y$ :  $y$  is said to be Granger-caused by  $x$  if  $x$  helps in the prediction of  $y$ , or equivalently if the coefficients on the lagged  $x$ 's are statistically significant. It is important to note that the statement " $x$  Granger causes  $y$ " does not imply that  $y$  is the effect or the result of  $x$ . Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term (Greene, 2000). Various tests of Granger-type causality have been derived, in this work we run bivariate regressions of the form:

$$y_t = \alpha_0 + \sum_{i=1}^l \alpha_i y_{t-i} + \sum_{i=1}^l \beta_i x_{t-i} + \varepsilon_t,$$

$$x_t = \alpha_0 + \sum_{i=1}^l \alpha_i x_{t-i} + \sum_{i=1}^l \beta_i y_{t-i} + u_t, \forall (x, y)$$

The reported F-statistics are the Wald statistics for the joint hypothesis:

$$H_0 : \beta_0 = \beta_1 = \dots = \beta_l = 0$$

$$H_1 : \overline{H_0}$$

If the test does not reject the null hypothesis, this means that “ $x$  does not Granger Cause  $y$ ”<sup>3</sup>.

We consider all six series showing a common trend in the previous section; we run the bivariate regressions for all these sectors, to discover the existence of causal relations between them and among them and all the sectors<sup>4</sup>.

The results are shown in Table V. According to them, the sectors show quite few and weak links among themselves, at most 2 links, as shown by Business Services, Trade and Communication, confirming the existence of an “external”, common force driving all them, the aggregate GPD per capita growth, as we suggested above. If there are not branches which Granger cause the others, it is interesting to stress that all branches show a link with

<sup>3</sup> The number of significant lags,  $l$ , is chosen according the Akaike’s Information Criterion, augmented by extra lags depending on the order of integration of the series. The I(1) series are added by one extra lag to each variable in the equation.

<sup>4</sup> Notice that any causal link among the nonstationary sectors may be long term, since their output movements have permanent effects.

Transport and Communication, which therefore are Granger caused by all the others. This means that the expansion of the diffusion of mass production in manufacturing, especially in automobile industry, enlarged the demand for all services, which, on their turn, asked for more Transport and communication services.

### Conclusion

The aim of the paper is to investigate the role of service sector in Italy during the “Golden Age” (1950-1971), to ascertain if some branches of service grew more than others, driving the growth of the entire sector, and which was eventually the integration among them.

We find firstly that there is no branch of services driving the dynamics of the entire sector, but their evolution depends on a common external shock. We candidate for the role the exceptional rate of growth of GDP per capita during the period, which was based on the diffusion of the mass production technologies, especially in Iron and Steel and in Automobile Industry.

Secondly, we find that the sectors show quite few and weak links among themselves, at most 2 links, as shown by Business Services, Trade and Communication, confirming the existence of an “external”, common force driving all them, the aggregate GDP per capita growth. If there are not branches Granger causing the others, we find, thirdly, that all branches show a link with Transport and Communication, which therefore are Granger caused by all of them. This means that the expansion of the diffusion of mass production in manufacturing, especially in automobile industry, enlarged the demand for all services, which, on their turn, asked for more Transport and communication services.

## Tables and Graphs:

Figure I: Individual Sectors Series (1951-1971)

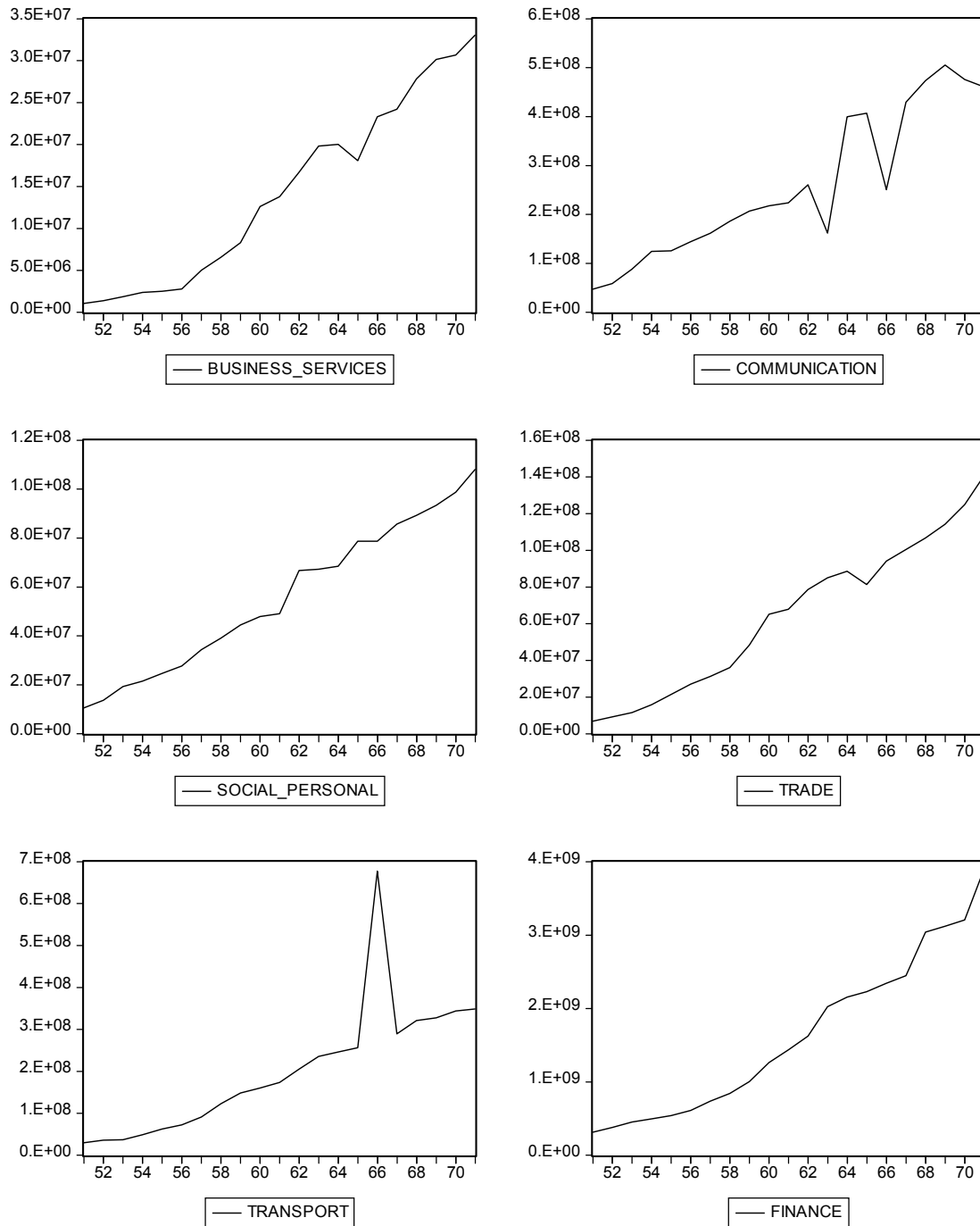


Table I: Sectors Weight (in percentage terms)

Year	Trade	Transports	Communication	Finance	Business Services	Social and Personal Services
1951	1,68	7,28	11,60	76,59	0,26	2,59
1952	1,85	7,23	11,83	76,05	0,28	2,76
1953	1,89	6,05	14,49	74,10	0,30	3,17
1954	2,24	6,89	17,54	69,96	0,34	3,03
1955	2,76	8,04	16,16	69,54	0,32	3,18
1956	3,05	8,20	16,29	69,01	0,31	3,12
1957	2,95	8,58	15,23	69,54	0,47	3,24
1958	2,93	9,95	15,07	68,35	0,53	3,17
1959	3,32	10,15	14,17	68,75	0,57	3,05
1960	3,69	9,07	12,32	71,49	0,71	2,71
1961	3,45	8,82	11,39	73,15	0,70	2,50
1962	3,50	9,13	11,57	72,10	0,74	2,97
1963	3,28	9,09	6,25	78,03	0,76	2,59
1964	2,98	8,27	13,42	72,36	0,67	2,30
1965	2,65	8,35	13,27	72,57	0,59	2,56
1966	2,72	19,52	7,23	67,59	0,67	2,27
1967	2,98	8,57	12,73	72,47	0,72	2,54
1968	2,63	7,91	11,67	74,90	0,69	2,20
1969	2,72	7,82	12,05	74,46	0,72	2,23
1970	2,92	8,04	11,12	74,91	0,72	2,31
1971	2,82	6,99	9,23	78,14	0,66	2,16

Table II: Sectors Rate of Growth

Year	Trade	Transports	Communication	Finance	Business Services	Social and Personal Services
1952	34,30	20,94	24,31	21,00	29,06	29,59
1953	24,90	2,48	49,93	19,30	33,84	40,68
1954	38,18	32,51	40,89	9,85	27,99	11,31
1955	34,66	27,97	1,01	8,97	5,66	14,91
1956	26,21	16,37	14,98	13,20	11,09	12,19
1957	15,75	25,22	11,91	20,64	79,41	24,02
1958	15,44	34,86	15,10	14,32	31,09	13,79
1959	34,11	20,65	11,13	18,92	26,60	13,72
1960	34,59	8,24	5,34	25,96	51,86	7,89
1961	4,09	8,09	2,76	13,78	9,28	2,33
1962	15,95	18,49	16,32	12,85	21,20	36,11
1963	7,99	14,80	-37,77	24,72	18,68	0,70
1964	4,28	4,42	146,56	6,45	1,02	1,78
1965	-8,20	4,11	1,92	3,36	-9,65	14,91
1966	15,82	164,15	-38,39	5,27	28,86	0,05
1967	6,62	-57,29	71,23	4,34	3,86	8,92
1968	6,34	11,07	10,27	24,30	14,91	4,13
1969	6,93	2,06	6,65	2,64	8,30	4,58
1970	9,38	4,94	-5,81	2,74	1,74	5,76
1971	12,66	1,43	-3,17	21,66	7,82	9,36
Mean	17,00	18,28	17,26	13,71	20,13	12,84

Table III: KPSS Unit Root Test

Sectors	Levels	1st Difference
Trade	0,63	0,22
Transport	0,57	0,40
Communication	0,61	0,20
Finance	0,63	0,26
Business Services	0,62	0,27
Social and Personal Services	0,64	0,43

Spectral Estimation Method: Parzen Kernel, Andrews Bandwidth;  
Trend and Intercept. Asymptotic Critical Values: 1%: 0,739; 5%:  
0,463; 10%: 0,347. \*: Spectral Estimation Method: Parzen Kernel,  
Andrews Bandwidth; Intercept. Asymptotic Critical Values: 1%:  
0,739; 5%: 0,463; 10%: 0,347

Table IV: Cointegration Test (Johansen, 1987): All Sectors

Hypothesized No. of CE(s)	Trace Stat. <sup>5</sup>	Max Eigenvalue stat.
None	270,72**	113,72**
At most 1	156,99**	57,37**
At most 2	99,62**	42,94**
At most 3	56,68**	34,51**
At most 4	22,17**	19,19**
At most 5	2,97	2,97

Table V: Granger Causality

Var 1	Var 2	1 does not G. cause 2 (p-value) <sup>6</sup>	2 does not G. cause 1 (p-value)
Trade	Transport	0,01**	0,97
	Communication	0,03*	0,02*
	Finance	0,11	0,75
	Business Services	0,22	0,71
	Social and Personal Services	0,07	0,26
Transport	Trade	0,97	0,01**
	Communication	0,03*	0,03*
	Finance	0,11	0,09
	Business Services	0,57	0,01**
	Social and Personal Services	0,98	0,02*
Communication	Trade	0,02*	0,03*
	Transport	0,03*	0,03*
	Finance	0,90	0,000**
	Business Services	0,20	0,003**
	Social and Personal Services	0,66	0,000**
Finance	Trade	0,75	0,11
	Transport	0,09	0,10
	Communication	0,000**	0,90
	Business Services	0,92	0,07
	Social and Personal Services	0,52	0,14
Business Services	Trade	0,71	0,22
	Transport	0,01**	0,58
	Communication	0,003**	0,20
	Finance	0,08	0,92
	Social and Personal Services	0,39	0,008**
Social and Personal Services	Trade	0,26	0,02*
	Transport	0,02*	0,98
	Communication	0,000**	0,66
	Finance	0,13	0,52

<sup>5</sup> \*: significant at 5% level, \*\*: significant at 1% level<sup>6</sup> \*: 5% significance level; \*\*: 1% significance level

Business Services	0,008**	0,39
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Detrended Series:

Figure II: Trend Growth in aggregate Capital 1951-1971 (source: Hodrick-Prescott Filter Representation)

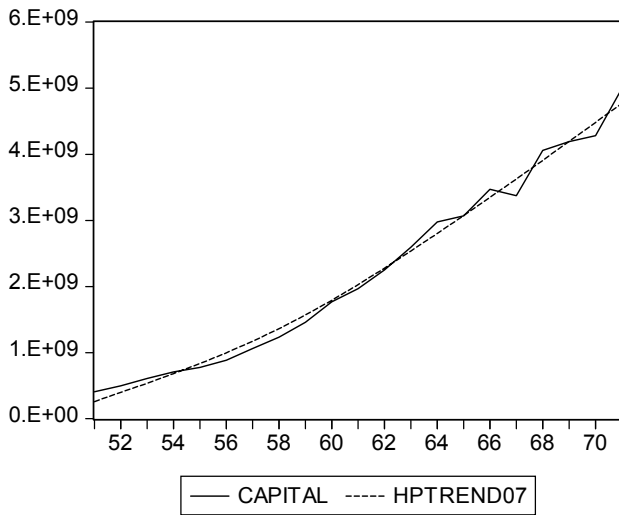
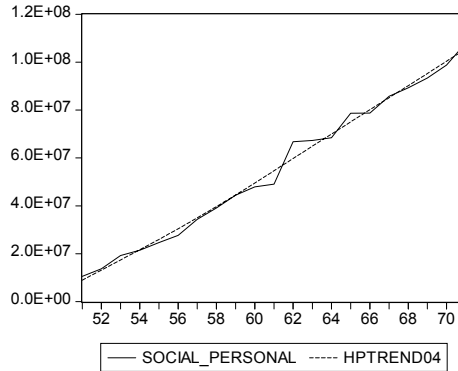
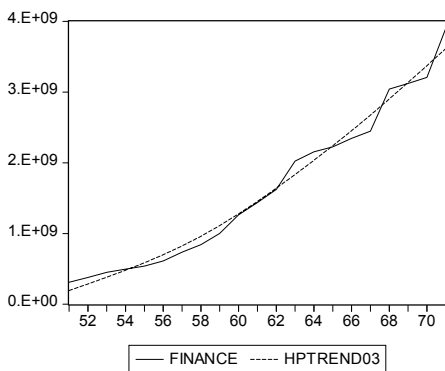
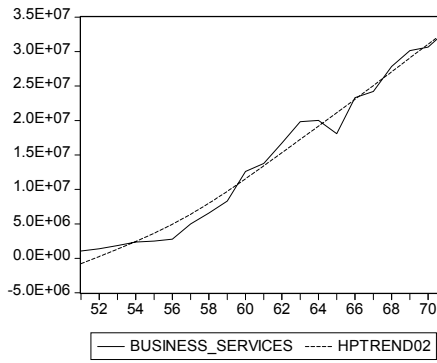
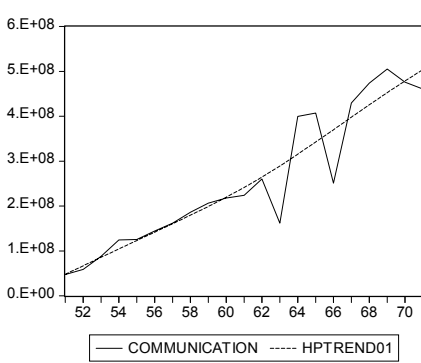
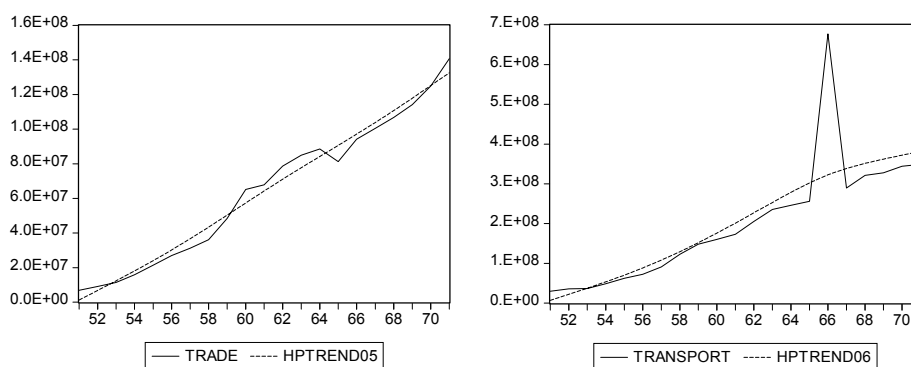


Figure III: Trend in disaggregate sector series 1951-1971 (source: Hodrick-Prescott Filter Representation)





## Appendix A

The series utilised in the paper derive from several volumes published since 1906 and up to 1925 by Credito Italiano, and then since 1928 to 1973 by the *Associazione fra le Società Italiane Per Azioni* [ASIPA]. The volumes of *Notizie statistiche* include all the joint-stock companies quoted on one of the Italian stock markets, together with all those companies located in Italy which, at the closing of the last balance sheet, had a corporate capital greater than a pre-established threshold, variable from year to year<sup>7</sup>.

The IMITA.db relational database [IMprese ITALiane. Data Base] is made up of all the information supplied by the volumes of *Notizie Statistiche*, regrouping it according to mining, manufacturing; public utilities and Services. It includes:

1. company register [COMPANY archive] according to benchmark year [1911, 1913, 1921, 1927, 1936, 1952, 1960, 1972]<sup>8</sup>, which includes a series of information relative to firms: year of foundation; sector of activity<sup>9</sup>, location; company capital and paid-up capital. In obtaining the information from the brief “company profiles” reported by the source, each company is assigned an identification code which makes it possible to reconstruct the company’s continuity even in the case of changes in the firm’s name;

<sup>7</sup> The threshold was equal to 1 million Lire until 1940, with the sole exception of 1913 when it amounted to 500,000 Lire. In 1953 the threshold was raised to 10 million Lire; it rose to 25 million in 1956 and to 50 million in 1962, to then reach 100 million Lire starting in 1964 and up to 1973. Until 1936, several companies were also included which, although they did not reach the pre-established threshold, were associated with ASIPA. Furthermore, up until 1936, instead, Italian companies with head offices abroad were also included in the source, but were excluded from the archives.

<sup>8</sup> The years of reference are those for which the information is reported in the source, and do not always correspond either to the year of publication of the volume or to the title indicated.

<sup>9</sup> The sectors of activity have been standardised on the basis of the Istat ATECO 91 classification [1991] according to section, sub-section, division and group.

2. composition of the boards of directors and boards of auditors [DIRECTORS archive] according to benchmark year [1911, 1913, 1921, 1927, 1936, 1952, 1960, 1972]. In addition to the indication of the name and address, this archive contains the status and the office held within the Boards of Directors;
3. balance sheets [BALANCE SHEETS archive], which cover all the years between 1900 and 1971<sup>10</sup>, reporting for all the companies contained in the COMPANIES archive – in addition to the companies not present during the benchmark years<sup>11</sup> - the following balance sheet items: company capital; tangible assets; inventory and commodities; securities and share-holdings; cash and accounts receivable; bonds; miscellaneous liabilities; depreciation funds; reserves; profits/losses; overall dividends; various appropriations.

As regards companies classified in Services, the data set is complete relative to the first two filing units, while the information relative to balance sheets is completed between 1950 and 1971, which are used here.

Table A1: Reclassification of Italian Service

Service	Original ATECO 91 Service classification ( 2 digit)
Trade	50 Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
	51 Wholesale trade and commission trade, except of motor vehicles and motorcycles
	52 Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
Transport	60 Land transport; transport via pipelines
	61 Water transport
	62 Air transport
	63 Supporting and auxiliary transport activities; activities of travel agencies
Communication	64 Post and telecommunications
Finance	65 Financial intermediation, except insurance and pension funding
	66 Insurance and pension funding, except compulsory social security
Business Service	67 Activities auxiliary to financial intermediation
	71 Renting of machinery and equipment without operator and of personal and household goods
	72 Computer and related activities
	73 Research and development
Social and personal services	74 Other business activities
	80 Education
	55 Hotels and restaurants
	85 Health and social work
	90 Sewage and refuse disposal, sanitation and similar activities
	91 Activities of membership organization n.e.c.
	92 Recreational, cultural and sporting activities
93 Other service activities	
	95 Private households with employed persons
	99 Extra-territorial organizations and bodies

<sup>10</sup> For the years 1940 to 1945, the number of balance sheets was very limited. For this reason, these years were excluded from the analysis. The balance sheets relative to 1972 were also excluded, because they were incomplete.

<sup>11</sup> These are all companies which, as they were founded and ceased activity over the lapse of years between two benchmark years, did not therefore appear in the relative volumes.

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